ILLEGAL LOGGING, FISHING, AND WILDLIFE TRADE:
THE COSTS AND HOW TO COMBAT IT

WORLD BANK GROUP

GLOBAL WILDLIFE PROGRAM

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Authors Note
Systematic data collection and additional research is needed to better understand all implications of illegal fishing, logging and wildlife trade. These activities are examples of renewable natural resource crimes. These are large-scale, involve organized crime, and should be treated as a serious crime and not small-scale localized activity not linked to transnational networks. International human rights, agreements, and national laws guide enforcement action, which should be proportionate and well-targeted. Design and implementation of national solutions should be guided by detailed assessments that incorporate environmental and social impacts, including direct and indirect impacts on communities, and opportunities to promote legal alternative livelihoods.

Main
Messages

» Illegal logging, fishing and wildlife trade deplete the world's natural resources, deprive nations of needed revenues, and undermine key ecosystem services such as carbon storage, biodiversity conservation, and water filtration.

» This illegal trade undermines international and local commitments to sustainable development, biodiversity conservation and climate change mitigation and adaptation.

» Illegal logging, fishing and wildlife trade have an estimated value of $1 trillion[1] or more per year. Most of the economic losses (more than 90 percent) comes from estimated ecosystem services that are not currently priced by the market.

» The inability of current markets to value crucial ecosystem services is a major policy dilemma facing global biodiversity conservation efforts including initiatives to combat illegal logging, fishing and wildlife trade.

» Governments in source countries forego an estimated $7-12 billion each year in potential fiscal revenues that aren't collected due to illegal logging, fishing, and, in some instances, wildlife trade. This shortfall in revenues hinders economic growth in source countries and increases development risks and vulnerabilities beyond national borders.

» Systematic corruption and weak governance across the public and private sectors enable illegal logging, fishing and wildlife trade.

» Without greater investments and coordinated action at the local, national, and global levels, the plundering of natural resources will undermine economic growth and social stability in poorer countries.

» International criminal organizations exploit low-risk, high-reward opportunities to conduct the multibillion-dollar illegal trade that is comparable in economic value and global scope to human and drug trafficking.

» Despite important targeted efforts already underway, initiatives to combat the illegal activities pale in comparison to efforts against other transnational crimes.

» Strong political commitment at the highest levels of government in source, transit, and demand countries is required to combat criminal activities, scale back corruption, take on powerful special interests, and change the incentives and behaviors that drive demand and supply for illegally traded wildlife, forest products, and fisheries.

» Effectively addressing illegal logging, fishing and wildlife trade requires policies and actions to strengthen governance, leverage risk-based financial and customs tools, and establish a legal and fiscal environment that bolsters private-sector investments and the use of certifiable trade mechanisms to promote sustainable livelihoods.

» Governments in source countries need to capture financial benefits from global ecosystem services such as carbon storage and biodiversity conservation, and promote legal and sustainable logging, fishing and wildlife trade to improve local livelihoods and increase their fiscal revenues.

Definitions

For the purposes of this paper, the following definitions are used:

Ecosystem services and natural capital losses are difficult to estimate due to insufficient data and established methodologies. Data and detailed analysis on illegal logging, fishing, and wildlife activities have not been systematically tracked and reported on at a global level. Existing estimates of illegal markets mostly focus on income and lost revenues, rather than estimating its full economic value. The estimates presented in this paper have a broader scope (larger than other estimates previously produced on the value of global illegal markets). To better understand the full impact illegal logging, fishing, and wildlife activities have on sustainable development, concepts and methodologies applied in natural capital accounting and used to estimate a nation's wealth rather than simply their GDP was used (see World Bank – The Changing Wealth of Nations 2018). Estimation of ecosystem services losses allows for a more complete understanding of the rough order of magnitude of illegal logging, fishing, and wildlife activities.

Illegal Logging (EU Forest Law Enforcement, Governance and Trade (FLEGT) Facility 2019): The harvesting, processing, transporting, buying or selling of timber in contravention of national and international laws. For example, illegal logging in a protected area and trade of that timber product is an example of an activity considered in the calculation of economic losses estimated in this paper. Evaded taxes and royalties on logging done illegally (without the proper licences/permits) but which could otherwise have been legally sanctioned is an example of activities considered in the financial calculations.

Illegal Fishing Encompasses illegal, unreported, and unregulated (IUU) fishing, (FAO 2019): Illegal fishing is conducted by national or foreign vessels in waters under the jurisdiction of a state, without the permission of that state, or in contravention of its laws and regulations; conducted by vessels flying the flag of states that are parties to a relevant regional fisheries management organization but operate in contravention of the conservation and management measures adopted by that organization and by which the states are bound, or relevant provisions of the applicable international law; or in violation of national laws or international obligations, including those undertaken by cooperating states to a relevant regional fisheries management organization. Unreported fishing includes activities that (a) have not been reported, or have been misreported, to the relevant national authority, in contravention of national laws and regulations; or (b) are undertaken in the

area of competence of a relevant regional fisheries management organization and have not been reported or have been misreported, in contravention of the reporting procedures of that organization. Unregulated fishing: in the area of application of a relevant regional fisheries management organization that is conducted by vessels without nationality, or by those flying the flag of a state not party to that organization, or by a fishing entity, in a manner that is not consistent with or contravenes the conservation and management measures of that organization; or in areas or for fish stocks in relation to which there are no applicable conservation or management measures and where such fishing activities are conducted in a manner inconsistent with state responsibilities for the conservation of living marine resources under international law. For the purposes of this paper, illegal fishing is estimated based on impact of illegal fishing to coral reefs and their ecosystem services provided for coastal protection, tourism and recreation, biodiversity, and fisheries (Cesar et al. 2003).

Illegal wildlife trade (IWT) "Wildlife" means all fauna and flora. "Fauna" are animals and birds, such as tigers and falcons, but also include fish. "Flora" are plants, such as orchids or cacti, but also include timber and non-timber forest products. IWT is a crime, which refers to acts committed contrary to national laws and regulations intended to protect natural resources and to administer their management and use (CITES 2019). The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) prohibits trade of species threatened with extinction (Appendix 1 listed species) and controls trade in species that are not necessarily threatened with extinction but whose survival could be threatened by international commercial trade (Appendix 2 listed species). International trade is illegal for all species listed on CITES Appendix 1. For the purposes of this paper, the economic valuation of IWT only considered the loss of elephants. For species under CITES Appendix II, it was assumed that 25 percent of the market is illegal based on Van Uhm's estimate. This is due to lack of reliable data and established methodologies that allow for comparison across species and geographies. Still, calculation of the economic losses for elephants can serve as a reference point for the wildlife sector.

I. Rationale

1. **More needs to be done, and more effectively.** This paper has two goals -- to motivate policy makers in developed and emerging economies to pay more attention to illegal logging, fishing and wildlife trade, and to provide a road map to address the root causes of the illegal activities.

2. **"Nature and its vital contributions to people, which together embody biodiversity and ecosystem functions and services, are deteriorating worldwide."** This is the stark conclusion of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) in its May 2019 report (IPBES 2019), which found that worsening trends over the last 50 years threaten the world's ability to meet climate change, sustainable development and biodiversity goals.

3. **Ecosystem functions and services are critical for poverty reduction, climate mitigation and adaptation, and other vital aspects of sustainable development, especially in low-income countries where livelihoods disproportionately depend on natural capital.** Forests provide valuable ecosystem services such as prevention of the degradation of watersheds and land erosion, while increasing both water quality and quantity and absorbing carbon emissions. Sound management in the fisheries sector prevents illegal depletion of fish stocks and destruction of coral reefs. Illegal wildlife trade directly causes declines in species population, resulting in the deterioration of ecosystem functions. For example, the IPBES report concluded that 75 percent of food crops and nearly 90 percent of wild flowering plants depend at least to some extent on animal pollination (IPBES 2019), a key ecosystem service.

4. **Illegal logging, fishing, and wildlife trade are significant contributors to the observed loss of terrestrial and marine ecosystems.** Illegal activities involve trade of species threatened with extinction, including many keystone species. It also covers a range of mammals, such as pangolins (considered the world's most trafficked mammal), and wood products such as rosewood, and marine mammals such as the vaquita[2] found in the Sea of

Cortez in Mexico. In source countries, illegal activities can include unauthorized deforestation and fishing that depletes valuable resources for local communities, corruption to facilitate transport of illegally harvested resources, avoidance of any taxes or other regulatory mechanisms, and other criminal pursuits often ignored or unnoticed, and therefore unpunished.

5. **While much of the criminal activity involves international organized crime, another contributing factor is corruption across the public and private sectors.** Combating corruption related to natural resources requires urgent attention and is the focus of work underway by the G20 (G20 2017); OECD, including studies on effects of trade in counterfeit goods (OECD 2019) and anti-corruption (OECD 2018); UNODC's Integrity Guide (UNODC 2019); and the USAID-funded Targeting Natural Resource Corruption (TNRC) consortium (WWF 2019).

6. **The public, political and policy attention given to illegal logging, fishing, and wildlife activity pales in comparison to other forms of Illegal transnational crimes, such as drugs or human trafficking.** An estimated $100 billion is spent globally each year (Count the Costs 2012) to combat the illegal drug trade, equivalent to about 19 percent of its total market value[3], with the US government alone spending more than $30 billion annually (US GAO 2019). By comparison, a World Bank study found that from 2010 to 2018, 24 multilateral, bilateral and philanthropic international donors collectively committed $2.4 billion[4] to combat illegal wildlife trade in 67 African and Asian countries, equivalent to $261 million a year (World Bank 2019). Despite notable successes in the fight against illegal wildlife trade, global attention and resources appear insufficient to successfully combat the broader criminal activities in natural resources trade that include illegal logging and fishing.

PHOTO BY JOEL HERZOG

II. Illegal Logging, Fishing, & Wildlife Trade: Why Act?

7. **Illegal logging, fishing, and wildlife trade activity is a global concern that impacts source, transit, and consumer countries.** It is among the most profitable forms of transnational crime (UNEP/UNICRI 2018), with low-income countries (LICs) the most affected. LICs are dependent on natural resources, including timber and fish, as a source of revenue and development opportunities, and often lack effective governance and law enforcement to manage these assets. Many governments (or at least key agencies involved in national risk management/law enforcement) are not aware of the magnitude of this transnational crime and the damage it causes to local communities, national economies, society, and the environment. Table 1 presents estimates of the financial (market value) of illegal trade in logging, fishing, and wildlife, and two other transnational crimes—drugs and human trafficking (for definitions of these transnational crimes see UNODC 2018). Although there are limited data available and established methodologies to estimate various illegal markets, Table 1 presents an UNEP/INTERPOL source that is often quoted (it is presented in this paper only for comparison purposes). These estimates are provided to highlight the relative magnitude of these transnational organized crimes. The negative impact to society from illegal drugs and human trafficking is well documented and has received systematic attention in recent decades, while illegal trade of renewable natural resources gets less attention and fewer resources. As this paper argues, these activities pose a large and growing challenge that can also be an opportunity for governments to take coordinated action and invest to protect natural assets that are essential to meet national and global sustainable development goals.

The estimated market or financial values shown in Table 1 are just the tip of the iceberg. Illegal trade in renewable natural resources has many more financial, economic, social, and political impacts that are not captured in the Table 1 financial figures. Some of these impacts are presented in Table 2.

Table 1: Recent Estimates of Selected Transnational Crime Value

Crime	UNEP–Interpol 2014	UNEP–Interpol 2016	GFI 2017
Estimated Annual Value $ (Billions)			
Illegal Logging	30 — 100	51 — 152	52 — 157
Illegal Fishing	11 — 30	11 — 24	16 — 36
Illegal Wildlife Trade	7 — 23	7 — 23	5 — 23
Subtotal	**48 — 153**	**69 — 199**	**73 — 216**
Drugs		344	426 — 652
Human Trafficking		157	150

Table 2: At Risk Capital Due to Illegal Trade in Renewable Natural Resources

Financial Capital	Natural Capital (Ecosystem Services)	Social Capital	Political Capital
» Government Revenue » Evasion (Tax, Non-tax, fees) » Economy (Size, productivity, profitability) » Investments » Macro/fiscal (Trade balance/ payments)	» Forests (Flood retention, water, pollination, soil erosion, carbon, wildlife reduction) » Fishing (Bycatch reduction) » Wildlife (Biodiversity)	» Jobs and livelihoods » Crime and conflict » Health (Morbidity, mortality)	» Governance (Corruption, land rights) » Reputation » Social Investments

8. **Social and political capital at risk includes jobs and livelihoods, crime and conflict, health, and governance.** Health capital risks may include transmission of diseases, such as consumption of toxins in wildlife that could result in kidney disease, liver cancer, and developmental effects in fetuses and children (Aguirre 2009). Crime and conflict associated with illegal natural resource trade includes both interpersonal conflict such as physical assault and intergroup conflict, including political instability. For example, a country's failure to protect a community's rights to forests threatens the rights and livelihoods of local residents, leading to conflict. Insecure land tenure in many countries causes disputes over customary rights of forest ownership and access. The illegal wildlife trade in some countries is run by local insurgent groups and may support terrorist organizations that use the trade to finance their operations, while wildlife conservation often results in violent conflicts between park rangers and poachers (Brashares et al. 2014). Criminal networks frequently operate more freely with the tacit or active collaboration of officials who are meant to regulate natural resources, enforce regulations, and/or investigate and prosecute illegal acts. As highlighted by the recent OECD report "Strengthening Governance and Reducing Corruption Risks to Tackle Illegal Wildlife Trade: Lessons from East and Southern Africa," the failure to reduce corruption makes addressing illegal wildlife trade a significant challenge (OECD 2018).[5]

9. **Financial capital** includes foregone government revenues such as lost taxes, licensing fees or royalties, particularly for fishing and logging. The use of tax havens or transfer pricing by companies in the fishing and forest sectors are common practices to reduce tax bills, increasing the potential financial losses. Recent estimates suggest that 70 percent of fishing vessels implicated in illegal catches were registered at some point in a tax haven (Galaz 2018). In some cases, payments for illegal activities are made directly to overseas accounts by a foreign entity, and never enter the formal national financial systems. In addition, the laundering of illegal revenues can undermine the integrity and stability of financial systems in local countries.

10. **Natural capital and ecosystem services** are derived from a country's natural resources, and are categorized as provisioning, regulating and cultural.

   A. **Provisioning services** correspond to goods provided by forests such as timber (e.g., logs) and non-timber products (e.g., mushrooms, fruits, or nuts) that typically have a market or financial value. Fish also have a market value. Many species of plants, fish and animals are protected under domestic laws and the Convention on International Trade in Endangered Species of Wild

B. **Regulating services** correspond to those with an economic value for society but no corresponding market price or value. These include water filtration, carbon sequestration, climate regulation, pollination services, and soil retention. For example, more than three-quarters of the world's food crops rely in part on pollination by insects and other animals, and $577 billion worth of annual global food production relies directly on pollinators (FAO 2016), but no market value exists for the pollination process. The estimated value of regulating services for illegally traded timber, fish or wildlife is captured in Table 3.

C. **Cultural services** involve aesthetic or spiritual values that typically are not priced by markets. However, they often provide the basis for nature-based or wildlife-based tourism.

11. **The overall health of ecosystems is impacted by illegal activities.** Deforestation destroys the aesthetic and natural value of forests and increases climate change through emissions of greenhouse gases when trees are cleared or burned, as recently observed in several key tropical forest basins. Illegal fishing reduces fish populations and causes environmental damage, especially when vessels use prohibited gear such as driftnets, which catch non-target species (e.g., sharks, turtles, or dolphins). Wildlife contributes to the health of ecosystems, which makes its conservation crucial. For example, forest elephants contribute to the health of tropical forests, and the diversity of fish populations contributes to the overall health of marine ecosystems.

12. Illegal activities in the wildlife sector directly cause a decline in species population and can spread diseases and invasive species when live animals are moved across international borders, resulting in the deterioration of ecosystem functions and services of both global and local importance.

13. Regulating and cultural services are being lost, permanently, because of illegal activities in the trade of renewable natural resources. The economic value of these regulating and provisioning services are not accounted for in the financial figures shown in Table 1. The estimates highlight the magnitude of the problem; however, they do not provide precise and definitive figures.

14. Based on methodology described in Annex 1, coral reef loss due to illegal fishing has an estimated yearly ecosystem service value of $17 million, most likely an underestimate. The yearly ecosystem service value associated with illegal wildlife trade is estimated at $15 million, also likely an underestimate, and the service value of

trade in illegal logging is estimated at almost $1 trillion or more – mostly due to the loss of carbon sequestration under the assumption that it is permanent.[6,7,8]

15. Combining financial and economic values, **Illegal logging, fishing, and wildlife trade has an estimated full global economic value of about $1 trillion to $2 trillion per year** (Table 3). More than 90 percent comes from the estimated value of ecosystem, regulating and cultural services that are not priced by the market. It is double or more the global risks of counterfeiting and piracy, which are estimated at $509 billion, or 3.3 percent of world trade in 2016 (OECD 2019).[9]

16. This market failure -- the inability of current market conditions to capture and account for the value of these regulating and cultural ecosystem services -- is one of the major drivers and policy dilemmas behind the observed depletion of ecosystem services worldwide (IPBES 2019). There are other man-made drivers, such as fiscal instruments in the form of subsidies or tax advantages, and inadequate tenure security to customary custodians such as indigenous peoples that results in land-use changes for the benefit of few at the expense of ecosystem services that benefit many.

Table 3: Economic Values of Illegal Trade of Renewable Natural Resources ($ billions/year)

Renewable Natural Resources Sector Values	Lower Estimate	Upper Estimate
1. Financial or Market Value (Provisioning Services)	**48**	**216**
A. Illegal Logging	30	157
B. Illegal Fishing	11	36
C. Illegal Wildlife	7	23
2. Economic Value of Regulating & Cultural Ecosystem Services	**839**	**1,737**
A. Illegal Logging (incl. carbon seq.)	838	1,736
B. Illegal Fishing	<1	<1
C. Illegal Wildlife Trade	<1	<1
Full Economic Value	**887**	**1,953**

Source countries, many of them low- or lower-middle-income, lose financial rents extracted from trade in renewable natural resources, potential fiscal revenues, the depletion of natural assets, and the permanent loss of ecosystem services and functions.

17. **Revenues from illegal trade in renewable natural resources are lost, accruing in informal or underground economies instead of in the formal economy.** Much of the revenue is captured by powerful individuals and networks in source countries and by organized crime networks in demand, transit, or tax-haven countries. Much of the revenues accrued from illegal trade are consumed or invested in non-productive activities outside source countries. In some instances, revenues may be laundered through complicated off-shore transactions and then returned to source countries through cash acquisitions of real estate, vehicles or other luxury goods. Natural assets or capital are therefore depleted without reinvestment in other forms of assets – such as human capital or manufactured capital -- that would help provide a basis for future national development.

Table 4: Tax Revenue Forgone (Financial Losses), Estimates by Sector Per Year

Illegal Natural Resources Sector	Lower Estimate		Upper Estimate	
	$, Billions	%	$, Billions	%
1. Illegal Logging	6	91	9	78
2. Illegal Fishing	<1	5	2	19
3. IWT (Direct)	<1	5	<1	3
4. IWT (Indirect)	<1	0	<1	0
Total Tax Revenue Forgone (Financial Losses)	**7**	**100**	**12**	**100**

Source: Original estimates calculated by authors.

18. **Governments lose $7 billion-to-$12 billion per year in potential fiscal revenues** from illegal logging, fishing and wildlife trade (Table 4). These foregone taxes represent opportunity costs for governments if efforts to reduce the illegal activities cost less than the amount ultimately collected.[10] For instance, the foregone tax revenue for illegal logging could be as high as 25 percent in the Solomon Islands. The detailed calculations and country results are presented in Annex 1.

19. **The depletion of natural assets and the permanent loss of ecosystem services and functions in source countries impact the poorest populations and undermine future development opportunities.** In addition, nature and healthy ecosystems are a vital element in mitigating climate and environmental risks, and

"The General Assembly encourages Member States to make use, to the greatest extent possible, of legal instruments available at the national level to tackle illicit trafficking in wildlife, including through legislation related to money-laundering, corruption, fraud, racketeering and financial crime."

— THE UN GENERAL ASSEMBLY, SESSION 71

III. Illegal Logging, Fishing, & Wildlife Activities:
Act, but How?

20. For all practical purposes, **combating illegal logging, fishing and wildlife trade is a governance issue that first and foremost requires high-level political commitment at the national and international levels.** Solutions are known, diagnostic and assessment tools are available, expertise exists, good practices abound and have been shown to be effective, and technologies – including new ones from drones to satellites, crowd-sourcing to social media -- reduce implementation costs and increase effectiveness.

21. The World Bank documented lessons learned from 20 international donor-funded projects aimed at combating illegal wildlife trade to create five generic principles for a global action plan. (See Annex 2 for a summary of key findings) (World Bank 2019). Similar generic principles can be drawn from the experience with illegal logging and fishing.

    i. Recognize the rights and important role of local communities, notably indigenous peoples, in managing natural assets and combating Illegal activities;
    ii. Adopt an integrated national strategy for dealing with illegal activities across the supply chain;
    iii. Recognize illegal activities in natural resources trade as a serious transnational organized crime[11] ;
    iv. Enable public-private-partnerships; and,
    v. Scale up funding.

22. The first four principles apply at the local and national levels, while the last principle applies more to the global level. At the national level, complementary and coordinated actions need to take place at both local and national jurisdictional levels. Illegal

fishing, because it takes place largely in areas beyond national jurisdiction, will require significant cooperation by willing countries, as well as coordination with the private sector, which eventually trades in and commercializes the illegally sourced products.

23. Each country faces threats that are specific and localized and have varying capacities and limited resources to mitigate these threats. National risk assessments, which use a risk-based approach to identify a country's unique strengths, weaknesses, opportunities and threats, can inform government strategies, help develop priority actions tailored to national conditions, and increase the efficiency and effectiveness of scarce financial and human public resources, including ODA, to address priority risks associated with illegal activities. A simplified risk-based approach is shown in Figure 1.

Figure 1:. Steps in a National Risk-Based Approach

| STEP 1 **Identify Threats** | > | STEP 2 **Inventory Assets** | > | STEP 3 **Conduct Risk Assessments** | > | STEP 4 **Prioritize Mitigation Strategies** |
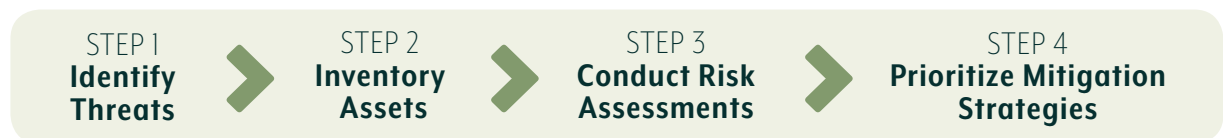
24. The OECD has developed several policy tools aimed at addressing governance gaps and at-risk activities. For example, the OECD anti-bribery convention (OECD 2011), Due Diligence Guidance for Responsible Mineral Supply Chains (OECD 2013), and Recommendation on Public Integrity (OECD 2017) set the leading international standards for improving governance. Similarly, the Financial Action Task Force (FATF) Recommendations (FATF 2012–19) provide a framework for a risk-based, peer-reviewed system of mutual evaluations for compliance with global standards on money laundering and terrorist financing. These tools are based on detailed and specific recommendations that set the standard for public and private sector actors. The implementation of such recommendations is often compliance-based. These national risk assessment tools can be expanded to also address illegal logging, fishing and wildlife trade and other natural resources crimes. National risk
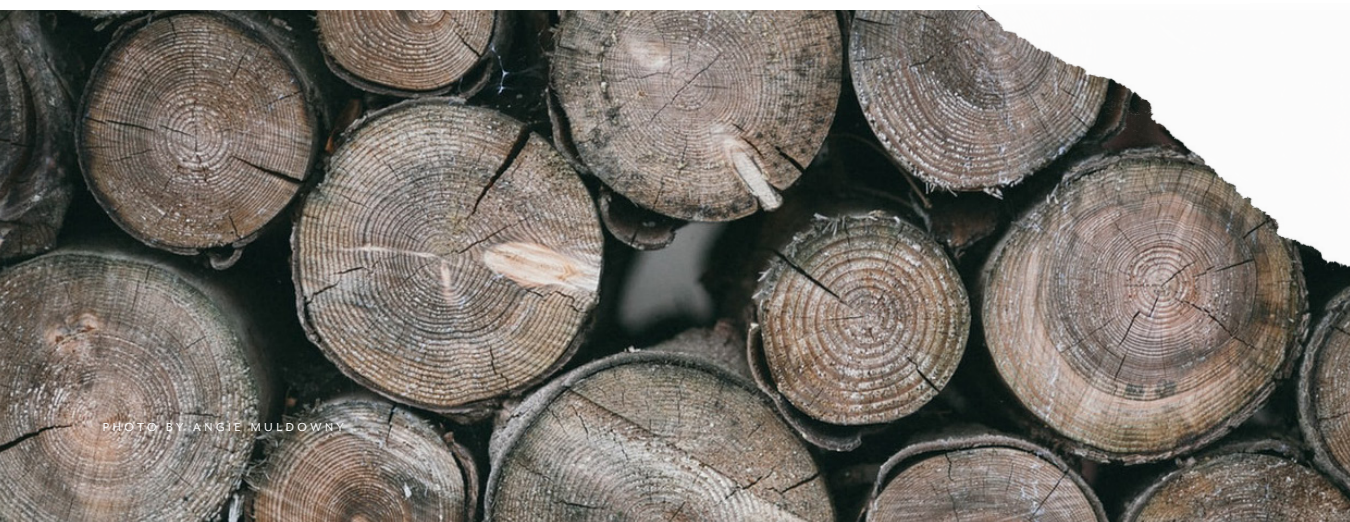
assessments can play a useful role in informing and facilitating integration with other national processes concerned with nature and biodiversity, such as Climate Change National Determined Contributions (NDCs), National Adaptation Plans, and National Biodiversity Strategies and Action Plans.

25. National risk assessments follow a process that involves risk identification, impact assessment, risk evaluation, and management. Examples of sector-specific national risk assessments many countries already use include assessments for money laundering and terrorist financing (ML/FT) and customs. There are numerous analytical tools and multi-stakeholder engagement processes that countries can consider for integrating illegal activities risks and prioritizing resource allocation to mitigate these risks. Tools that can be used as part of an illegal activities national risk assessment include: PROFOR's Forest Governance Assessment tool (PROFOR 2011) and the World Bank money laundering and terrorist financing national risk assessment tool (NRA) (World Bank 2015), which allows users to develop a better understanding of the scope of the proceeds generated by natural resource crimes. National risk assessments are specific to the financial sector, but apply similar principles of threat assessments and prioritization of threat mitigation strategies. The World Bank recently developed and tested a new national risk assessment for environmental crime module to assess natural resources crimes. Tools for illegal activities in trade of natural resources that can help inform national risk assessments include UNODC's Wildlife and Forest Crime Analytic Toolkit (UNODC 2012) and the International Consortium for Combatting Wildlife Crime (ICCWC) indicator framework. OECD's National Risk Assessments: A Cross-Country Perspective (OECD 2018) highlights good governance practices in establishing national risk assessments and how the results are used to inform public policy.

26. Application of national risk assessments helps countries prioritize and sequence actions to combat illegal activities. Integrating natural resources criminal activities into national risk assessments tackles two choke points for combating illegal trade, through enhanced customs screening of physical movements of cargo at selected exit or entry points (e.g., ports, airports, border check points, free trade zones); and activities in the financial sector. For example, money laundering occurs in source/transit countries when the proceeds from sales of illegally traded natural resources (once bundled from lower-level poachers/brokers) are used to fund offshore accounts or buy real estate or luxury goods. Offshore accounts can then be used to purchase bulk products, resalable items that can be resold, or as a source for trade-based money laundering. In addition, it may also take place far from source countries, suggesting the important role of international cooperation and coordination in tracing illicit financial flows and

identifying potential proceeds available for money-laundering arising from natural resources crimes.

27. A focus on customs and financial sectors to integrate natural resources crimes into national risks assessments provide effective entry points to combat illegal activity more systematically and enable sustainable interventions. Targeting financial and customs systems in the short term helps cut off funding for illegal activities. The application of risk-based approaches and tools enables governments to develop national strategies and implementation plans to combat illegal activities that target high-risk and impact areas, effectively choking off financial resources and the key transportation modes and nodes. It also facilitates agency efforts to address challenges at the local, national and global levels. This multi-tiered approach (Figure 2) promotes a "whole-of-government" and coordinated response to illegal activities.

Figure 2: Priority Local, National, and Global Illegal Activities Policy Actions

A. Local	B. National	C. Global
1. Establish/enhance property rights/tenure 2. Establish mechanism for communities to contribute to land-use management 3. Stimulate alternative economic opportunities 4. Establish transparent mechanisms to ensure that the resources and benefits derived from ecosystem services e.g. PES and REDD+ payments flow to local communities and stakeholders	1. Define natural resources crimes as a serious organized crime 2. Enact national strategy to mobilize resources and build institutional capacity 3. Establish legal and fiscal environment to catalyze investments 4. Undertake anti-corruption reforms and empower anti-corruption agencies 5. Establish national mechanisms (e.g. National REDD+ funds) to capture the value of ecosystems services, including GHG mitigation, and their contribution to the economy	1. Establish/leverage mutual legal assistance treaties and bilateral mechanisms to combat natural resources crimes 2. Utilize Egmont Group and international financial networks to conduct joint investigations across countries and jurisdictions as part of criminal investigations 3. Contribute to and leverage data systems to generate transparent and reliable natural resources crimes data 4. Create global markets and mechanisms to capture the value of ecosystems services including mitigation of GHG emissions

28. Local-level policy actions enable biodiversity-based economic activities to become a productive form of land use. In that process, **local communities can become the first line of defense to combat illegal activities if good governance principles are applied to align local development objectives of communities with global objectives.** Governments can empower communities to prevent corruption and reduce criminal enterprise coercion (and coercion applied by other powerful individuals/groups) with good governance of natural assets at the local level. According to the International Institute for Environment and Development (IIED), three elements provide the basis for good governance at

Namibia: Namibia successfully established national policies to benefit conservation and communities. Policy actions included a ground-breaking tourism and wildlife concessions policy, which enabled greater community engagement as custodians and beneficiaries of protected landscapes. This policy and other reforms granted rights to communities of ownership to revenue from game, tourism, and huntable game. This facilitated investments (many supported by international donors) that contributed an estimated $488 million (at 2018 exchange rates) to net national income and created 5,147 jobs from the beginning of 1990 to the end of 2016. Namibia's national elephant population increased from 7,500 animals in 1995 to around 22,711 by 2015. Source: Namibian Association of Community-Based Natural Resources Management Support Organizations (NACSO).

» Distribution: Sharing of costs and benefits among different actors, and how the costs experienced by some actors are mitigated.

29. Community-based considerations are an integral part of sustainable, long-term solutions. Priority local policy actions include:

» Establish/enhance land and property rights/tenure for local communities and indigenous peoples. Community trusts, conservancy committees, community resource boards, or rural district councils all play a pivotal role in governance of wild lands and natural resources and equitable benefit-sharing. Decentralization and devolution are key to promoting local levels of authority, responsibility and entitlement, with accountability to constituencies. There are numerous governance methodologies and tools available to assess governance, management, socioeconomic and environmental considerations of natural resources management. Governance tools (and geospatial mapping technologies) can help address complex and congested property rights/tenure issues. Local community participation and tenure reform can create a new paradigm for resource policy. For example, social and community forestry programs helped address the problems of illicit grazing and uncontrollable theft of firewood across much of South Asia. Since the 1980s, the World Bank supported governments with community forestry programs that helped the lives of hundreds of millions of people.

» Establish mechanisms for communities to contribute to land-use management plans and implementation. As with land and property rights/tenure, Governance Assessment of Protected and Conserved Areas (GAPA), First Line of Defense (FLOD) and other similar methodologies can also be used to help communities enhance governance through strengthened dispute resolution and equitable benefit-sharing.

» Stimulate enterprise investments to generate alternative economic opportunities for local communities and indigenous peoples. Community participation in natural resources management and enterprises tied to its value chain is critical to provide alternatives and reduce a community's reliance on natural resources. The Building a Wildlife Economy toolkit (Space for Giants 2019) is an example of a reference governments can use to boost conservation earnings while protecting wildlife and landscapes.

» Establish transparent mechanisms to ensure that the resources and benefits derived from ecosystem services flow to local communities and stakeholders. National governments that have built systems to capture the value of ecosystem services should ensure that the benefits of ecosystem conservation flow to local governments and in turn are distributed to local beneficiaries (e.g.

Kenya: The Olderkesi Conservancy is a community trust that played a key role in reducing negative consequences of land subdivision, agriculture, deforestation and livestock grazing in the conservancy, which is adjacent to the Maasai Mara Nature Reserve. IIED's GAPA methodology, in conjunction with IUCNs/IIED's FLOD, was applied in Olderkesi and shows the importance of community participation and benefit-sharing in conservation efforts. GAPA demonstrated the need to develop a benefit-sharing policy and for policies to include criteria for employment opportunities. It highlighted the importance of increasing representation of women on the conservancy board and ensuring equity in benefit-sharing. (Source: Franks & Booker, 2018)

Mexico: Numerous forest communities successfully developed some of the world's most advanced commercial community forestry enterprises around timber and non-timber. (PROFOR 2013)

Mexico: In response to sea turtle declines, a community-based effort -- Grupo Tortuguero de las Californias (GTC), or the Sea Turtle Conservation Network of the Californias -- was launched in 1998, beginning a tradition of yearly meetings. By 2006, the gathering had grown from its founding group of 45 fishers, coastal residents, scientists, educators, and conservationists to the current international network linking 500 members from more than 53 coastal communities, dozens of non-profit organizations, and numerous government agencies and research institutes from Cuba, Japan and Mexico. GTC members have developed a wide array of sea turtle and non-sea turtle conservation, education and advocacy projects. The group provides monitoring and transparency by reporting sea turtle sightings and strandings via an online database. GTC's efforts demonstrate how illicit wildlife trafficking, even when it is highly culturally engrained, can be reduced through community-based monitoring. (Grupo Tortuguero de las Californias)

30. At the national level, countries have existing structures that can be used to address natural resources crimes, each with their own specific challenges, risks and gaps. National-level actions include legal policy actions that create the rules, structures and enabling environment to incentivize stakeholders to take actions that deter illegal behavior and increase incentives for conservation. An example of a national legislative effort that can have a significant impact beyond national borders is the People's Republic of China's State Council ban in 2017 on the processing and sale of ivory and ivory products. A February 2017 Save The Elephants report showed the price of ivory in markets across China dropped by two-thirds, from $2,100 per kilogram in early 2014 to $730 per kilogram in February 2017. Further, TRAFFIC found that compared to the first six months of 2017, the price of ivory bracelets in 2018 decreased nine percent in China and the price of raw ivory declined 17–38 percent at the end of 2017 (Traffic 2018). Priority national policy actions include:

» Define natural resource crimes as serious organized crime and ensure the illegal activity falls within the national definition of "predicate offense" to money laundering. Although poaching of wildlife or illegal harvesting and trade of natural resources is not always committed by organized criminal networks, the significant detrimental impacts these networks have on the society, environment and economy make it a particularly important focus for national threat mitigation efforts. Serious crime definitions vary across countries and typically relate to specific penalty levels (UNODC 2018). Regardless of the penalty level in a country, it is critical that natural resource crimes committed by organized crime networks are prosecuted with penalty levels commensurate with the serious nature of this crime. In addition, it is essential that natural resources crimes fall within the definition of "predicate offense" to money laundering, so financial investigations are conducted, and tougher charges can be brought against criminals that reap proceeds from natural resource crimes. The need to ensure that natural resource crime, including illegal wildlife trade, is met with adequate enforcement (penalties/sanctions) was highlighted in the 2018 London Conference on the Illegal Wildlife Trade.[12] However, as of 2016, 97 countries failed to deem wildlife violations as serious crimes. According to UNODC, any pattern of profit-motivated, serious criminal activity is considered organized crime, and nearly all transnational wildlife trafficking fits the criteria. A critical first step in combating illegal activities is to enact principal legislation aimed at punishing such crimes, including trafficking, importing counterfeits, and importing and selling prohibited products, as well as ancillary legislation that punishes associated crimes such as money laundering, handling or possession of proceeds of crime, corruption and embezzlement, and organized crime or racketeering. The national legal

framework should be tied to international frameworks that define natural resources trade crimes as "serious crimes" (penalties of more than four years in prison), according to UNODC definitions under the United Nations Convention against Transnational Organized Crime (UNTOC) (UN 2004). Note that the Financial Action Task Force (on Money Laundering) recommends (FATF 2016) that predicate offenses should include offenses that are punishable by a maximum penalty of more than a year in prison (or minimum penalty of more than six months in prison for countries with minimum thresholds for offenses in their legal system). In assessing potential criminal offenses for wildlife, timber and fisheries crimes, it is critical that human rights and due process procedures are followed to mitigate risk of any abuse of power.[13] In establishing natural resources crimes as "serious" offenses and unleashing state-led law enforcement efforts, it is essential that these efforts are directed toward industrial-scale transnational criminal syndicates and that there are checks and balances in place to avoid adverse effects on communities' rights, empowerment, and benefits. In addition, countries need robust systems in place to protect human rights and promote citizen engagement and empowerment through use of transparent processes, complaint systems, codes of conduct, and whistleblower protection.

» Implement "whole-of-government" and multiagency illegal activities strategy. This should include financial intelligence units, anti-corruption agencies, customs and tax units, and strengthened institutional capacity. Multiagency collaboration and roadmaps for coordinated action across government would need to be part of more effective national strategies that tackle corruption, organized crime, and money laundering risks (see governance tools referenced in paragraph 28). In addition to strategic collaboration, operational cooperation among these agencies — in the form of creation and implementation of joint task forces, information exchange platforms, resource sharing, and enforcement efforts — is essential to yield results on the ground and break down silos. Work across agencies can also help reduce corruption risks by requiring staff across ministries that may not work together to share information, resources, and regulatory and enforcement power. A government-wide initiative that has political support from the top helps secure the financial and technical resources required to combat serious crimes.[14] This support is critical to improve government agency staff capacity to design and deploy risk-based approaches to enhance enforcement actions, investigations, prosecutions, and convictions of natural resources trade crimes and related offences, as well as the ability to partner with communities and the private sector. This recommendation (and others included below) is aligned with the OECD report on Illegal Wildlife Trade and Corruption in Southern and Eastern Africa (OECD 2018c) and the forthcoming report on Illegal Wildlife Trade in Southeast Asia (OECD 2019).

Tanzania: Tanzania's tourism industry is worth $5 billion and relies on wildlife as a tourist draw and a critical source of foreign exchange. From 2009–14, more than 60 percent of the Tanzanian elephant population was lost to poaching. This was 30 percent of all illegally killed elephants on the African continent during that period. Tanzania responded by recognizing IWT as a serious transnational organized crime, which enabled its National and Transnational Serious Crimes Investigative Unit (NTSCIU) to tackle this poaching crisis. Since 2014, the NTSCIU helped reverse the poaching trend and is effectively combating IWT. NTSCIU became one of Africa's most effective and recognized countertrafficking teams taking on wildlife crime syndicates in Tanzania. It also actively fights corruption.

» Increase institutional capacity. Customs and border officials require skills, training and technology to assist in screening/profiling, risk management, and understanding of environmental laws and penalties.[15] Similarly, most countries can benefit from financial intelligence unit analysts training to increase awareness, capacity and use of natural resources criminal data. Investigation and prosecution authorities can tailor training to overcome the investigative, legal and procedural challenges related to natural resource crimes. Priority training areas are identified through the national risk assessments and existing capacity across government institutions, but may include criminal intelligence analysis, controlled deliveries, corruption risk assessments, risk-based approaches, and training on relevant tools and decision-making. Non-institutional actors from corporate financial institutions also need training and development of standardized procedures on development of typology information and risk indicators to identify suspicious transactions tied to natural resource crimes. Governments can enhance their analytical and enforcement capabilities if the private sector actively partners with relevant agencies on capacity building and information-sharing through secure communications channels and established mechanisms. An essential element of the natural resources trade strategy is to enhance financial investigation capabilities and apply them to identify major predicate crimes for money laundering. The financial intelligence units and staff of other key agencies also require the political directive to support operations and training, and to provide sufficient resources to be effective. Government agencies must work effectively with the private sector (including financial and transportation sectors) and establish a regulatory environment for banks and transportation companies to work collaboratively and apply due diligence standards that reduce risks in the supply chain and financial system. OECD's Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas (OECD 2013) is an example of a collaborative, government-backed, multi-stakeholder initiative on responsible supply chain management of minerals from conflict-affected areas that provides useful recommendations for due diligence guidance for promoting responsible supply chains. In addition, the importance of engaging online retailers and other private sector entities to reduce the use by criminals of online and social media channels to sell their illegal products is increasingly clear. For example, WWF, IFAW, and other partners are collaborating with companies across continents, such as Alibaba, eBay, Facebook, Google, Microsoft and Tencent, to unite the industry and maximize impact for reducing wildlife trafficking online. CITES and INTERPOL are also engaging with partners to capture good practices and collaborate with governments and private sector partners to push illegal trade of wildlife to the dark net.

» Establish mechanisms to capture the value of ecosystems services, including GHG mitigation, and their contribution to the economy. National governments must work with partners to better understand, capture and assess value for their natural resource assets and the ecosystem services they provide. The economic value of the forestry, wildlife and fisheries sectors is underestimated in many countries, leading to insufficient levels of attention paid to their conservation and sustainability. An example in the forestry sector of mechanisms to measure and valuate the ecosystem services provided are national REDD+ funds that are used to create incentive for reducing GHG emissions through protection and sustainable use of standing forests.

» Engage with NGOs and civil society: International and local non-governmental organizations (NGOs) play a major role in helping governments combat natural resource crimes. OECD's previously mentioned governance and corruption risks reports highlight case studies and recommendations of governments partnering with NGOs. The technical expertise of NGOs -- as well as their ability to attract international financial resources, and their presence across source, transit and destination countries -- make their contributions essential to combat these crimes in some of the most challenging conditions, especially for illegal wildlife trade. International and local environmental and other sustainable development NGOs play an important role in uncovering and monitoring illegal activity. NGOs can provide information to competent authorities for use in the detection, investigation and prosecution of natural resources crimes and related offenses (corruption, anti-money laundering, etc.). Indonesia's Wildlife Crimes Unit (WCU) highlighted the benefits of involving civil society (WCS 2018). The WCU experience, in which civil society support from multiple professional disciplines complemented government efforts to address wildlife trafficking, included providing intelligence information, assisting in sting operations, supporting day-to-day court paperwork, and working with journalists. . The WCU efforts have led to dismantling up to 80 percent of the tiger trafficking network, reducing the killing of tigers by more than 75 percent in Leuser and Ulu Masen (WCS 2018).

» Establish an enabling environment that promotes transparency and responsible supply chains for products that could be traded legally to generate private sector investments across the value chain and reward environmental stewardship. Such policies will help reduce the opportunities for illegal goods to enter the market by legalizing (bringing into the formal, legal sphere) sustainable production and environmentally and socially responsible value chains. The technical and financial resources of the private sector and NGOs are critical to prevent, detect and prosecute natural resource crimes. In promoting public-private partnerships, gov-

Brazil: Certification plays a central role in reforestation and climate mitigation policies in Brazil, yet the actual practices of the forestry sector are not aligned with environmental standards. The sector comprises companies with high standards that follow strict protocols under certification schemes. Of the 7.7 Mha of planted forests in Brazil, 4.8 Mha (63 percent) are certified by independent organizations. Still, there are companies that contribute to illegal deforestation and/or adopt unsustainable practices. The exploitation of native forest for timber and non-timber products is allowed by law after authorization by public agencies. There is a growing concern about sustainability in sector practices and forest product sourcing from planted forests. The involvement of the private sector/industry in the prevention, detection and fight against environmental crimes and corruption is more and more recognized, and some initiatives are implemented to strengthen the cooperation with, and commitment of, the industry. Government and the private sector have a role in enhancing traceability, establishing a secure chain of custody, and reducing corruption risks.

ernments can establish initiatives that leverage the core capabilities of both NGOs and the private sector. These partners can be encouraged and mobilized by government efforts to create a legal framework and investment climate that inspires community participation across the environmentally and socially responsible value chains for legal commodities. Such responsible value chains are an avenue to leverage the private sector. National legal frameworks and trade policies can support verification systems of legal and sustainably sourced products that in turn will help to reduce the share of illegal products on the market. To enhance the regulatory regime and risk management along the supply chain, countries can partner with private enterprises to explore alternatives to illegal or unsustainable production and adopt chain of custody systems and certification schemes that maximize traceability across the supply chain (OECD 2012). Governments have a key role in leveling the playing field between legal, sustainable products and those that are not.

31. Global-level actions to address crimes that are transnational in nature, involving source, transit, and destination countries. Timely information sharing and mutual legal assistance are critical to stop illegal financial flows from crossing boundaries and moving between jurisdictions. Many trade policies and international agreements do not give adequate importance to natural resources crimes or establish the required safeguard mechanisms to minimize risks. Innovative policies can create incentives for regional and international stakeholders to take actions that support and leverage intelligence, enforcement, and trade networks. Priority global policy actions include:

» Establish or leverage mutual legal assistance treaties and other bilateral mechanisms to include natural resources crime issues and promote information exchange, operational support, asset recovery, and extradition of individuals and criminal groups between countries (UNODC 2017). Mutual legal assistance treaties, both bilateral and multilateral, are important tools to address transnational crimes, and must be properly designed and targeted with effective legal and institutional frameworks and adequate resource allocation. In addition, it is critical to leverage global markets for carbon sequestration (i.e. REDD+), as the major economic benefits from tackling illegal activities are derived from carbon offsets that are global goods, but action to generate the benefit is needed at the local/national level.

» Utilize international networks of finance intelligence units (Egmont Group) for information sharing (exchange of financial information ahead of a formal request for mutual legal assistance). Financial Intelligence Units (FIUs) play an important role in enforcement across multiple jurisdictions and should be brought into

law enforcement efforts related to natural resource crimes at an early stage in support of the financial crime investigations. For countries that are not part of Egmont, support can be obtained through bilateral agreements. At the request of host countries, INTERPOL, UNODC and other specialized organizations (i.e. Europol) can also help with operational support that may include investigations across jurisdictions. The following are examples of global/country efforts that strengthen the legal and enforcement environment to combat natural resources crimes:

a. As discussed previously in section 3, a national risk assessment[16] is an important tool to assess risks from IFFs that facilitate natural resource crimes. Countries can leverage FATF recommendations to assess risks of money laundering and terrorist financing. Recommendations 30 and 40[17] are especially relevant to natural resource crimes. Use of politically exposed persons lists and various other systematic and industry-specific tools are available to minimize risk of unknowingly financing natural resource crimes. FIUs must be engaged in natural resource crime investigations to allow for opening of parallel financial investigations and use of AML tools to choke natural resource criminal proceeds. In addition, FIUs need technical support to better understand natural resources crimes, identify data which is often not found in its typical tracking systems (as proceeds are generally kept outside formal systems), and have the political backing to leverage tools, resources and adequate training to detect and support law enforcement agents in addressing natural resources crimes. A typology of these crimes is needed, as well as more robust tools to adequately assess and integrate them as part of ongoing national risk assessments and other established risk-based efforts. Under China's leadership, FATF is looking more closely at money laundering operations related to wildlife crimes under its 2019–20 Objectives. FATF's work in this area could build on recent work by the FATF-style regional bodies (FSRBs) (FATF 2019) and current international initiatives and may provide opportunities for countries to enhance threat assessment capabilities toward these crimes and the application of ML/TF tools to combat natural resource crimes (FATF 2019). Environmental agencies and specialized entities can provide information, data and reports to inform threat assessments and other efforts done by FIUs.

b. As previously mentioned, financial sector interventions can be complemented with interventions at trade points (customs, border points) as well as along the supply chain of natural resource commodities through a coor-

dinated investigation and enforcement approach. The United for Wildlife Transport and Finance Task Forces (United for Wildlife 2019) provide a robust network of over 150 private sector entities to share intelligence and coordinate action across borders. The combined TFs now comprise more than 150 organizations that actively collaborate on IWT issues, including on intelligence-sharing mechanisms. Since their formation, the TFs have supported 52 law investigations, contributed to 10 trafficker arrests, assisted in over $500,000 worth of seizures, and trained more than 55,000 industry employees. UfW TFs regularly provide alerts to industry and targeted direct support to investigations. TFs also have a link with formal information-sharing mechanisms -- UK's Joint Money Laundering Intelligence Taskforce (JMLIT), the US 314 Consortium, and the UNODC container control program -- and with law enforcement. Similarly, global efforts to educate and incentivize potential whistleblowers can help increase the number of high-quality confidential reports to detect natural resources crimes and enforce laws prohibiting illegal trafficking worldwide. Interventions to follow-the-money should also consider money laundering methods related to trade-based money laundering (TBML) (ACAMS 2019). TBML enables illicit actors to disguise and legitimize illicit finances by purchasing trade goods, moving these across borders, falsifying their value, quality or quantity, and mis-invoicing or mis-representing trade-related financial transactions (Luna 2019).

c. International trade rules can include language related to protecting the environment and combating major transnational crimes, including natural resource crimes. For example, the U.S.-Mexico-Canada Agreement includes provisions to combat trafficking in wildlife, timber and fish, and strengthen law enforcement networks to stem such trafficking (USTR 2018).

» **Create global markets and mechanisms to capture the value of ecosystems services including mitigation of GHG emissions.** Global (and regional) initiatives that create incentives for the recognition, valuation and protection of ecosystems services provided by renewable natural resources can help to create the momentum needed to curb illegal trade in these resources. For instance, REDD+ climate finance that is tied to reducing emissions from forests, or global and regional Payments for Ecosystems Services schemes for better land-use practices including agriculture, are strong incentives that mobilize national governments to invest in their renewable natural resources and preserve the provided ecosystems services. Such investments can be tied to commitments

and targets that national governments make under global and regional treaties such as Nationally Determined Contributions, Restoration targets under Bonn Challenge and UNCDD, Biodiversity Targets under UNCBD, and others.

32. As part of national capacity building efforts, investments should be made to enhance core capabilities across government agencies with resources and training in global positioning systems (GPS), geographic information systems (GIS), surveillance, electronic record keeping, data collection on crimes, radios, patrol vehicles, and security measures. The following are examples of global/country efforts that strengthen the legal and enforcement environment to combat natural resources crimes:

> **a.** Use of national, regional and global databases for natural resources crime can improve controls on illegal trade and help increase awareness about the extent of the problem. Several initiatives exist, including the CITES/WCMC database; Chatham house studies; Interpol databases and the WRI Open Timber Portal; ITTO and TRAFFIC investigations on trade discrepancies; global tracking/tracing mechanisms such as fish vessel monitoring systems; International Monitoring, Control and Surveillance (MCS) Network for Fisheries-related Activities and Combined Illegal Fishing Vessel List; CITES and monitoring of permits by WCMC; and specific initiatives such as ETIS and MIKE for elephants/ivory. These initiatives need to be scaled up and integrated into automated trade and risk management tools, rather than kept in paper-based systems that are prone to inefficiencies and fraud.

> **b.** Databases and Politically Exposed Persons (PEPs) lists can be used in joint blacklisting of illegal traders. Briefings and input from the UfW TFs, INTERPOL, and intelligence assessments can be incorporated into due diligence tools used by governments and the private sector to mitigate risks of engaging with higher risk entities.

IV. Path
Forward

Natural renewable resources have significant financial and economic value, yet are being lost due to illegal trade, among other reasons. As shown in this paper and recent work by OECD and the ICCWC (including law enforcement work led by ICCWC partners INTERPOL and anti-corruption efforts led by UNODC), many actions can be taken to stem the current loss of natural resources and conserve them as valuable assets protected by the state, communities, and private enterprises. Collectively, the coordinated actions discussed in this paper across legal, institutional and operational levels can help countries strengthen their preparedness levels to combat natural resources crimes and elevate efforts to protect their natural resources.

An extensive body of research and network of experts are available with experience working in transnational organized crimes (including drugs and human trafficking) that can be leveraged for national government efforts to combat natural resource crimes. Sector-specific actions (FATF recommendations) and national-level interventions have shown their potential to impact illegal trade. The road map presented in this paper can help governments shift to a more proactive prevention stance to enhance these existing efforts to address in a more systemic and sustainable fashion the root causes of natural resource crimes that have a global impact on the depletion of natural capital. A multi-stakeholder and transparent process that ensures human rights and protection of natural resources is the essential building block for tackling natural resource crimes and linking these efforts to broader initiatives to mitigate corruption risk.
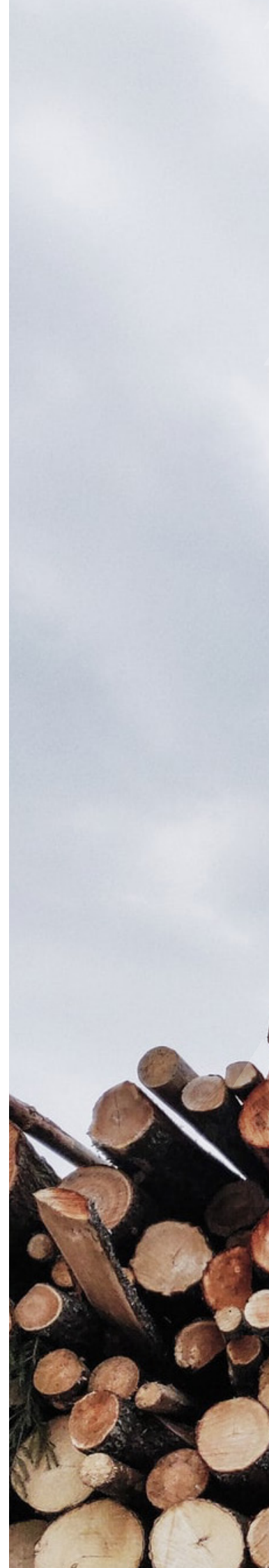
Annex 1
A.1 – Illegal Logging, Fishing, and Wildlife Activities: Sector–specific Economic Service Loss-

Ecosystem services and natural capital losses are difficult to estimate due to a lack of sufficient data and established methodologies. Still, estimation of ecosystem services losses allows for better understanding of the rough order of magnitude of this serious transnational crime. This annex presents the estimates of ecosystem service losses for each natural resource sector. Forests provide valuable ecosystem services such as prevention of the degradation of watersheds and land erosion, while increasing both water quality and quantity and absorbing carbon emissions. Sound management in the fisheries sector prevents Illegal and the severe depletion of fish stocks and destruction of coral reefs. IWT directly causes declines in species population, resulting in the deterioration of ecosystem functions.

The ecosystem services value for forests are calculated using the ecosystem services estimates by Carrasco et al. (2014) and Siika-maki et al. (2015), as well as considering the estimated total production of illegal timber of approximately 183 million cubic meters (see Table A2).[18] The mean estimated value of forest ecosystem services used was $147.1 hectare/per year (Siikamaki et al. 2015) as lower bound and $1,312 hectare/per year as upper bound (Carrasco et al. 2014). Based on these estimates, and assuming a production of 63.5 cubic meters per hectare,[19] the estimated total annual ecosystem service losses are between $424 million and $3,781 million. This calculation does not include values of carbon dioxide absorbed by forests, which is a significant contributor to climate mitigation. If the shadow price of carbon suggested by the World Bank (2017) is considered (which varies from $40 to $80 per ton of CO_2) and assuming 367 tCO2e/ha, the total annual ecosystem service losses from the forest sector increases substantially to $42 billion to $88 billion.

Unsustainable fishing is the most pervasive of all local threats to coral reefs. More than 55 percent of the world's reefs are threatened by overfishing or destructive fishing, with nearly 30 percent considered highly threatened (Burke et al. 2011). Coral reef economic value estimates are $30 billion per year due to their ecosystem services provided for coastal protection, tourism and recreation, biodiversity, and fisheries (Cesar et al. 2003). The first two components (coastal protection and tourism/recreation) represent nearly 60 percent of the total economic value. The total annual ecosystem service losses in the fisheries sector due to coral reef losses are estimated at $16.5 million (55 percent of the total economic value). There are other factors that contribute to losses but are not included.

Evidence for the wildlife sector is limited. The most obvious IWT environmental impacts are the deleterious effects on target species. Declines in wild populations are directly attributed to illegal harvesting and trade, with certain species driven to the brink of local, national, or global extinction. Examples include many charismatic, high-profile mammals, such as elephants, rhinos, and tigers (UNEP 2017). It is not feasible to calculate total ecosystem service losses for the entire wildlife sector due to lack of data. Still, calculation of the economic losses for elephants can serve as a reference point for the wildlife sector. It is expected that tiger-range states and other countries that effectively promote nature-based tourism products and a broader wildlife-based economy experience similar losses.

Elephants are ecological engineers that create and maintain forest habitats; thus, their loss has major consequences on the composition and structure of tropical forests (Poulsen et al. 2018)—in addition to the decline, and possible extinction, of the species. Considering the natural growth of the elephant population (estimated at five percent) and the level of illegal poaching, with illegal killing rates at nearly 6.8 percent between 2010 and 2012, an average of approximately 33,630 elephants were killed per year based on current estimates of the entire elephant population (Smith and Porsch 2015). The loss of elephants beyond sustainable levels is estimated at an annual loss of $15.4 million due to illegal poaching compared to natural growth rates.[20]

Given the long-term nature of the ecosystem services losses, the economic losses are significant. Total long-term economic (ecosystem services) losses are estimated at $839 billion to $1,737 billion in net present value (NPV) terms (See Table A1).

Natural Capital Sector	Lower Estimate	Upper Estimate
	$, millions	$, millions
1. Illegal Logging (no carbon seq.)	445	3,967
2. Illegal Logging (carbon seq.)	42,306	84,612
3. Illegal Fishing	17	17
4. Illegal Wildlife Trade	15	15
Subtotal Ecosystem Service Losses	42,782	88,611
Subtotal Ecosystem Service Loss (Long Term)	838,546	1,736,795

Source: Original estimates calculated by authors.
NPV value (30 years and three percent discount rate)

A-2 – Illegal Logging, Fishing, and Wildlife Activities: financial losses (government taxes forgone) by sector

Table A1 highlighted that government losses from natural re-source crimes represent significant financial losses. This annex presents the estimates of government taxes forgone for each nat-ural resource sector. It specifies the sector-specific calculations of the potential government gains if illegal activities were legitimate and, implicitly, investments were made to reduce or eliminate nat-ural resources criminal activities. Calculations at the sector level

Illegal Logging and Trade in Illegal Timber

The Chatham House methodology was used to estimate the illegal timber market size. Chatham House reports provide the most thorough analyses of illegal logging in key countries cur-rently available.[21] For production (source) countries, supporting data included wood balance analyses (comparisons of reported production, consumption and exports, and reported imports from that country); reports from independent forest monitors; national expert perceptions surveys; satellite data; and studies from other organizations. Illegal production estimates for the three indus-trial roundwood subcategories (saw logs and veneer logs; pulp-wood; other industrial roundwood), with separate calculations for

coniferous and non-coniferous timber, were applied to the 2017 reported production in 56 timber-producing economies. Together, these countries accounted for 41 percent of 2017 reported global production.

Table A2 highlights the volume and percentage of estimated illegal production for the six largest producers. The remaining countries were grouped by region. Total production of illegal timber comes to an estimated 192 million cubic meters, equivalent to 23 percent of the reported production of these 56 countries. Estimates of aggregate tax revenue forgone in 2017 from illegal logging in 56 countries are between $6.1 billion and $9.0 billion based on extraction fees (stumpage fees) from two major producer countries.

Table A2: Estimates of Illegal Logging and Forgone Tax Revenue, 2017

Country / Region	Estimated Illegal Production		Extimated Tax Revenue Forgone	
	Volume (Mm3)	% of Total Production	Low ($, millions)	High ($, millions)
1. Brazil	19	13	1,450	1,450
2. China	8	5	178	336
3. India	18	36	387	773
4. Indonesia	41	56	1,804	1,804
5. Nigeria	9	87	191	383
6. Russian Federation	38	19	828	1,656
7. Other African countries (21)	19	56	417	833
8. Other Asia & Pacific countries (10)	19	34	419	838
9. Other Europe (4)	9	24	190	380
10. Other Latin American countries (15)	12	18	256	513
Total 56 countries	*192*	*23*	*6,121*	*8,987*

Source: Sources: Blundell et al. 2018; Chatham House
(https://indicators.chathamhouse.org)

Illegal Fishing

Agnew et al. (2009) provide one of the first and most widely cited global estimates of illegal fishing[22] for 54 countries and on the high seas. According to FAO (2016), the Agnew et al. study is the only global analysis to date with a sound methodological approach. Illegal fishing occurs in virtually all capture fisheries all over the world. Illegally caught fish account for 11–19 percent of reported catches, representing 10–26 million metric tons of fish, valued at $10 billion to $23 billion. Updated numbers based on marine capture production in 2011–14 suggest that annual illegal and unreported marine fishing generated 12–28 million metric tons of fish at a value of $16–37 billion. This updated estimate tacitly assumes that global fisheries have not changed substantially since the report's publication. Nevertheless, it is perceived as a conservative estimate as it does not include unregulated fishing or any illegal fishing in inland fishing areas, e.g., artisanal fishing (GFI 2017). Considering only a resource rent extraction or landing fee, based on international experience (ranging from two to six percent), and estimates of illegal market size, forgone tax revenues are estimated to be between $313 million and $2.2 billion

Table A3: Forgone Revenue Estimates for Illegal Catches ($1,000 per year)

	Landing Fee (%)	Lower Illegal Fishing Estimate	Upper Illegal Fishing Estimate
Landing Fees (Lower)	2	312,784	729,829
Landing Fees (Higher)	6	938,351	2,189,487

Sources: Agnew et al. 2009; GFI 2017; Paredes 2018.

Illegal Wildlife Trade (IWT)

IWT includes poaching and is often associated with "charismatic species" such as elephants, rhinos and tigers. It is a global issue that affects species across regions and includes plants and a diverse range of products needed or prized by humans, including skins, medicinal ingredients, and food products. Although there are estimates of the global scale of the illegal trade in wildlife, there has been no comprehensive and detailed analysis. Research has mainly focused on the illegal trade in charismatic or the most highly endangered species, which represent only one aspect of the broader issue (UNEP 2017). There is also an extensive trade in

less endangered species (e.g., those listed on CITES appendix II), which include species not necessarily threatened with extinction, but in which trade must be controlled to avoid legal or illegal utilization incompatible with their survival.

IWT economic costs are difficult to estimate, mainly due to lack of data and varied trade status for specific species. For species threatened with extinction (CITES Appendix I listed species), commercial trade is not allowed; therefore, there are no tax revenues forgone. Poaching of Appendix I species does reduce income from alternative activities such as tourism, with accompanying impacts on incomes and taxation. For less threatened species, however, there are tax revenues forgone from lost legitimate trade. For CITES appendix I species, potential losses are estimated based on loss of indirect activities, such as ecotourism. For CITES Appendix II species, tax revenue forgone is estimated for species that otherwise would have been traded legally.

Naidoo et al. (2016) combined tourist visits with elephant population approximations in 164 African protected areas. They estimated that higher elephant density increases the number of visits to the protected areas. An increase in elephant density of 0.1 per square kilometer results in approximately 700 additional annual visits to a protected area: in other words, each additional elephant increases tourist visits by 371 percent. Considering the direct and indirect spending that each tourist brings, and assuming the average VAT rate for countries with the highest elephant population (15 percent), the forgone tax revenue is estimated between $0.64 million to $4.26 million per year, with an average estimate of nearly $4 million per year (Table A4).

Table A4: Estimates of Government Losses on Tourism Activities Due to Illegal Trade on Wildlife, 2016

	$, millions, per year					
	Predicted Annual Visits	Direct Tourism Benefit Lost	Indirect Tourism Benefit Lost	Total Benefit Loss	Min.	Max.
1. Southern Africa	1,605,487	0.71	1.28	1.99	0.87	3.80
2. East Africa	384,439	0.67	1.20	1.87	0.64	4.26
3. West Africa	55,405	0.02	0.03	0.05	0.02	0.12
4. Central Africa	8,412	0.00	0.00	0.00	0.00	0.03
Total	**2,053,743**	**1.40**	**2.51**	**3.91**	**0.64**	**4.26**

Sources: Naidoo et al. 2016.

Regarding estimation for other species commercially traded, estimates are simpler due to a lack of global data. According to TRAFFIC, and as van Uhm (2016) suggests, the calculation method used in Table A5 is far from a complete representation of the value of the wildlife traded; yet it serves as an indication of scale and is the only global estimate available in the literature. Van Uhm's (2016) approach was used, which suggests that worldwide illegal trade in wildlife accounts for nearly 25 percent of the legal market, representing nearly $8.5 billion per year. The value of the legal global international wildlife trade, including non-CITES species, is based on the data for declared import values in 2012 (UN Comtrade and FAOSTAT database). Considering a tax base of 15 percent, total forgone losses represent nearly $320 million (Table A5).

Table A5: Global Illegal Wildlife Trade Estimates, 2012

$, millions, per year	
Live Animals	
Primates	132
Birds of Prey	5
Cage Birds	11
Reptiles	38
Ornamental Fish	358
Animal Products	
Mammal Furs	6,623
Reptile Skins	371
Corals and Shells	144
Natural Pearls	76
Game Meat	674
Reptile Meat	4
Edible Snails	102
Total Legal Trade	*8,538*
Estimated Illegal Trade (25%)	*2,135*
Forgone Tax (15%)	*320*

Source: van Uhm 2016.

Estimates of Tax Revenue Forgone In the Forest Sector

Calculating economic value of natural resource crime comprises two parts: (1) financial (or market) value of illegal production and trade ($48 billion to $216 billion per year, Table A1); and (2) loss of ecosystem services/economic losses ($838 billion to $1,736 billion, Table A3). The financial revenues derived from the total tax revenue forgone for all three natural resource sectors ($7 billion to $12 billion, Table A4) are captured in the financial losses due to environmental illegal activities. While the financial revenues forgone seems low compared to the total value of illegal environmental activities, they could be an important financial source for individual countries. For example, the tax revenue forgone for illegal logging (which is the only natural resource sector with country-level estimates) could be as high as 25 percent of a nation's total tax revenues, with an average of two percent for all countries. See

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Table A5: Estimated Tax Revenue Forgone as Share of Government Fiscal Revenues, Top Countries

Country	Estimated Tax Revenue Forgone		Total Revenue	Forgone Revenue Tax as % of Total Revenues	
	Low ($, millions)	High ($, millions)	US $, millions	Low (%)	High (%)
1. Solomon Islands	63	126	509	12.4	24.8
2. Lao PDR	75	150	2,583	2.9	5.8
3. Papua New Guinea	78	156	3,347	2.3	4.7
4. Gambia, The	4	9	193	2.1	4.7
5. Congo, Dem. Rep.	81	163	4,609	1.8	3.5
6. Congo, Rep.	33	66	2,137	1.5	3.1
7. Suriname	7	14	575	1.2	2.4
8. Gabon	29	58	2,403	1.2	2.4
9. Mozambique	36	71	2,945	1.2	2.4
10. Cameroon	51	103	4,835	1.1	2.1
11. Equatorial Guinea	19	39	1,904	1.0	2.0
12. Myanmar	105	210	11,901	0.9	1.8
13. Paraguay	60	119	6,878	0.9	1.7
14. Nigeria	191	383	22,506	0.8	1.7
15. Indonesia	1,804	1,804	133,638	1.3	1.3
16. Côte d'Ivoire	38	76	7,046	0.5	1.1

a/ World Bank estimates
b/ IMF World Economic Outlook Database

Annex 2

Summary findings from illegal wildlife trade lessons learned

1. **Policy/Legislation:** Many source, transit, and demand countries do not consider IWT a serious crime and lack adequate legal systems and the capacity to prosecute and convict environmental criminals. Having adequate laws, policies, and regulations in place that reflect the serious transnational organized crime nature of IWT, and the understanding and tools of how to apply them, is essential to tilting the risk/reward equation for those involved in criminal industrial scale IWT. Drafting and passing legislation often requires significant time and is dependent on a constantly changing political landscape. Important success factors include:

   a. Engage legislators to increase their awareness of the value of conservation, nature-based tourism, and IWT specific issues to gain political, legal, and financial support to preserve wildlife and combat IWT. International and domestic engagement through various forums, including CITES and knowledge exchanges, can increase awareness and promote debate of IWT issues.
   b. Training and mentoring prosecutors in wildlife cases and judges and empowering them with adequate tools to effectively work their caseloads can help increase capacity to prosecute and convict criminals.

2. **Law enforcement:** Where laws are in place, capacity is often insufficient to properly enforce them in the field. Low capacity levels are exacerbated by lack of resources (i.e. infrastructure, personnel, equipment, and technical) and incentives to uphold the law (complicated bureaucracies, weak leadership commitment, corruption, and dangerous conditions faced by front-line staff dealing with powerful organized criminal networks). Important success factors for dealing with the industrial-scale organized

| **c.** Build relationships and develop trust

> **i.** Cooperation with law enforcement personnel in country and across countries/regions -- police, customs, CITES, financial intelligence units (FIUs), anti-corruption commissions, etc. -- can help enhance understanding of trafficking networks and deploy resources to deter criminals. Experiences and resources from regional wildlife enforcement networks, intergovernmental organizations — such as the International Consortium for Combating Wildlife Crime (ICCWC) -- and donors are available to support cross-border enforcement plans and operations. Engaging FIUs, tax inspectors, and major anti-corruption agencies can help shut off funding sources used for IWT activities.

> **ii.** Collaboration with civil society is critical to complement government efforts (i.e. intelligence, informants, sting operations, communications, mapping, and networking tools). NGOs can provide ancillary assistance to wildlife trafficking investigations. Multistakeholder engagement efforts can also help broaden accountability, reduce single-party discretion, and corruption risks while increasing expertise and joint capacities. Well-trained LE coalitions help assess risks and deploy targeted interventions to combat large-scale criminals behind IWT

d. Tailor interventions to existing capacity (i.e. improve core policing skills, leverage technical equipment already available, etc.) to facilitate deployment and promote ownership of donor-funded activities and reduce need for continuous external support.

e. Build comprehensive organizational capacity rather than providing activity-based training to concerned staff. In the short term, use of vetted personnel for targeted law enforcement operations, with adequate qualifications and mentoring can be more effective than trying to influence the entire system. Over the long term, IWT should be embedded in mandatory training programs in the national police academy and other mandated capacity development activities to sensitize broader groups of stakeholders.

3. **Protected area management:** Although over the last few decades an increasing number of countries designated significant portions of their territory as protected areas (PAs), many PAs in Africa and Asia are still not effectively managed or protected only on paper. The sheer size and remote nature of PAs translate to large financial resources required to protect and grow these natural assets. Sustainable funding for PAs is a persistent challenge. Important success factors include:

> **f.** Consider PAs part of a national system with the legal, policy, governance, and financial mechanisms to support their effective management (i.e. conservation area laws, concessions, management agreements, etc.). Further, institutions responsible for managing these national assets require financial and technical resources to operate.
>
> **g.** Deploy cost-effective solutions (i.e. SMART Conservation Tools) to support rangers and other stakeholders protect wildlife and its habitat. Wildlife provide critical ecological services and underpin tourism in many countries.
>
> **h.** Establish partnerships across sectors and with local communities, NGOs, and the private sector to bring innovative technical and financial solutions to conserve PAs and promote inclusive economic development. Nature-based tourism (NBT) and other wildlife-based economic activities that engage local communities and achieve actual conservation results can help countries preserve their wildlife and provide sustainable livelihoods. However, NBT is not a solution for all conservation areas and needs to be supported by business plans, market assessments, and a robust supply chain that minimizes environmental and social impacts.
>
> **i.** Explore opportunities to create or strengthen landscape and transnational conservation areas beyond single PAs and buffer zones to achieve greater ecological and economic benefits. Integration of PAs across domestic and transnational portfolios can help to diversify donor support and create opportunities (i.e. tourism circuit, biodiversity management, monitoring, etc.). For landscape and cross-border networks to become operational, the strategic issues must be linked to action on

4. **Communications and awareness (including demand reduction/behavior change):** A communications strategy is an important but often overlooked component of many IWT projects. Development and rollout of a comprehensive communications

strategy is needed to reverse prevailing attitudes that negatively impact wildlife. Strategic communications and outreach can have high multiplier effects beyond project confines. For demand reduction/behavior change interventions, use of media and advertising resources has been critical to the success of campaigns to reduce consumption of protected wildlife in China, Thailand, and Vietnam. By informing consumers of the facts and educating them of the consequences of their actions, with support of key opinion leaders, significant change in consumer behavior can be achieved. Important success factors include:

> **j.** Identification of target consumer groups by assessing demographics, social status, education, and geography. Use insights from existing research on wildlife consumption as well as research on consumer markets, especially the luxury goods market.

> **k.** Evaluate key drivers that encourage or discourage consumer behavior, internal and external factors that affect behavior (i.e. value-action gap), and apply commercial marketing techniques and insights from academic research on manipulating consumer choices to demand reduction campaigns and engage celebrities, governments, peers, children, etc.; deploy optimal mix of communications channels such as social media, traditional media, education systems, and the government distribution channels

> **l.** Apply impact measurement techniques and leverage evaluations tools to monitor impact and changes in be-

5. **Sustainable use and alternative livelihoods:** Lack of ownership and shared benefits of wildlife hinders support of local communities as front-line defenders for wildlife. Indigenous peoples and local communities are affected by insecurity and the depletion of important livelihood and economic assets, while often being excluded from the benefits of conservation and suffering from human-wildlife conflicts. On the other hand, the long-term survival of wildlife populations, and the success of interventions to combat IWT, will depend to a large extent on the engagement of those who live with wildlife populations. Many communities are still not actively engaged in wildlife management, including nature-based tourism. In some instances, communities are exploited by criminals and crime facilitators and driven to serve as low-level poachers. Engaging local communities for conservation and combating IWT can offer many conservation and development benefits that complement government-led initiatives. Community-based conservation investments can improve livelihoods and have a direct impact on reducing the illegal killing of wildlife. Well-governed, independent community institutions are the foundation of successful community conservation and support a holistic approach

a. Engage communities on governance boards to provide oversight, local ownership, and strengthen conservancy institutions. A peer-led process that involves respective chairpersons of the community institutions can help resolve complex and deep-rooted environmental and social challenges.

b. Enlist community conservancy rangers and eco-guards into wildlife monitoring and anti-poaching programs to address threats from poachers and broader security monitoring.

c. Develop enterprises to generate alternative economic opportunities and jobs for conservancies, especially women and youth; community-based natural resource management can help alleviate pressures on wildlife habitats and increase tolerance and coexistence with wildlife (support transition from pastoralism to tourism-based economy).

d. Increase awareness of value and benefits of wildlife through educational programs.

6. **Research and assessment:** Innovative technology and analytical data tools are revolutionizing industries and driving efficiencies. Although there has been an increase in use of technology and integrated data management solutions for IWT, many wildlife conservation efforts are still low-tech and unsophisticated. Lack of timely and comprehensive data and information, disconnected data systems, use of paper systems, and slow procedures limit the type and amount of data and information that is captured real time and used to inform management decisions. Still, an increase in use of data solutions, survey techniques, and technology used to combat IWT and support wildlife management are being used. Examples of technology used include: (i) aircraft surveillance; (ii) drones; (iii) tracking devices (monitored microchip/radio transmitters); (iv) camera traps; (v) spatial monitoring/cyber tracking tools; (vi) remote sensing; and (vii) various global positioning systems (GPS devices). Various exploratory methodologies are also being considered, for DNA analysis, use of trained animals to search for wildlife products in transportation hubs, to mobile solu-

    a. Design, develop and deploy technological solutions that complement existing nontechnological capabilities. Effective management systems, trained staff, and basic skills are needed before advanced technological solutions and equipment can be adopted.
    b. Obtain guidance and requirements from those closest

to IWT issues (i.e. protected area managers and on-the-ground staff) rather than relying on intermediaries. Those who understand the issues and experience the challenges daily are often best-positioned to identify the problem that the technological solution can solve.

c. Create a community of practice (CoP) that supports growth and development by practitioners to leverage technological solutions rather than just a point solution for the product.

d. Consider operations, maintenance, and long-term integration as part of technological or research initiatives.

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Notes

[1] All currency figures are U.S. dollars.

[2] The documentary "Sea of Shadows" highlights how an international crime syndicate is behind poaching of the vaquita in the Sea of Cortez. https://www.terramater.at/cinema/sea-of-shadows/.

[3] Calculation uses UNEP-Interpol 2016 estimated annual value of $344 billion ($100 billion/ $344 billion).

[4] It is important to note that this funding estimation does not consider resources countries spend from their own national budgets.

[5] Corruption is recognized as a pervasive facilitating factor in environmental crime. Crime perpetuates a vicious cycle, undermining investments in good governance, reinforcing the opportunities and incentives for corrupt behavior, and spreading its negative effects throughout society. The flow of illegally traded goods and proceeds from this crime is enabled by corruption, without which organized criminal networks would not be able to function.

[6] According to the World Bank, the shadow price of carbon varies from $40 to $80 per ton of CO_2. Table 3 assumes $40 per ton.

[7] The environmental impacts from Illegal wildlife trade relate to the deleterious effects on target species. Declines in wild populations are directly attributed to illegal harvesting and trade, with certain species driven to the brink of local, national, or global extinction. For example, elephants are ecological engineers that create and maintain forest habitats; their loss has major consequences on the composition, structure, and health of tropical forests. These losses were not taken into account in the estimates provided.

[8] The data for illegal wildlife and ILLEGAL fishing is limited (with considerable uncertainties across all data sources) as in the forest sector. Additional research on the ecosystem services and valuation of these sectors is needed to enhance future analysis.

[9] Counterfeiting and piracy is projected to reach $2.3 trillion by 2022.

[10] Estimates presented in Table 4 are likely to be overestimated, as they assume all illegal activities can become legalized, and therefore can be taxed. Some activities cannot be legalized, such as logging or fishing in protected areas, logging or fishing beyond

allowed quota, etc. In general, data on the proportions of different types of illegal activities do not exist. Even if it did, the data would likely vary significantly between countries, which would still hinder calculation of precise estimates. On the other hand, Table 4 estimates do not account for sustainability parameters that allow the species population to recover and generate long-term gains. Considering sustainability parameters, current estimates are likely to be underestimated. For example, the case of fisheries shows that illegal fishing harms the recovery of the world's oceans from severe depletion. Costello et al. (2016) estimated that if illegal fishing was eliminated, fishing to maximize long-term catch would increase by 25 percent, leading to significant economic benefits. Based on Cabral et al. (2018), if illegal fishing were addressed in all regions, global fishing would become more sustainable.

[11] See UNODC website on transnational organized crime, including international cooperation, for more information: <https://www.unodc.org/unodc/en/organized-crime/intro.html>.

[12] Sixty-five countries signed the London Conference on the Illegal Wildlife Trade (October 2018). The Declaration emphasized the need to "treat wildlife offences as predicate offences, including for money laundering crimes, as defined in the UN Convention against Transnational Organized Crime." The signatories to the London Declaration also urged "strong use of the UN Convention against Corruption to prevent and combat corruption related to the illegal wildlife trade and wildlife trafficking."

[13] Members of the judiciary, prosecutors, and criminal investigators must have the requisite skills and resources to enforce the law: knowledge of environmental crimes and sanctions, capacity to avoid backlog of cases, granting bail, record keeping, requirements for evidence, witness/whistle-blower protections, etc. Standard operating procedures for prosecutions, case management procedures, and sentencing guidelines for natural-resource crimes related offenses must be put in place in national and subnational laws and policies.

[14] The February 2017 Executive Order on Transnational Criminal Organizations (TOC) is designed to strengthen enforcement of Federal law in order to thwart transnational criminal organizations and subsidiary organizations, including criminal gangs, cartels, racketeering organizations, and other groups engaged in illicit activities that present a threat to public safety and national security and that are related to, for example: (i) the illegal smuggling and trafficking of humans, drugs or other substances, wildlife, and weapons; (ii) corruption, cybercrime, fraud, financial crimes, and intellectual-property theft; or (iii) the illegal conceal-

ment or transfer of proceeds derived from such illicit activities."

[15] Technological advancements can also complement human capacity building efforts, as new technology can be used to enhance agency staff efficiency and effectiveness. For example, technological advances in x-ray screening, smart containers, forensics, mobile data collection and information sharing, real-time data analysis, and automation in freight/waybills can facilitate analytical and enforcement efforts.

[16] NRAs evaluate a countries ability to investigate and prosecute money laundering (ML). They also identify major predicate crimes for ML (tax crimes, corruption, drug offenses, etc.). Action plans are created as part of the NRA process and often identify the need to strengthen specific areas (financial investigations, international or domestic cooperation, etc.). Countries should assess all proceed-generating crimes as part of the NRA process, including natural resource crimes when looking at ML/TF predicates.

[17] Recommendation 40 highlights the different channels that can be appropriate for the exchange of information. Examples of mechanisms or channels that are used to exchange information include: bilateral or multilateral agreements or arrangements, memoranda of understanding, exchanges on the basis of reciprocity, or through appropriate international or regional organizations.

[18] Carrasco et al. (2014) and Siikamaki et al. (2015) are used to estimate biodiversity values. Carrasco et al. (2014) carried out a spatially explicit meta-analysis based on 30 studies of ecosystem service values in tropical forests from the Economics of Ecosystems and Biodiversity (TEEB) database and found a mean estimated value of $1,312 per hectare per year. Siikamaki et al. (2015) also carry out a meta-analysis from 123 studies in the forest ecosystem service literature. Siikamaki et al. (2015) included four types of ecosystem services: (a) water (incorporating erosion and flood control), (b) habitat and species protection, (c) recreation values, and (d) non-forest wood products.

[19] Average of 88 cubic meters per hectare (Indonesia) and 38.6 cubic meters per hectare (Brazil).

[20] The value of an elephant considered here is taken from IWORRY (2015) and it is estimated using their value. That said, it is estimated that a single elephant can contribute $22,966 to tourism per year.

[21] Similar methodologies were used to estimate imports and exports of illegal timber included in the independent evaluation of

the European Union's (EU's) Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan (EC 2016).

[22] See the IUU Watch website: <http://www.iuuwatch.eu/what-is-iuu-fishing/>.