



Understanding the damages of environmental crime

Review of the availability of data

Deliverable No. 3.1



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ABSTRACT

This deliverable is the conclusion of Task 1 of work package (WP3) of the FP7 research project "European Union Action to Fight Environmental Crime" EFFACE. The aim of WP3 is to understand the impacts (quantitative and monetary) of environmental crime. The purpose of the first task of WP3, Task 1, was to review and collect data on the extent and impact of different types of environmental crime. It was not at this stage to produce estimates of the impact of environmental crime or otherwise quantify that impact – this is the subject of the subsequent tasks of WP3. Rather, Task 1 was to summarise the data sources available for different types of environmental crime and to summarise the type and extent of the data these sources contain. This review would, therefore, form the basis for determining the appropriate next steps in the WP.

A standard table was completed for each report, data source, etc. The table asked for clear information about the data source (including links), its location, geographic and temporal scope as well as methodology used for collection. It also asked for information on whether it provides data on the extent of criminal activity (extent, individuals involved, etc.) and whether the data provide information on qualitative, quantitative and monetary impacts on the environment, society and/or economic impacts. In each case, comments were asked on data quality, etc., where possible.

The survey of data sources within Task 1 of WP3 of EFFACE showed that the data on environmental crime are usually highly dispersed with limited detailed data collations. The most likely sources of consolidated data are international institutions (such as Conventions and the EU). However, even here data are often limited. For many Conventions data collation is limited to those data reported by Parties and such data are often limited, of uncertain quality and with significant gaps. At EU level there has been limited data gathering on environmental crime (in contrast to other data sets on environmental quality and pressures). Perhaps the best data set at EU level identified concerned fires.

While consolidated data sets are uncommon, there are many examples of data on impacts in specific cases, such as for individual countries, individual instances, sites, etc. As a result it is not possible to provide a robust estimate of the overall impacts of environmental crime. There are simply too many gaps for this to be done with any confidence. Even doing this for certain areas of environmental crime is problematic. Therefore, it is important to focus on quantifying the impacts of environmental crime in areas where there are sufficient data for this to be done robustly and with confidence.

Following the examination of the data sets described in this deliverable, the following areas were identified as being most suitable for quantitative and economy analysis, given the availability of data:

- Waste shipment
- Fisheries
- Protected areas
- Fires
- Marine incidents

This quantitative and economic analysis will form the next stages of work of WP3 and the results will be set out in the next WP3 deliverable in April 2015.

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LIST OF ABBREVIATIONS

CFC	Chlorofluorocarbons
CFP	Common Fisheries Policy
CITES	Convention on International Trade in Endangered Species
EEA	European Environment Agency
EEE	Electrical and electronic equipment
EFFIS	European Forest Fire Information System
E-PRTR	European Pollutant Release and Transfer Register
EU	European Union
IUU	Illegal, unreported and unregulated (fishing)
MEA	Multi-lateral Environmental Agreement
NGO	Non-governmental organisation
ODS	Ozone depleting substances
OECD	Organisation for Economic Co-operation and Development
TEEB	The economics of ecosystems and biodiversity
UK	United Kingdom
UNEP	United Nations Environment Programme
UV	Ultra violet
WEEE	Waste electrical and electronic equipment
WP	Work Package
WSR	Waste Shipment Regulation
WWF	World Wide Fund for Nature

1 Introduction

1.1 The scope of Task 1 of Efface WP3

This deliverable is the conclusion of Task 1 of WP3 of EFFACE. The aim of WP3 is to understand the impacts (quantitative and monetary) of environmental crime. The purpose of the first task of WP3, Task 1, was to review and collect data on the extent and impact of different types of environmental crime. It was not at this stage to produce estimates of the impact of environmental crime or otherwise quantify that impact – this is the subject of the subsequent tasks of WP3. Rather, Task 1 was to summarise the data sources available for different types of environmental crime and to summarise the type and extent of the data these sources contain. This review would, therefore, form the basis for determining the appropriate next steps in the WP.

1.2 Methodology

The methodology agreed was that data sources for different types of environmental crime would be examined. It was also agreed that the focus on the data search would focus on a definition of environmental crime as being that of activities which are illegal. It was recognised that some data sets may not be able to distinguish between actions or harm from illegal or legal activities, but this would be noted during the data search.

It was further noted that the scope of the information sources would vary according to the subject. Where criminal activities involved EU and third country relationships, the scope would be global. Where the criminal activity takes place entirely within the EU, the scope of data collection would be limited to the EU. The following table sets out the subject division for examination of information sources and the geographic scope that was covered.

Table 1. Subject area responsibilities for partners for Task 1

Subject Area	Scope (EU/international)
Soils	EU
Waste: landfills, dumping	EU
Waste: shipment	International
Pollution incidents	EU
Fisheries	Scope is CFP, so some international
CITES	International
Protected areas	EU
Chemicals: trade, bans	International
Fires	EU
Marine (oil, Marpol, London Convention, etc.)	International
Timber	International

The task was to scope, as far as possible, available data sources covering the range of different types of impacts (environmental, social, economic) that can arise from environmental crime in that subject. The objective was not an analysis of the data, but an overview of the data available in order to allow the WP to contextualise the quantitative analysis in the subsequent tasks of the WP.

The table provided a framework for clear information about the data source (including links), its location, geographic and temporal scope as well as methodology used for collection. It sought information on whether the source provides data on the extent of criminal activity (extent, individuals involved, etc.) and whether the data provide information on qualitative, quantitative and monetary impacts on the environment, society and/or economic impacts. In each case, where possible, comments were sought on data quality, etc. The table used for Task 1 is set out below. The subsequent sections of D3.1 provide a short analysis of the overall availability of the data for these different areas.

Table 2. Table for Task 1

Issue	Sub-issue	Description of information and data available for subjects below	Other comments (including on quality of data, potential to aggregate data)
Type of environmental crime			
Title of information/data source			
Where is the data source? Link if available?			
Method used for data collection			
Geographic scope of data (country coverage), including if transboundary			
Temporal coverage of data (start and end date)			
Extent of environmental crime	Numbers of instances of the crime or other measure of scale (e.g. area affected)		
	Number of individuals involved in criminal activity		
Relationship to organised crime (if any)?			
Qualitative impacts	To environment		
	Social		
	Economic		
Quantitative impacts	To environment		
	Social		
	Economic		
Monetary impacts	To environment		
	Social		
	Economic		
Other issues/comments			

2 Results

2.1 Introduction

The following sub-sections provide an overview of the analysis of the data survey of Task 1. The completed tables are provided in an annex to this deliverable. The sub-sections cover:

- Soils
- Waste: landfills and dumping
- Illegal waste shipment from Europe
- Pollution incidents
- Fisheries
- CITES
- Protected areas
- Chemicals: trade, bans
- Fires
- Marine (oil, Marpol, London Convention, etc.)
- Timber

2.2 Soils

The survey of data concerning soils is set out in the Annex. With regard to the data review for soils, the following points can be made:

- The key impacts for which information/data are available to some extent are on the environment (quantitative information) and on social impacts (qualitative information).
- It is more difficult to find data on impacts which are quantitative and/or monetary.
- With regard to data limitations, work on data collection at the EU level has generally been limited to the collection of "country level" information for local contamination. Several exercises have been carried out to collect data at "regional" level, with the aim to reach a higher detail, trace variations within countries and regional areas and to identify "hot spots".
- With regard to data quality, the results obtained so far show a large heterogeneity in the gathered data at country level as well as at the higher spatial detail. Most of the existing

national provisions in the European Union tackle the problem of soil contamination, but not all Member States have established a national inventory of contaminated sites (European Commission, 2006).

- In general, it can be said that there is good availability of data at national level where contaminated sites management is centralised. However, there are still different and inconsistent definitions regarding site management steps in the various countries, different progress and level of prioritisation.

In conclusion, in taking forward the work of WP3, on undertaking quantitative analysis of the impacts of environmental crime, the health impacts of high levels of soil contamination could be analysed. With regard to monetary analysis, an interesting aspect that could be analysed is the national expenditure for the management of contaminated sites.

2.3 Waste: landfills and dumping

The survey of data concerning soils is set out in the Annex. With regard to the data review for waste, the following points can be made:

- The key impacts for which information/data are available to some extent are the environment (quantitative data) and social impacts (qualitative data).
- It is more difficult to find data on impacts that are quantitative and/or monetary.
- The limitations on the available data include the geographic spread of data, limited by year, etc.. For example, the limitation concerning the geographic spread of data, is that they are mainly collected on a Regional/ Country level (e.g. UK, Italy).
- Regarding data quality, the data are mainly gathered through country reports, desk studies, interviews of public authorities, and NGOs. The analysed studies provide information on improving, implementation and enforcement of EU waste policy, focusing on the environmental, economic and social impacts of these activities.
- Regarding data availability, data issues on illegal waste activity are internationally recognised to be a problem. EU Member States do not have the means available to estimate the volume of legal waste movements, let alone the illegal percentage. This is largely to do with the fact that most movements are not subject to any pre-notification requirements, which means that the authorities are not consistently informed about this type of activity. At present, the possibility to conduct research that seeks to understand illegal waste activity is hampered by data recording deficiencies.

In conclusion, in taking forward the work of WP3, on undertaking quantitative analysis of the impacts of environmental crime, it could be interesting to undertake a quantitative analysis on the economic impact of illegal waste landfills and dumping (e.g. on agricultural activities, etc.). With regard to monetary analysis, an interesting aspect that could be analysed is the costs of illegal landfills (clean-up costs for a contaminated site, etc.).

2.4 Illegal waste shipment from Europe

In order to examine the extent and impacts of illegal waste shipment from Europe one should first define what types of activities are considered to be illegal. According to the EU Waste Shipment Regulation (Regulation EC No 1013/2006) illegal waste shipment can take many forms including:

- Transporting waste without notifying the competent authorities concerned;
- Transporting waste without the consent of competent authorities;
- Falsifying any documents linked to waste loads;
- Transporting any waste subject to the Basel Export Ban out of the EU or the OECD (e.g. transporting hazardous waste to non-OECD countries or exporting waste for disposal outside the EU);
- Mixing certain types of wastes; or
- Classifying hazardous waste as non-hazardous.

As Member States are obliged to report to the European Commission under the EU Waste Shipment Regulation (WSR) every year on the number of instances of illegal waste shipment statistical figures are publicly available (see annex). Nevertheless, these figures only indicate the reported amount of illegally shipped waste and thus volumes are considered to be much higher. In addition, these reports cover all forms of illegal waste shipment and usually do not differentiate between the different types of actions.

Illegal activities often lead to structured and centralised actions and thus result in the development of organised crime. This is also the case for illegal waste shipment and numerous publications can be found in this area (see annex). Some of the reports only provide a general view of the structure of the organised crime activities linked to waste shipment, while others include specific case studies which present the results of on-site investigations. Data quality in this area is considered to be good nevertheless publications do not assess the quantitative and qualitative impacts of the illegal acts in all cases. Data are available for some specific European countries, for instance information on UK activities were found in two reports.

Even though all forms of illegal waste shipment violate the EU WSR the impact of the different types of activities are not considered to be the same. Electrical and electronic goods are more frequently used by European citizens and as people exchange their appliances for new ones more often waste electrical and electronic equipment (WEEE) is a growing waste stream.¹ Furthermore, as electrical and electronic equipment (EEE) contains hazardous substances but at the same time some precious metals too it is especially crucial to manage the generated e-waste in a sustainable and sound way. Although the export of WEEE from the EU to non-OECD countries is prohibited experience shows that large volumes of e-waste are shipped from the EU to developing countries, such as China, Nigeria and Ghana. For the reasons above the main focus of the scoping exercise was on the extent and impact of e-waste streams from the EU to non-OECD countries.²

As a first step literature focusing on the amount of WEEE generated and exported from the EU was gathered (see annex). A number of publications were found to present volume estimates for specific European countries, such as Germany, Denmark, Belgium and the Netherlands (see annex). Data availability was considered to be good nevertheless one can question the quality of statistical data. An obvious reason for inaccuracy lies in the nature of any types of illegal activity but for instance the lack of differentiation between new and used EEE exported from the EU in statistical databases also make data unreliable. As the WSR does not prohibit the export of used and second-hand EEE to non-OECD countries this loophole is frequently used by exporters and significant amount of used EEE is shipped to developing countries which turns out to be non-functioning and thus should be considered as WEEE. Subsequently, the indicated volume figures are seen as rough estimates which often use assumptions and extrapolations.

The second focus area of the literature review was on the quantitative and qualitative environmental, social and economic impacts of WEEE. Even though some publications were found to present the general impacts of WEEE streams in developing countries (see annex) in most cases reports specifically look at different geographical areas. Publications were found to be mainly focusing on West Africa, primarily Nigeria (see annex) and Ghana (see annex) and Asia, especially China (see annex). Data availability was considered to be good on human health and labour impacts (see annex) and many academic and non-academic publications were found on various impacts of WEEE in China (see annex). Some reports build their findings on desk-based literature

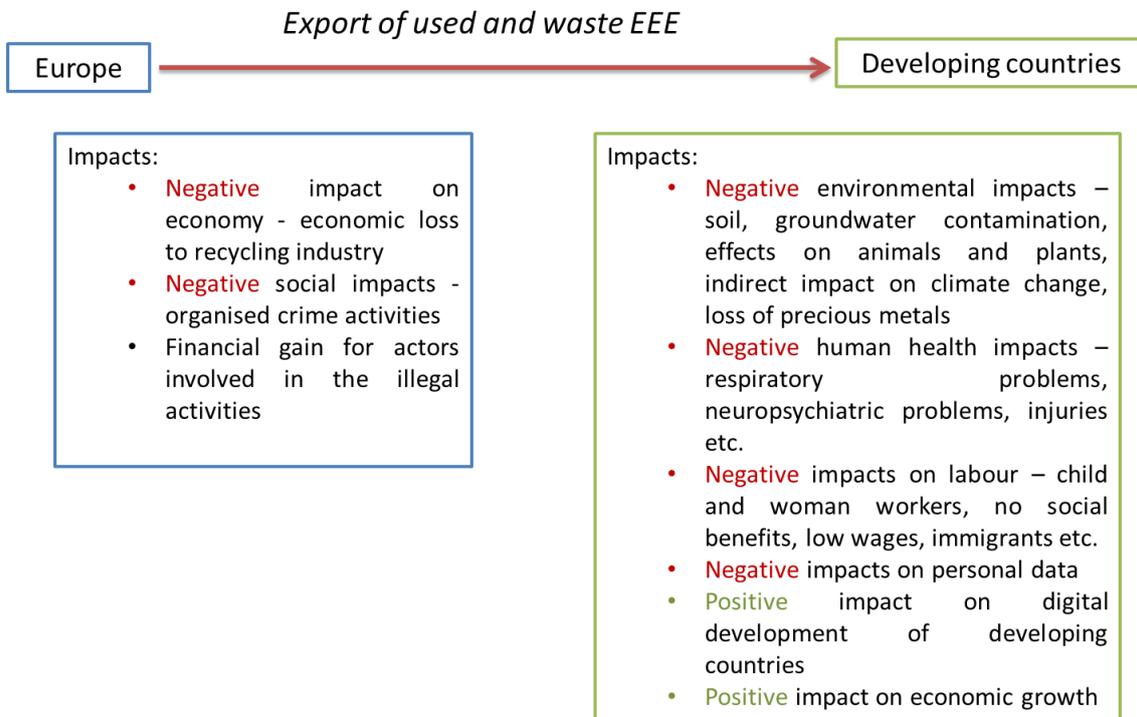
¹ EEA (2009) Waste without borders in the EU? Transboundary shipments of waste, EEA Report No 1/2009

² As information was also available on the generated and exported amounts and impacts of the broader category of hazardous waste, which includes not only WEEE, literature on this topic is also included in the section below (see Table 8 and Table 9).

review, while others, especially those which cover case studies, rely on expert interviews, on-site investigations and analysis. Academic publications for instance include very accurate and specific data about selected e-waste recycling sites. Based on the scoping exercise an overview of impacts of used and waste EEE from Europe to developing countries is presented in the figure below.

In summary, the scoping exercise looked at both 'grey literature' produced by governmental, research and non-governmental organisations (e.g. European Commission, European Environment Agency, Secretariat of Basel Convention, United Nations Environmental Programme, Interpol, Greenpeace and Basel Action Network) and academic literature. After narrowing down the focus to WEEE, data were easily found on the generated amounts of WEEE in Europe, the exported volumes to developing countries and the environmental, social and economic impacts of e-waste in non-OECD countries. Nevertheless, many of the reports examined did not link the observed impacts to specific amounts of e-waste and thus there seems to be a tendency that publications either focus on the generated amounts of WEEE or on the impacts of this waste stream. Exceptions can be found when the focus is on site-specific case studies. Furthermore, with regard to the estimated amounts of generated and exported WEEE there is a great concern that statistical data are not accurate. Even though many estimates were discovered on the exported volumes of WEEE no estimates were found at all on the number of individuals involved in the criminal activities. It was more challenging to find information on the economic and monetary impacts of illegal shipment of e-waste than on environmental and social impacts. Furthermore, more information was found on the qualitative impacts than on quantitative impacts. Mainly academic publications analysed quantitative environmental and health impacts – soil contamination levels and toxic material levels in blood samples. Finally, some thematic reports provide a good overview on the link between the illegal e-waste recycling sector and organised crime nevertheless it seems like that such publications in most cases do not detail the impacts of these illegal activities.

Figure 1: Overview of potential impacts of used and waste EEE streams shipped from Europe to developing countries



Source: Own compilation based on literature listed below

2.5 Pollution incidents

In order to examine the extent and impacts of localised pollution incidents in Europe it was first necessary to consider the types of pollution incidents to research. There are many different types of localised pollution, including waste-related pollution, emissions to air, discharges to freshwater, spillages/dumping at sea, and contamination of land. To ensure that the scope of the research was kept manageable it was decided to focus on a limited number of issues where it was thought enough information would be available to contribute to the project in a meaningful way:

- Illegal dumping/fly-tipping of waste;
- Illegal discharges (of oil and/or waste) by ships at sea; and
- Contamination of land/soil (including technological accidents and pollutant releases).

There are somewhat limited data sources that cover local pollution incidents across the whole EU territory. It was therefore necessary to search in a wide range of locations, including the websites of Member State environment ministries, reports by governmental organisations/agencies and

academic reports/research undertaken by consultancies. This meant that a considerable amount of time was required to locate useful information, due to the disparate sources used.

The most information was found on illegal dumping/fly-tipping of waste. An interesting source is the TrashOut database, which is based on crowd-sourced data from the public. Whilst not the most scientifically robust source, it does provide an interesting overview of the scale of the problem of fly-tipping in 27 EU Member States (there are some data for all except Lithuania). Several sources were found regarding waste-related crime in the UK (see annex). The quality of data is relatively robust, and recent data are available, providing an up-to-date picture of the amount of fly-tipping occurring in the UK. Information available includes the number of illegal waste sites, serious and organised waste dumping incidents and smaller fly-tipping incidents, as well as numbers of offenders sentenced and successful prosecutions undertaken. Some information is also available on the cost of tackling waste crime, and the cost of waste crime to the UK economy (including evasion of landfill tax). So far, only anecdotal evidence has been found on links to organised crime. A handful of information sources were also found for other Member States, including unauthorised waste activity in Ireland, and illegal landfills in Bulgaria. Further research could perhaps be carried out into the number of illegal landfills across the EU to provide a more thorough picture of this type of environmental crime, if this is deemed to be an area of focus for the project.

Several information sources were also found on illegal discharges from ships at sea, most notably oil spills. One EEA report includes information that covers most Member States (except Romania, Bulgaria and Croatia), and additional information is available on the Baltic Sea and North Sea more specifically. The EEA report refers to 'accidental' oil spills, thereby not clearly defining whether the spills can be considered illegal; the other sources, however, all refer to 'illegal' spills. Information is available predominantly on the number of oil spills and the volume of oil spilled. Interestingly, the source specifically dealing with the North Sea highlights the particular problem of illegal oil discharges that take place at night, when they are harder to detect; this is taken to be an attempt to conceal illegal discharges and avoid any penalty. One research project which concluded in 2005 may have compiled a considerable amount of data on illegal oil discharges, but it seems that the database is no longer available online. However, only one source (includes quantified estimates of the economic/monetary cost of oil spills. One source was also identified on the dumping of waste from ships, including oily waste, general waste, fishing gear and waste water. This source includes estimates on the quantities of these types of waste, and also limited estimates of the total external cost of ship source pollution.

Finally, information was found on contaminated sites, technological accidents and pollutant releases. It should be noted that several of the information sources identified do not specify

whether the contamination/pollution is the result of deliberate criminal activity, but it was nevertheless thought useful to include them in the literature review to provide an overview of contamination incidents. On contaminated sites, information found relates to the scale of local soil contamination, sources of contamination (notably including waste-related activity, industrial/commercial activity, storage, transport spills), a specific illegal toxic dump in Italy (table). The main quantified cost information relates to expenditure on the management of contaminated sites, and an estimate of compensation related to the illegal Italian toxic dump. On technological accidents, an EEA report provides an overview of oil spills, industrial accidents and toxic spills from mining, including the volume of spillages, number of human fatalities and estimated costs. A JRC database lists major accidents and near misses (releases, fires, explosions and transport incidents), partly based on mandatory reporting by EU Member States under the Seveso III Directive (2012/18/EU); quantitative information on impacts is included for some entries in the database. On pollutant releases, the European Pollutant Release and Transfer Register (E-PRTR) is based on mandatory annual environmental data reporting by over 30,000 industrial facilities in the EU Member States plus Iceland, Liechtenstein, Norway, Serbia and Switzerland. It includes data on the annual quantity of pollutants released to air, water and/or land by facilities, but no information on actual or perceived cost.

Two additional information sources were identified which do not specifically fit into the three main categories above. These are: a source from Estonia listing legal offences related to the environment (violations of the Waste, Earth's Crust, Integrated Pollution Prevention and Control and Water Acts) and fines imposed; and a source from 2007 detailing the magnitude of legal sanctions (fines and prison sentences) applied in the EU for unlawful discharges of hazardous substances to water and unlawful dumping of waste, but not the number of such sanctions imposed.

In summary, many of the information sources lack quantitative data, in particular data on costs. A greater amount of data is available on the quantity of polluting materials dumped or released into the environment, however, so where cost information is lacking it may be possible to undertake some calculations to provide estimates of the cost based on general estimates of the cost of specific types of pollution. There is also a lack of information on whether organised crime is suspected in many cases of pollution incidents, and in some cases the information sources do not delineate between criminal and non-criminal activity.

2.6 Fisheries

This section considers the data sources on the extent and impact of illegal fisheries in EU waters and by EU vessels. In fisheries science and policy illegal fishing is often referred to alongside unreported and unregulated fishing, abbreviated to 'IUU fishing'. Illegal fishing occurs when vessels or fishers operate in contravention of the laws of a fishery. Unreported fishing refers to fishing activities which have not been reported, or have been misreported to the relevant national authority or fisheries management organisation, in contravention of the laws governing the fishery. Unregulated fishing refers to fishing activities 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.

Not all IUU fishing is a crime, such as unregulated fishing in the high seas for example, and so from a strictly environmental crime perspective this terminology can introduce inaccuracies. However, other criminal conduct is frequently associated with unregulated activity, as a lack of regulation of fishing vessels facilitates their use in other crimes, including serious and organised crimes such as illegal immigration, human and drug trafficking, and modern slavery. Organised crime has also been found to be a problem in some particularly lucrative fish species, such as those for abalone, sturgeon or toothfish.

The data review uncovered several sources of data on the extent of illegal or IUU fisheries, in the Baltic Sea cod fishery, the Arctic cod fishery, in the Mediterranean (specifically the use of illegal driftnets), and illegal fishing for turbot in the Black Sea. There were also sources identified that produced estimates of the worldwide extent of illegal fishing. These sources refer to differing time periods, and the unit of measurement varies, ranging from a percentage of reported catches or total allowable catches, to a tonnage of illegal catch, a number of infringements/ illegal gears detected. This variability presents challenges for aggregation of the data.

The review also uncovered several sources that provide information on the impacts of illegal or IUU fishing. The impacts most frequently cited are environmental, including detriment to habitats and bycatch of non-target species (including birds, cetaceans and sharks) and particularly the harm to fish stocks resulting from their illegal (over)exploitation. Note that the latter could also be classified as an economic impact, as reduced catches clearly present an economic burden. Social impacts generally refer to reduced employment in the legitimate fishing sector and ancillary sectors, threats to food security, and the governance impacts resulting from illegal fishing undermining the fishing

regulations. Economic impacts identified were economic losses from lost landings, loss of any fees or taxes, and distortion to markets.

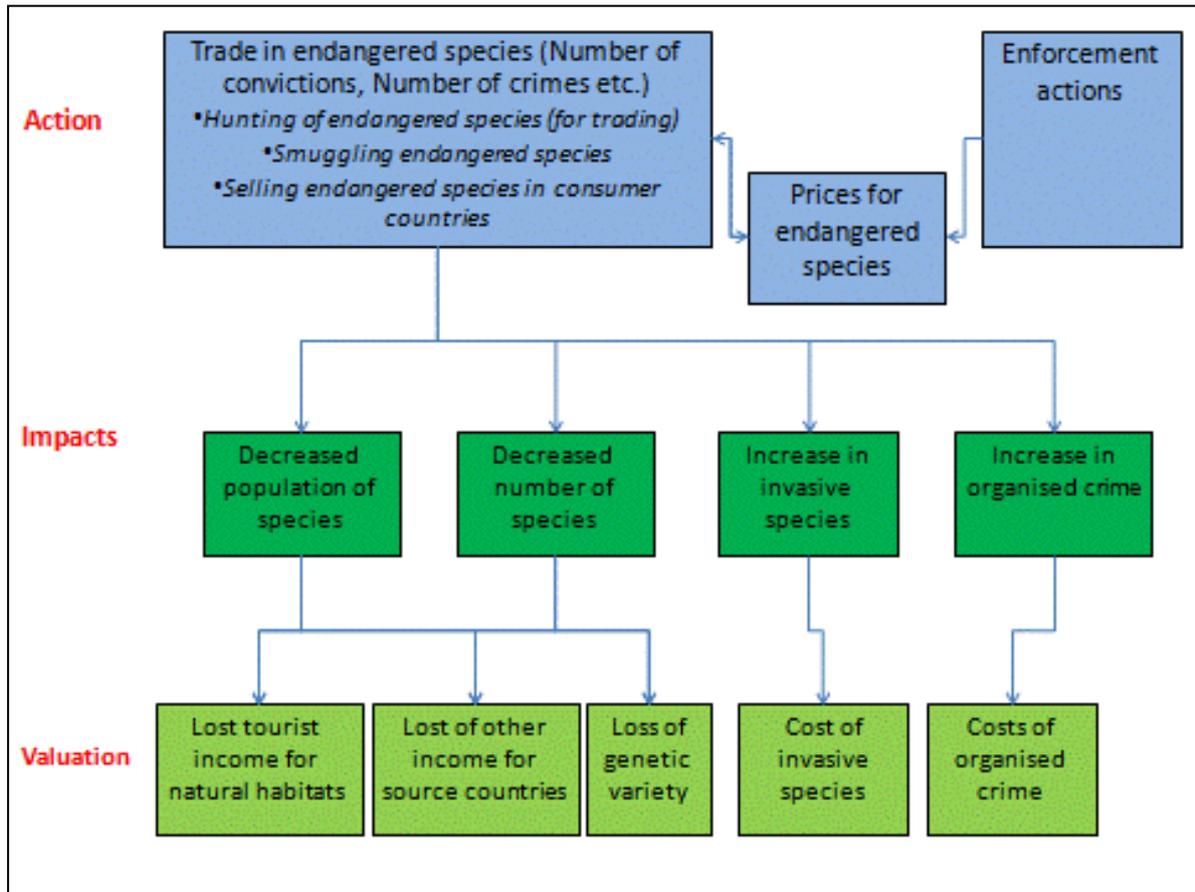
The majority of this information on impacts was qualitative, particularly that relating to social impacts. Several sources contained quantitative data on impacts, but this nevertheless presents a challenge for aggregation or extrapolation, as the units of measurement varied significantly. For example, some sources have figures for the tonnage of illegal catch, or number of illegally caught fish, and other sources have figures for the number of birds, cetaceans and other species caught illegally per year or during a fixed study period. One source included an estimate of sea turtle bycatch in the form of a bycatch to catch ratio. This variability presents a challenge, but there is some potential for harmonising the data to a degree in order to aggregate it. Efforts to extrapolate any estimates from a specific study period should recognise that policy reform or changes to enforcement may have occurred since the research was performed meaning that the rates of illegal catch or bycatch resulting from illegal activities may no longer apply.

A handful of sources provided monetary estimates, and these all related to economic impacts (although, as, stated previously, reduced catches could also be considered an environmental impact). These impacts were almost entirely expressed in terms of the value of lost catches. Of these estimates, one refers to developing countries, one is on a global scale, and one estimates the costs of IUU fishing in the EU. The former may still be relevant to the EU as EU vessels may be responsible for the illegal activity in developing countries' waters. An exception to this trend of monetising purely the value of catches lost to illegal fishing among the literature is a figure for the fines paid by Turkey to states for detaining illegal fishers in the Black Sea. No estimates were made of the monetary impact of the losses from illegal fishing to bycatch species (such as cetaceans and birds) or other environmental impacts.

2.7 CITES

Trade with endangered species has been an important focus of environmental policy and advocacy for quite a while which means that very detailed information is available although not always in the form useful for an economic assessment of costs. We have used the following rough structure for our data search:

Figure 2. Impacts of trade in endangered species



In respect to the incidence of environmental crime the numbers available are not very precise. There is information on the legal trade of endangered species and some authors derive estimates on the size of the illegal trade based on these numbers but there is little evidence on any precise methodology for this step. Linking the trade data with data on seizures could be a way of identifying this crucial link but seizure data in general is very narrow and the results might be not reliable.

Linking the information on incidences to the impacts is also difficult. However, the correlating environmental impacts of poaching and trade in specific species, particularly, Tigers and Elephants, where data is available, could be used to valuate related costs in terms of losses in relation to ecosystem services, economic development, tourism, employment and even conflict. Tourism incomes or species numbers are fluctuating to varying degrees from poaching as there may be other contributing factors, such as conflict, and therefore the causation must be assessed. For some species (e.g. elephants) it might be possible to make this link clearer as information on the causal link is available.

Linking such information with valuation results will be possible in some cases. The value of tourism income can be derived from trade statistics and some valuation of invasive species and the value of ecosystems can be derived from EVRI, although this remains limited to some specific valuations. The key challenge will be in these cases the link between the data on incidences and crimes above, which is based on species, to measures like tourism income and the value of ecosystems.

Information on the types of crime and crime incidents

There are two types of data that could be useful for valuing illegal wildlife trade: import and export data and licensing data (CITES Trade Database (Table 1); EU COM/FAO STAT Databases (Table 2)). The second type of useful data is seizure data (EU-TWIX3 (not accessible) & CITES Biennial Reports (Table 4)).

Trade Data

The OECD 2012 report, titled, Trade in Environmentally Sensitive Goods explains that import and export data in some environmentally sensitive goods (e.g. CITES), can be used to gauge the level of illegal trade using discrepancies between two reporting countries that enter into trade with one another. As is common with many MEAs, CITES operates using a licensing system or permits of certification, that make trade in a specific product legal. The development of a licensing system allows importing countries to determine whether the imported product is legal or illegal. For instance, the OECD 2012, attempts to identify the impacts and economic, environmental and social costs of illegal trade, using three sets of data comparisons⁴:

- Between customs data and data recorded by licensing systems
- Between customs data from importing and exporting countries
- Between licensing system data from importing and exporting countries⁵

³ EU-TWIX stands for European Union Trade in Wildlife Information eXchange. It is managed by TRAFFIC. Introduced in 2005, EU-TWIX comprises a database of information on wildlife seizures in the EU and an associated mailing list that allows quick and efficient information sharing between designated enforcement officers from all 27 EU Member States, plus Croatia, Montenegro, Norway, Serbia, Switzerland and the Ukraine. The database currently holds over 31,000 wildlife seizures as well as information on prices of wildlife specimens in trade.

⁴ See Executive Summary: <http://www.oecd.org/tad/envtrade/ExecutiveSummaryIllegalTradeEnvSensitiveGoods.pdf>

⁵ OCED 2012. Illegal Trade in Environmentally Sensitive Goods. OECD. Available online: <http://www.oecd.org/tad/envtrade/ExecutiveSummaryIllegalTradeEnvSensitiveGoods.pdf>

Availability

The CITES trade database (Table 1) includes data on the trade of CITES-listed species using self-reported import, export and re-export data which is authorized through a licensing system.

The database allows users to identify where trade of a particular endangered species is occurring at the national level, it allows searching for species, animal parts, and finished products (chess sets made from ivory) and also includes information on its intended purpose (circus, educational, hunting). The overall trade volume of CITES listed species and specific CITES listed species should be evident through this database. Other useful commodity trade databases include (Table 2) UN COM and FAOSTAT.⁶ Generally speaking, these trade databases can give an indication of overall trade volumes of legal wildlife commodities or derivatives thereof, which are interesting for evaluating the economic or monetary dimensions of legal and illegal wildlife trade, however, they are imprecise in determining specific species and thus less useful in measuring the environmental impacts.

Reliability

UNCOM, FAOSTAT, CITES account for legal trade flows between importing and exporting countries and they rely on countries' self-reported data. The CITES Trade database (Table 1) depends on states' self-reported data submitted in annual reports which varies significantly in quality of reporting. There are clear discrepancies in reporting and some countries do not file their annual reports to CITES as dictated in the treaty. Other issues include a lack of standardized terms used to describe the articles/commodities in trade, with for instance, an import country recording 55 Python Belly Skins and an export country reporting simply "skins". Also, discrepancies occur between the number of permits or certificates issued compared to the actual number of species traded (e.g. more permits may be issued than are actually used). Finally, the source of species/commodities (wild-caught or bred in captivity) as well as, the intended purpose for which permits are issued, are often different between countries.⁷

Another problem with relying on licensing information from CITES has been permit fraud⁸, which resulted in a 2001 decision where the CITES Secretariat issued additional advice on permits and

⁶ The FAOSTAT measures the trade volume of bushmeat in specific countries which is relevant for qualitative factors, such as food security and cultural heritage and integrity.

⁷ CITES Trade Database Interpretation Guide:
<http://www.cites.org/sites/default/files/common/resources/TradeDatabaseGuide.pdf>

⁸ Falsification of permits is especially problematic in products of extremely high value. Caviar as highly vulnerable to permit fraud, corruption and falsification. (OECD 2012).

certificates to Parties.⁹ There are often differences between the number of permits issued and the number of specimens traded. The 2012 OECD report explains that the discrepancies should, in theory, be picked up by the importing country that is responsible for recording actual trade, however, this is not guaranteed. While export countries are required to fill out records for customs indicating the number of species, it is quite common that this is not done in some countries.¹⁰

In combination with other sources of information (e.g. seizure data, prices), overall trade volumes of wildlife can give an indication of the potential illegal trade. Some studies use a ratio that assumes illegal trade as a certain percentage of legal trade. For instance, the Global Financial Integrity Report on Transnational Crime¹¹ estimates that illicit wildlife trade accounts for some \$7.8 and \$10 billion per year, based on the assumption that illegal trade accounts for approximately one third of legal trade. However, the Coalition Against Wildlife Trade (CAWT) states that estimates of illegal wildlife trade range from 25% to 70% of the legal trade.¹² In comparison, TRAFFIC used declared import figures from the early 1990s to estimate the value of illegal trade today and came up with the figure £2.25 billion £6.3 billion.¹³ Global trade databases are mainly used to gauge the "big picture" of trade flows and trade volumes and there seems to be different methods for determining the value of illegal trade.

Missing information

Cross checking documents of trade data is very difficult because of the enormity of the total volume of trade. Only a small amount of the total volume of goods, including animals and plants, in international trade can ever be physically inspected.¹⁴ Moreover, even when shipments are inspected, the knowledge of the officer on duty to recognize one of the 34,000 CITES species is incredibly difficult.

Also, cross-border trade (between countries that share a border) is likely to circumvent both the UNCOM/FAOSTAT and CITES databases. Information, on smuggling and trading between regions, therefore, is limited.

⁹ Ibid, p. 91.

¹⁰ Ibid, p. 91.

¹¹ See Jeremy Haken (2011): Transnational Crime in the Developing World. Available online: http://www.gfintegrity.org/storage/gfip/documents/reports/transcrime/gfi_transnational_crime_web.pdf

¹² Coalition Against Wildlife Trafficking. Available at: <http://www.cawtglobal.org/wildlife-crime/>

¹³ Coalition Against Wildlife Trafficking. Available at: <http://www.cawtglobal.org/wildlife-crime/>

¹⁴ OECD, 2012 p90.

The CITES Trade Database only deals with international trade in wildlife and does not address domestic/internal wildlife trade in countries. For example, CITES prohibits the trade of any tiger or tiger part, however, China still has a legal and domestic market for tiger parts.

Seizures

Availability

The main database recording seizures in Europe is EU-TWIX, the use of which is restricted to European wildlife enforcement officials. However, important cases of CITES wildlife seizures carried out in the EU are made publically available in a report on an annual basis.¹⁵ As required by the CITES legislation, parties are required to publish (Biennial Reports: Table 4) on legislative, regulatory and administrative measures adopted by the country to implement and enforce the regulations. The Biennial Reports are not comprehensive in their data collection of CITES Parties (Table 4), however, they contain information on national compliance and enforcement efforts and include information on the number of inspections, number of investigations, number of confiscations, number of prosecutions, number of convictions, number of penalties, number of court decisions. The reports may also contain details of specimens seized, confiscated or forfeited.

There are also several databases that record data on seizures related to specific species such as elephants (Table 8 ETIS) and tigers (Table 10 Tiger Tracker). These databases give information on the number of seizures, the geographical location and volume or quantity. They are useful for monitoring the economic value and the environmental impact of trade in a specific species.

Reliability

The global seizure databases (Table 8 ETIS) and the information in the Biennial Reports all rely on country's own self-reported data. The quality of reporting varies significantly between countries with some failing to submit reports at all. Data quality is determined by discrepancies in reporting, enforcement capabilities, technological capacity, financial resources, skill-sets of employees working in relevant agencies, and the perceived importance or prioritization of wildlife trade in a country's national agenda. To a certain extent the irregularity of reports is made evident by the fact that both the import and export countries submit information on the same transaction, then a country with bad or non-existent reporting will be implicated in the reports of its trade partners. For example, a country may have reported zero seizures themselves but were implicated in many

¹⁵ The reports for 2011 and 2012 are already available online (see <http://www.cites.org/sites/default/files/eng/com/sc/62/Inf/E62i-03.pdf> and <http://ec.europa.eu/environment/cites/pdf/Overview%20significant%20seizures.pdf>) and the 2013 report is currently in preparation.

seizures made by other countries. This information can give an indication of countries of particular importance in relation to illegal trade.

Missing Information

Seizure data is commonly used to gauge the volume of illegal wildlife trade, but relies only on criminal offences that are brought to the attention of authorities, in other words, it does not contain quantifiable information on “the ones that got away”. Estimating illegal trade by analyzing seizures, therefore, is presenting a very narrow figure of overall illegal trade. When using crime statistics it is important to keep in mind the difference between how much crime is reported and how much crime actually occurs.¹⁶

Other tools to measure illegal trade (prices, surveys)

There are several internet search tools that aim to tap into and evaluate the blackmarket directly. Wildleaks and Havoscope (Table 11, 12) collect open-source documents such as photographs, videos, anonymous information, newspapers, government reports and academic journals in attempt to monitor the illegal/black market trade in wildlife. These search tools bring up freely available and real-time information from the internet. These tools actively use and seek out statements from involved individuals, consumers and whistleblowers. Wildleaks (Table 12), for instance, is a whistle blower platform for wildlife and forest crime and uses TOR software that allows any individual to submit content anonymously and confidentially (photos, video, document).

Reliability/Missing Information

The reliability of open-source data is difficult to determine, but at the same time perhaps the only insight into real-time prices, demand and trade.¹⁷ The web-based search tools (Tables 11, 12) are useful for collecting literature, but collect documents in the English language (usually).¹⁸ There is an accessibility issue with information in Asian languages that could inform data, information and prices which is important since this region of the world is of great relevance to wildlife crime.

¹⁶ CITES 2013. Wildlife Crime Analytic Toolkit. http://www.cites.org/sites/default/files/eng/resources/pub/Wildlife_Crime_Analytic_Toolkit.pdf

¹⁷ Havoscope (Table 11), has been used by reputable sources such as Bloomberg, The Atlantic and National Geographic.

¹⁸ A cited data-gap area identified in the Chatham House Publication. “There is a need for more empirical data to assess the rise in demand, and probably also for a wider literature review incorporating Chinese and Asian publications,” in Lawson, K and A. Vines. The Costs of Crime, Insecurity and Institutional Erosion. P 22.

Environmental/Social Impacts

The main environmental impacts are loss of biodiversity in source countries and the risk of invasive species and pathogen pollution in import countries. In addition, illegal trade undermines the ability of developing countries to manage their natural resources which results in significant long-term environmental and economic losses. The presence of organized criminal networks in illicit wildlife trade also exacerbates the threat of violence and corruption with implications for economic and political development

Availability

Most information on the impacts of illegal plant and wildlife trade on biodiversity is available in the IUCN Red List Database (Table 6) and the CITES Species+ database (Table 5). The CITES Species+(Table 5) provides data on population trends (increasing or decreasing) over time the purpose of which is to determine which species are at risk of extinction and in most need of conservation and protection¹⁹.

Reliability

A noticeable short coming is the fact that these databases measure biodiversity loss which occurs for many different reasons. Wildlife crime may be one or none of the contributing factors. For example, elephant populations in Central Africa could be decreasing because of a combination of habitat loss, poaching and climate change, however, the website measures the decrease in species and does not differentiate between the causes.

In contrast, the species specific database MIKE (Table 9) records elephant population in relation to poaching exclusively. Using 'carcass encounter data' it relies on reports from anti-poaching patrols in select African and Asian range states that record dead elephants whose tusks are removed when found. The information collected includes: elephant population data; reports of illegal hunting; law enforcement effort deployed in detecting and preventing illegal hunting and trade; and other qualitative factors, such as whether the poaching took place in a region experiencing civil strife, increased levels of human activity or within proximity of international boundaries. Other qualitative data include changes in elephant behaviour and distribution, poaching camps within the site and intelligence reports from the area. MIKE is one of the few databases that directly links species decline with poaching. In terms of reliability, reporting varies country by country.²⁰

¹⁹ Sold Into Extinction. P 19

²⁰ A shortcoming noted about MIKE, is that it was developed without the inclusion of the African and Asian range states for which it is meant to serve. For this reason, reporting remains inconsistent and usability varies from country to country.

Impact on Ecosystem Services

The main impacts of wildlife trade on the ecosystem services is the risks associated with invasive species and pathogen pollution. While TEEB could be used to illustrate the economic costs of illegal wildlife trade in relation to invasive species or ecosystem services, the amount of literature on these topics in the downloadable TEEB database was extremely limited and often only contained literature studies on European countries. There was however, the EVRI (Environmental Valuation Reference Inventory) that contains a database of literature that deals touches upon invasive species on a case by case basis using specific valuation techniques. The hypothetical costs of pathogen pollution were not found in any databases. These environmental impacts (degraded ecosystems, invasive species, and pathogen pollution) tend to be dealt with in a case by case basis in literature.

Impact on Socio-Economic Development

The socio-economic costs of wildlife crime are difficult to quantify and information is not available in databases but more often discussed and analyzed in literature on specific cases or countries. There are however some databases such as, EVRI (Environmental Valuation Reference Inventory) that contain a database of literature that deal with the socio-economic impacts on a case by case basis using specific valuation techniques. The issues for which EVRI could be used include the estimated worth of cultural heritage to a specific community and the value of a specific species for wildlife tourism, or wildlife tourism for a specific country.

In addition the UNTWO and the World Tourism Organization (Table 15) provides information on each country and the % of GDP and % of employment derived from tourism. Missing information however results from the fact that data does not distinguish between wildlife tourism and other types of tourism. However, it could be applied to countries where wildlife tourism is the main type of tourism.

Impact on International Security and Governance

The prevalence of wildlife trade and trafficking is increasingly linked to organized crime which relates to governance issues, political stability and international security which have economic and social impacts most profoundly on source countries but also transit countries where traffickers operate. The long-term economic, social and political costs that result from increasing levels of criminal and corrupt behaviour are difficult to gauge and predominantly studied in literature (not databases). There is increasing reason to believe that the actors involved in illegal wildlife trade include organized crime syndicates, made evident, for instance, by some seizure data of large

stockpiles of contraband goods. I did not come across any sources that quantified this threat in monetary terms.

Reliability

Information is provided for in scientific literature and reputable news publications. There is substantial literature on the subject which has been listed separately from the tables.²¹ Evidence gathering for proving the involvement of organized crime syndicates is undertaken in specific case-by-base studies.

At the end of the document containing the tables, there is a list of relevant literature that addresses wildlife crime and economic development, institutional capacity, terrorism, conflict, and organized criminal activity.

Valuation of impacts of crime incidents

Different authors and institutions have attempted to estimate the total economic value of illegal trade in wildlife. The estimates are exactly that, an estimate of illegal activity, which is hard to quantify by its very nature, and therefore not widely agreed upon either.

In a 2012 report by WWF, titled, *Fighting Illicit Wildlife Crime trafficking: A Consultation with Governments*, they estimate that illegal trade in wildlife is between US\$7.8 billion and US\$10 billion per year. This figure, however, was taken from a 2011 report by Global Financial Integrity, titled, *Transnational Crime in the Developing World*, Global Financial Integrity that made estimates for all kinds of crime including for instance human and drug trafficking. In relation to wildlife, the GFI report did not specify how the estimate was realized but cited the fact that the value of illegal crime usually constitutes 30% or one third of the legal market. The Coalition Against Wildlife Trafficking (CAWT), an organisation supported by the US State Department makes a similar estimate of illegal trade to be worth US\$10 billion. At the same time, CAWT cautions that estimates of illegal trade compared to legal trade constitute a broad range from 25% to 70%.

In a 2007 report by TRAFFIC, *Opportunity or Threat? The Role of the EU in Global Wildlife Trade*, it estimated the legal trade in wildlife to be worth US\$22.8 billion.

2012 OECD. *Illegal Trade in Environmentally Sensitive Goods*. The report undertakes three sets of data comparisons A) between customs and licensing schemes, B) between customs data from importing and exporting countries, and C) between licensing system data from importing and exporting countries for selected environmentally sensitive goods, including wildlife, fish, timber,

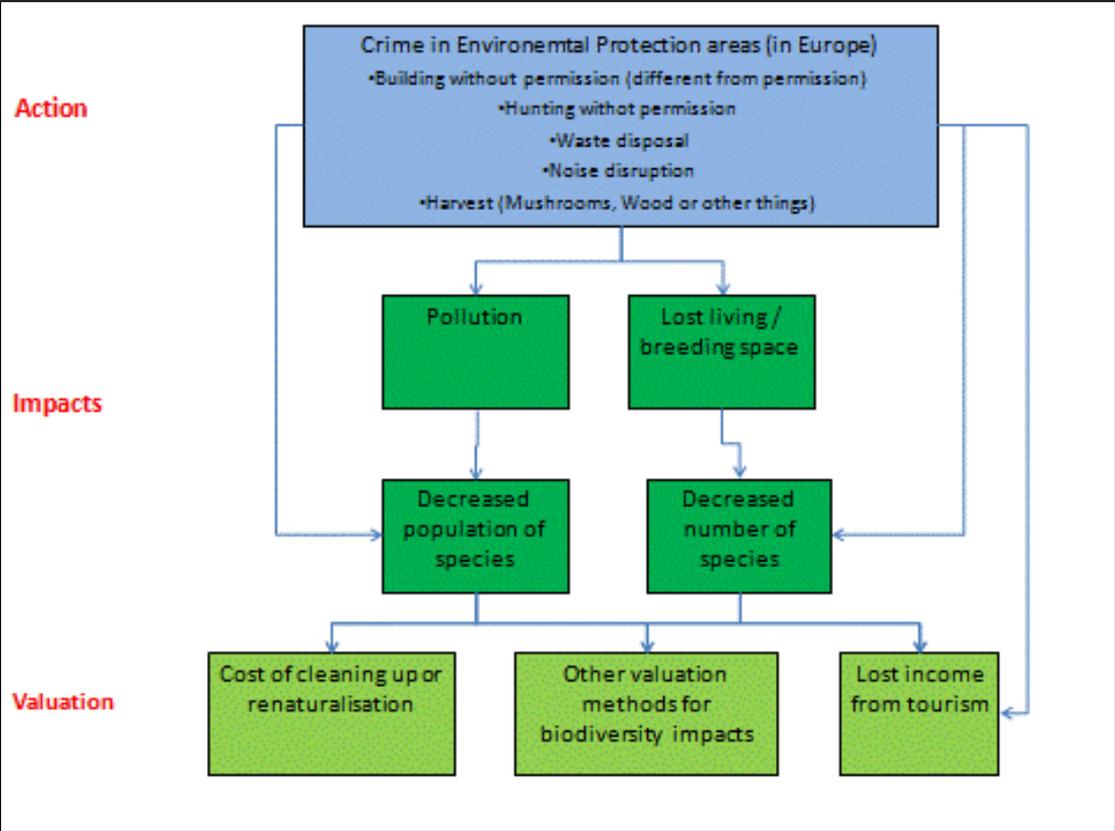
²¹ List was from Chatham House (2013).

ozone-depleting substances (ODS) and hazardous waste. It examines the extent to which this information can be used to identify and measure illegal trade. It provides an overview of the economic and environmental impacts of such trade.

2.8 Protected Areas

Environmental crimes in protected areas include mainly building and construction without or different from permissions, illegal logging and poaching. However, data availability is very limited concerning numbers of illegal activities as well as impacts and valuation. We have analysed the information using the following rough framework.

Figure 3: Impacts of environmental crime in protected areas



Although there is some information on the size of protected areas and some information on environmental crime it is difficult to connect the spatial component of those two information sources. Mostly it is not known whether crime happened in protected areas and the categories of crime reported do not give any idea to where it happened.

The biggest gap is the connection between the topic of environmental crime and protected areas. Data on environmental crimes, if they are available, are collected on a national level, making it

difficult to conclude how much of the illegal activity takes place inside protected areas. Information on protected areas, on the other hand, does not include data on crimes, but is mainly restricted to spatial information, number and size of protected areas.

This applies especially to the World Database on Protected Areas (Table 1), which provides only information which can answer basic questions such as how many protected areas are there in the area of interest and what is their total area. This information could be used for extrapolation but not for detailed analysis.

More detailed information on the impacts of environmental crime is available but only for a very limited number of areas mainly in Slovenia (only illegal construction) and the UK. For these case studies an economic assessment has been done which could be used to extrapolate the results to a European scale but such an extrapolation would carry a lot of caveats. Based on this information only an extrapolation in illegal construction seems worth further investigation.

It is worth noting though that we should compare this available information with information on illegal logging or illegal waste dumping as it might be that combined case could be better stocked.

One data source provides data on criminal and civil sanctions undertaken by Natural England concerning environmental crime (Table 11). The source provides data about prosecutions, fines and costs, and descriptions of damages for illegal activities on SSSIs (Sites of Specific Scientific Interest), half of which are internationally important for their wildlife and partly designated as Special Areas of Conservation, Special Protection Areas or Ramsar sites (the data refers to SSSIs, the different forms of protection are not considered). These prosecutions include crimes like motorcycling or quad riding, which are illegal only in the context of protected areas. It is not clear if the data is updated regularly, because the last data is given for 2006.

Also for Slovenia, data is available on criminal offences against the environment, space and natural resources (see Table 7 for a list of crime types recorded), investigating the trend of environmental crime in the last decade, providing numbers of offences, charges and convictions. However, there is no information whether these crimes were committed inside of protected areas.

Another source investigates pressures and threats to protected areas in Slovenia (Table 13), based on surveys. The categories of threats the interviewees were asked about include logging, changes of planned use, changes of land use, abandonment of traditional use, intensive grazing/mowing, intervention in riverine/riparian areas, hunting/fishing, mining, non-timber forest product collection, tourism, waste disposal, cross-border impacts and invasive alien species, but there is no data provided, just the perceptions of threats are described. These threats can include both legal and illegal activities, but the majority of mentioned threats are no crimes recorded in the statistics.

The data that is available is mostly based on official crime statistics, for which a very high grey zone must be assumed. The main type of missing information concerns the numbers of environmental crimes in protected areas.

Impacts of crimes and crime incidents

Most information can be found on the impacts of illegal construction in protected areas, which seems to be a problem mostly in Eastern Europe. For the Pirin National Park in Bulgaria (Table 12), there is a detailed report on the impacts of illegal construction of ski facilities. Environmental impacts include the destruction of habitats, wildlife avoidance and habitat quality deterioration, and the increased presence of humans in the area leads to further problems like pollution, invasion of alien species, poaching and illegal logging. The report also provides detailed information on the impacts on selected species. A socio-economic poll among random citizens of the area gives information on the social and economic impacts, namely a deterioration of the quality of life because of pollution, a deteriorating state of the public infrastructure and disappointment because the economic returns of the project are not as high as the population expected.

A similar, albeit not so detailed report is available for the national park Durmitor in Montenegro (Table 8), where 350 illegal buildings were built on the territory of the national park, leading to environmental degradation and destruction of habitats and to problems with the installation of the necessary infrastructure for the illegal buildings in an area with very scarce infrastructure options. There is also additional information on illegal construction and its environmental, social and economic impacts in Montenegro in general available, which is not focused on a protected area.

For the UK (Table 10), a detailed report by the House of Commons Environmental Audit Committee is available on wildlife crime (describing illegal vehicle use, damage caused by the building and construction industry, damage caused by the introduction of non-native species, illegal actions such as shooting and illegal burning, bat crime and illegal fishing). The report gives information on numbers of incidents and trends, the percentage of sites in unfavourable condition and on fines and prosecution. The report also describes the impacts of the mentioned activities on habitats and species, and also gives some data on quantitative impacts like losses in timber production due to invasive species and the costs for clearing sites from invasive tree species.

For Russia, a report on illegal logging is available (Table 9), covering the impacts of a reduction of illegal logging in European Russia on the EU and the European Russia forest sector and trade. The report contains an economic impact assessment and therefore good information on monetary economic impacts of illegal logging. However, there is no limitation to protected areas, so there is an overlap with the topic of timber covered by another project partner.

Some information can be found on impacts of activities that are not necessarily crimes, especially marine litter. This can have huge impacts on marine habitats in general and also on marine protected areas. Table 15 and 16 contain sources on impacts of marine litter. They give qualitative and some quantitative descriptions of impacts to the environment, like the damage of coral reefs through derelict fishing gear or the starvation and malnutrition of birds, social impacts like health and safety risks and economic impacts (beach closures and impact on tourism, losses in catch revenues, reduction of standing fish stock, opportunity costs, clear-up costs etc.). The sources do not provide an overall impact assessment, but rather a description of possible impacts and some numbers for specific example cases, like an estimation of clean-up costs for a specific site.

Table 17 reports an incident of toxic waste spillage from a zinc mine near a Spanish national park. 10,000 hectares of farmland along the banks of the river were poisoned, with disastrous impacts on the environment (high river acidity level, contamination along the food chain, ground water contamination etc.). Tourist incomes and farming land was lost and there were huge clean-up costs. The sludge was stopped just before it reached the national park, but nevertheless caused damage to a fragile ecosystem, and there is no information if other impacts like water contamination affected the national park ecosystem.

No general data or information on impacts, just case examples, which makes it hard to tell if the impacts mentioned cover all possible impacts or if important problems might have been left out

Valuation of impacts of crime incidents

A lot of studies are available on the valuation of ecosystem services, the most prominent is TEEB, which evaluates the benefits of ecosystem services in mostly economic terms. Table 2 gives a number of links to reports and the link to the TEEB database, which is a database on monetary values of ecosystem services which now contains over 1350 data-points from over 300 case studies. Most of the studies are general estimations of the economic value of ecosystems or sites.

The highest number of case studies in the TEEB database can be found for the UK, but mostly for marine or coastal ecosystems, and for Spain. For Eastern Europe, however, there are no case studies with evaluations of ecosystems or sites in the database.

More specific information is provided in Tables 3 and 5, which evaluate the ecosystem services in specific protected areas. The first case of the Hoge Veluwe forest, the Netherlands, follows the general approach of the Millennium Ecosystem Assessment with regard to the identification, analysis, and valuation of ecosystem services

The second study conducts an ecosystem services evaluation of the Skocjan Caves Regional Park in Slovenia, with a detailed assessment of the market value of the national park with current use, potential use and potential gains.

The report on the Bavarian Forest National Park (Table 4) focuses only on the evaluation of the economic benefits of the national park, considering only the monetary values from tourism income. Also the study on reforestation in Croatia (Table 6) conducts an economic analysis of a coastal forest reconstruction and protection project, with estimates of the willingness to pay for forest landscapes by tourists, calculating the costs of reforestation, the benefits for hunting, wood production, non-timber products, recreational value and erosion protection.

There is a general question how reliable estimations of the economic value of ecosystem services are, which is not a question for the mentioned sources but concerns the underlying methodology. The main missing information concerns the direct valuation of the cost of environmental crimes.

2.9 Illegal trade in chemicals

Life on Earth depends on the protection provided by ozone in the stratosphere, which acts to screen harmful ultraviolet (UV) solar radiation from the Sun. The ozone layer is depleted as a result of the emission of certain human-made chemicals that react and destroy ozone molecules in the stratosphere. The major ODS (ozone-depleting substances) include: chlorofluorocarbons (CFCs), which are used in refrigerators and air-conditioning units; halons, used in fire extinguishers and fire suppressant installations; and methyl bromide, an ozone depleting pesticide.

The economic, social and environmental impacts of illegal trade in chemicals can be sufficiently important to disrupt whole economies and ecosystems, undermining environmentally sustainable activities and reducing future options for the use of resources.

Illegal Trade in Chemicals

The consumption, production and trade in hazardous chemicals are increasingly subject to international as well as national regulation. The Rotterdam Convention was agreed in 1998 to control the trade in banned or severely restricted chemicals and severely hazardous pesticide formulations. Under this convention, such substances can only be exported if the prior informed consent of the recipient country has been given. The Stockholm Convention was signed in 2001 with the objective of banning or regulating production, consumption and trade in a specified list of long-lasting organic chemicals. There has been considerable experience, however, of illegal trade resulting from the implementation of the Montreal Protocol on Substances that Deplete the Ozone

Layer, agreed in 1987 to address the depletion of the Earth's stratospheric ozone layer. The Protocol aims at phasing out completely the production and consumption of all categories of ozone-depleting substances (ODS), of which the most extensively used were chlorofluorocarbons (CFCs).

Illegal trade in ODS arose in part because of their different phasing-out in countries, with developing countries being given a longer timeframe in which to eliminate their production and use. ODS ostensibly destined for developing countries were sometimes diverted into developed country markets where the products were being phased out. This illegal trade declined in significance as CFC-using machinery was steadily replaced, but then started to appear in developing countries as they began to implement their own phase-out schedules.

Main Impacts of Illegal Trade

Illegal trade only occurs when an economic return can be made from it, either in terms of profits generated or costs avoided, for the participants in the exchange. Illegal trade is likely to develop when the expected returns are higher for illegal than for legal activity. Therefore, it can occur where compliance with regulations results in costs that may be avoided through illegal behaviour. For example, during the phase-out process for ODS, the legal non-ozone-depleting alternatives often proved to be more expensive than the original substances, and sometimes additional costs were required for the conversion of equipment to use the substitutes. In China in 2007 the price of CFC-12 was USD 4 per kilogramme, whereas that of the main substitute, HFC-134a, was USD 7; the cost of adapting a CFC air-conditioning unit so that it could use this alternative was USD 100-200 (Coppens, 2007). It was therefore cheaper to source illegal CFCs.

The externalities or societal costs of illegal trade are not always obvious or are not always fully quantified. Consequently, this area of crime is often seen as "victimless" or is not considered to be that serious a problem. The impacts of illegal trade can be divided into three areas: economic, environmental and social.

Economic Impacts

The economic impacts of illegal trade occur at different scales, from that of individuals or groups of stakeholders engaged in the trade to the national level. The most common means of depicting the scale of the problem of illegal trade of chemicals is to estimate its economic value. However, it should be borne in mind, however, that there are no reliable sources of data on international environmental crime related to ODS. As with other categories of illegal trade, it is impossible to measure the volume or value of illegal environmental trade directly; if it were possible to measure it more accurately, it would be controlled more easily.

The economic impact of illegal trade at the national level is complex and varied. Developing countries tend to be most affected by the illegal trade, both because of their dependence on them as a source of revenue, and also because they tend to be more vulnerable to illegal activities, with, in general, poorer standards of governance and law enforcement. For example, as noted by Chatham House and EIA, 2006, studies of ODS illegal trade have estimated that in 2005 worldwide economic losses amounted to between USD 250 million and USD 600 million. These losses at the national level are due to a variety of factors. Firstly, it can result in the loss of revenues due to the non-payment of taxes and other charges. Secondly, in addition to direct macroeconomic impacts, illegal trade also has indirect impacts. These include the loss of income and employment in related industries and activities, the depression prices for legal products in exporting sectors. Finally, illegal trade may also result in environmental or other damage that necessitates economic costs to clear up. Examples would be damage to equipment because of the use of poor-quality ODS counterfeit products.

Environmental impacts

The illegal trade in ODS has a direct environmental impact, since it is these substances themselves that are harmful. The environmental effects of ODS were first observed in the mid 1980s over the Antarctic stratosphere. Scientists, who had begun measuring ozone levels in 1975, estimated that ozone levels had declined by 60%–70% from their pre-1975 levels which shields the Earth's surface from harmful solar ultraviolet radiation (UV). Life on Earth depends on the protection provided by ozone in the stratosphere, which acts to screen harmful ultraviolet (UV) solar radiation from the Sun. Changes in the natural shield that protects us from UV radiation, although modest, are able to cause very negative consequences on the ecosystem. The effect of ODS on climate change is further exacerbated as CFCs and HCFCs are generally potent greenhouse gases, so contributing to global warming.

Social impacts

Illegal trade in chemicals can have a detrimental effect on the functioning of societies and state authorities. Indeed, it is often associated with corruption and sometimes with other areas of crime (Banks et al., 2008). The extent of criminal involvement in these trade networks is uncertain, but there is oftentimes anecdotal evidence of links between environmental and other areas of crime and of the involvement of criminal networks in illegal trade. For example, the same networks have been found to be used for smuggling arms and drugs as for chemicals (World Bank, 2006).

Illegal trade can also have a negative impact on health. In all areas of illegal activity, the work environment is often a dangerous one, as employment and safety laws tend to be ignored. For example, employees may be working with hazardous chemicals without adequate protection or

without adequate training or equipment in logging operations. Moreover, any delay in the recovery of the ozone layer leads to longer periods during which the Earth's surface is subjected to higher levels of solar ultraviolet radiation. Higher levels of radiation are linked with increased incidences of skin cancer and eye disease and suppression of the immune system (UNEP, 2006).

Assessing the ODS Illegal Trade Flows

It should be emphasized that there are no reliable sources of data on international environmental crime related to ODS. However, there are possible indicators of illegal trade in chemicals. For example data on seizures or outcomes of court cases could be used to obtain an indication of trends.

In principle it should be possible to obtain an indication of illegal trade in ODS by examining import and export data and analysing discrepancies between the two sources. Wide variations between different countries' statistics may indicate illegal trade in some form.

One possible means of investigating data discrepancies involves comparing legal trade volumes (from licensing scheme data) with legal production and domestic-consumption volumes (from other sources). A study carried out for UNEP on transboundary movements of CFCs found discrepancies in reported CFC trade data of up to 2 000 tonnes per year between countries in the Asia-Pacific region, with some discrepancies indicating unreported imports of CFCs equal to more than 70% of national consumption (UNEP DTIE/Government of Sweden, 2005). While the study concluded that the discrepancies might be the result of illegal trade in chemicals, it also noted that there were many other possible explanations, including failures in data recording and reporting.

An innovative mechanism to promote and observe formal compliance with a multilateral environmental agreement (MEA) within the United Nations Environment Programme is the new online version of the Informal Prior Informed Consent on Trade of Ozone Depleting Substances (iPIC). iPIC is a voluntary and informal mechanism of information exchange on intended trade of ozone depleting substances (ODS) between the authorities in importing and exporting countries which are responsible for issuing import/export licenses for the chemicals controlled under the Montreal Protocol on Substances that Deplete the Ozone Layer.

2.10 Fires

Forest Fires can be defined as uncontrolled fire caused naturally or by humans with susceptibility to expand into forested areas, arboreal or bushy, including any structures and infrastructures placed within such areas, or on cultivated or uncultivated land and pastures adjacent to these areas (National Wildfire Coordinating Group, 2013).

Forest fires or wildfires are an integral component of Mediterranean ecosystems in Europe and around the world. However the way in which humans deal with wildfires has rapidly changed throughout the years, especially in Mediterranean Europe. European Mediterranean ecosystems are characterized by several conditions. These include the rural exodus to cities leading to the abandonment of forests of low timber production, and the simultaneous accumulation of fuels in these forests. Additionally, as living standards in Europe have evolved, rural areas have been populated by secondary homes, which have enlarged the wild land urban interface. Human populations and assets are thus at a higher risk of forest fires than ever.

Fire trends in Europe show a high concentration of fire events and, more importantly, fire effects in the Mediterranean regions. Most of the total burnt area in Europe concentrates in this Region. The average area affected by fires annually across Europe reaches 550,000 ha, and 95% occur in the Mediterranean countries, with approximately 35,000 events a year. Assuming the phenomenon regularly distributed in time, it is about 100 fires a day, throughout the year.

The fires appear to be increasingly an explicit symptom of socio-economic problems related to a complex set of circumstances: the depopulation of vast areas, abandonment of agriculture, the distribution of new settlements in rural areas, the spread of transportation infrastructure, the existence of conflicting interests with the preservation of natural resources, the instrument to activate forms of employment, and so on.

One point should be emphasized: forest fires are often not a natural disaster or a fatality, but rather an anthropogenic phenomenon, with an exclusive, direct dependence on social behaviour, both voluntary or involuntary.

Although the number of fires seems to be decreasing in the last decade, critical weather conditions have recently caused unprecedented damages in economic, social and environmental terms and regrettably in number of human casualties.

Impacts of wildfire

The effects of wildfires are numerous and wide-ranging. They can have significant impacts on the economy, environment, heritage and social fabric of rural areas.

On the economy

Economic costs range from direct costs associated with fire fighting, to loss of income from the land following wildfire incidents and damage to property. Landscape-scale damage and loss of specific infrastructure can also impinge on tourism, with a consequence to local businesses and communities. Restoring damaged habitats is also becoming an important component of post-

wildfire recovery in sensitive environments, which is typically a very costly and time-consuming process.

On the environment

Apart from the obvious effects of wildfires on upland biodiversity and habitats, they also have a direct impact on benefits that people receive from the environment, including:

- Provision of food, water and fibre
- Regulation of floods, drought, land degradation and disease
- Soil formation and nutrient cycling
- Cultural services and recreational benefits
- Carbon sequestration and storage

Wildfires directly impact on upland ecosystem services through damage caused to the vegetation, peat and soils, which results in loss of valuable habitat and associated wildlife alongside carbon release. Exposed soil and peat is at increased risk to wind and water erosion, with water run-off from uplands potentially resulting in downstream flooding, sedimentation of watercourses and discolouration of drinking water.

On local heritage

Wildfire can cause serious damage to historic environment features. Archaeological remains are often protected by soil and vegetation cover and so the loss of this cover can have severe implications for features. The damage can occur both during a wildfire and due to the erosion caused when sites are exposed.

On local communities

Wildfires create safety issues for those who live and work in isolated areas, as well as endangering people who use and enjoy the countryside. They are also a very real threat to the health and safety of the emergency services.

Most fire-fighters in rural areas are 'retained'. This means that they are part-time and can be called away from their normal work to attend to fires. This can disrupt local businesses.

Wildfire also has the potential to affect the lives of people well outside the immediate area of any incident. Smoke can travel many miles on prevailing winds, affecting air quality and visibility in areas far away. This can have public health implications, especially for people with respiratory problems, as well as causing disruption to traffic

European Legislation Framework

The lack, until few years ago, of a specific definition and regulation of a forest fire at European level has brought some member countries to implement national forest polices without giving the

right weight to the problem. Therefore, in order to establish a Community scheme for harmonised, broad-based, comprehensive and long-term monitoring of European forest ecosystems the European Legislator introduced the Regulation (EC) 2152/2003 (so called Forest Focus) now expired and followed up by the Regulation (EC) 614/2007 (so called LIFE+). They provides for the implementation of measures that aim to:

- collection, processing and validation of harmonized data;
- a better assessment of data at Community level;
- the improvement of the quality of the data and information collected;
- the development of forest monitoring activities;
- the study of the wildfires and their characteristics;
- the definition of indicators and methodologies to assess the wildfire risks and causes.

To achieve these objectives member States identify and implement national programs lasting two years. The programs must be submitted to the Commission and shall include an ex-ante evaluation. States also have mid-term and final reports which result to be very useful for the European Fire Database.

European Fire Database

The European Fire Database is an important component of the European Forest Fire Information System (EFFIS)²² containing forest fire information compiled by EU Member States and the other countries members of the EFFIS network.

The first steps to create a forest fire database were taken under the Regulation EC No 2158/92 (now expired), and finalized by the Forest Focus Regulation (EC) No 2152/2003. According to the implementing rules of the Regulation, monitoring of forest fires in Europe continued to be recorded in order to collect comparable information on forest fires at Community level.

The forest fire data provided each year by individual EU Member States through the above-mentioned EU regulation, and additional data coming from other European countries have been checked, stored and managed by EFFIS. The database is now known as the European Fire Database. The database contains four types of information: about the time, location, size and cause of the fire.

²² The EFFIS supports the services in charge of the protection of forests against fires in the EU countries and provides the European Commission services and the European Parliament with updated and reliable information on wildland fires in Europe.

Access to summarised information from the database is provided through the EFFIS web interface <http://effis.jrc.ec.europa.eu/fire-history>, which allows the users to retrieve general information such as maps of the number of fires, burnt area and average fire size for a selected year (data are available for Mediterranean Countries since 1985 and for the entire EFFIS network since 2005) and for the required countries. The data can be displayed at country or at different region level and may be filtered to exclude fires below a certain size, while an interactive graphical facility allows the user to display the same fire statistics over time. It is worth noting that the European Fire Database is an high quality data since it is complete, (all relevant data - such as burnt area, average fire size, years, etc. for a given country - is linked) accurate (absence of data problems like misspellings, typos, and random abbreviations), available (required data is freely accessible on demand; users do not need to search manually for the information) and timely (up-to-date information is readily available).

Since 2008 an important service of a more detailed fire causes identification was launched by EFFIS with the aim of developing a common framework for harmonized classification and reporting on fire causes in Europe. A key new feature that has been introduced in the scheme is the explicit statement of the confidence level of the knowledge of a fire cause: qualified as "certain" only if, after investigation, the ignition point of the fire has been found and the cause has been identified with no doubts. This allows identifying the exact nature of the fires and thus understanding if they are related to crimes or just accidental or natural. However, at moment, this does not allow us to link the crime of arson to organized crime.

2.11 Marine

Scope of the potential impacts of environmental crime related to marine pollution

Marine pollution is a broad category, consisting notably of oil pollution (including *accidents with offshore oil and gas installations*) but also all other marine pollution in relation to MARPOL and the London Convention.

MARPOL, the International Convention for the Prevention of Pollution from Ships, is the main international convention covering prevention of *pollution of the marine environment by ships* from operational or accidental causes. Its annexes list various forms of marine pollution, caused by oil, noxious liquid substances, harmful substances in packaged form, sewage and garbage from ships, etc.

The London Convention (Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter of 1972), which entered into force in 1975, aims to control pollution of the sea

by *dumping*. It covers the deliberate disposal at sea of wastes or other matter from vessels, aircraft, and platforms.

In addition to the obvious (but difficult to quantify) environmental damage caused by marine pollution, there is social and economic damage which includes financial damage to the operators of installations, lost profits for the tourism sector, etc.

It should be noted that marine pollution is not necessarily – and perhaps most often not – related to environmental *crime*. However, the data do not distinguish between intent, (gross) negligence, and other causes of marine pollution.

Systematic reporting of the available data

12 reports/articles containing data on marine pollution are summarized (listed below), out of which five sources are very informative (#6, #9, #10, #11, #12) and three are ‘moderately’ informative (#1, #3, #7). The remaining four sources contain data which are only indirectly relevant. We nevertheless decided to compose summary tables for all 12 reports/articles. The reports are:

1. U.K. Health and Safety Executive, ‘Accident Statistics for Fixed Offshore Units on the UK Continental Shelf 1980-2005’ (2007)
2. U.K. Health and Safety Executive, ‘Offshore Injury, Ill Health and Incident Statistics 2012/2013’ (2014)
3. U.S. Environmental Protection Agency, ‘Marine Debris in the North Pacific’ (2011)
4. Torres et al., ‘Biochemical Biomarkers in Algae and Marine Pollution: A Review’, *Ecotoxicology and Environmental Safety* 71 (2008)
5. Grigoriadou, Schwarzbauer and Georgakopoulos, ‘Molecular Indicators for Pollution Source Identification in Marine and Terrestrial Water of the Industrial Area of Kavala City, North Greece’, *Environmental Pollution* 151 (2008)
6. UNEP- GEF WIO-LaB Project , ‘Preliminary Transboundary Diagnostic Analysis on Land-based Activities: Marine Pollution’ (2007)
7. OGP (International Association of Oil & Gas Producers), ‘OGP, Major Accidents’ (2010)
8. Edward Anderson Marine Sciences et al. (report prepared for the South Pacific Regional Environment Program), ‘Marine Pollution Risk Assessment for the Pacific Islands Region’ (2003)

9. Hannah Luhtala et al. (Centre for Maritime Studies, University of Turku), 'Maritime Transportation of Chemicals in the Baltic Sea' (2010)
10. HELCOM (Helsinki Commission, Baltic Marine Environment Protection Commission), 'Ecosystem Health of the Baltic Sea' (2010)
11. US Coast Guard, 'Report on Implementation of the Oil Pollution Act 1990' (2004)
12. METRO (report for DG Energy), 'Civil Liability and Financial Security for Offshore Oil and Gas Activities' (2013)

See summary tables 1-12 in the annex and the comparative table below for details of the information these reports contain

Table 3. Comparison of the key data sources on impacts relating to marine pollution

WP3 MARINE POLLUTION (# of the report)	Available data (qualitative/qu antitative)– key impacts	No available data – key impacts	Limitations on the available data (e.g. time, geographic area)	Comments on the quality of the data	Comments on the availability of the data
#1	Quantitative EN	Quantitative EC, SO Qualitative EC, SO, EN	Geographically limited to the UK continental shelf. Temporally limited to 1980-2005.	The data provided is of reliable quality, and it is mostly obtained from the WOAD database.	This report does not provide a very high amount of data, as it only partially focuses on the environmental aspects of incidents on offshore facilities.
#2	Hardly any relevant data, perhaps exclude.				

#3	Qualitative EC, EN Quantitative EN	Qualitative SO Quantitative EC, SO	The sources this report draws upon are compiled throughout quite a wide timeframe (1972-2011).	The data provided is mostly of reliable quality, and all sources should be reliable as the authors surveyed them and compiled them together.	The aim of the report itself is identifying data-gaps in the topic, therefore this document is evidently lacking of information in some aspects. No monetary impact at all.
#4	Hardly any relevant data, perhaps exclude.				
#5	Hardly any relevant data, perhaps exclude.				
#6	Quantitative EN Qualitative EC, SO, EN	Quantitative EC, SO	Geographical coverage of the WIO region.	The data sources analysed (listed at pp. 3-4 of the report) all seem to be particularly reliable, as they are rather recent and many of them are compiled by well-known international organisations.	This report contains a great deal of data.
#7	Quantitative EN Qualitative EN	Quantitative SO, EC Qualitative SO, EC	Relevant data provided for US, UK and Norway	The report reports data gathered from reliable databases, such as WOAD, and of international organisations and national governmental authorities.	The report does not provide any kind of Economic and Social impact data. However, it does provide some relevant data for environmental impacts.
#8	Hardly any relevant data, perhaps exclude.				
#9	Qualitative EN, SO Qualitative SO, EC	Qualitative EC Quantitative EN	Geographical coverage of the Baltic Sea.	This is an extremely well constructed and reliable report, created by the centre for maritime studies of the University of Turku.	The report contains a great amount of very relevant data.

#10	Qualitative EN, SO Quantitative EN, EC	Qualitative EC Quantitative SO	Geographical coverage of the Baltic Sea.	The data provided is reliable and it is gathered by HELCOM itself.	The report contains a good amount of relevant data.
#11	Qualitative EN, EC Quantitative EN, EC	Qualitative SO Quantitative SO	Geographical coverage limited to the USA.	The report is compiled by the US Coast Guard, which is an inherently reliable source of information.	Despite the lack of social impact data, the report is very informative.
#12	Qualitative EN, SO Quantitative SO, EC	Qualitative EC Quantitative EN	Geographical coverage EU and USA.	The report is an adequate source of information, as it is published by the European Commission.	The report contains a great deal of data in many different fields.

<p>Legend:</p> <p>EC – economic impacts</p> <p>SO – social impacts</p> <p>EN – environmental impacts</p> <p>ql. – qualitative data</p> <p>qn. – quantitative data</p> <p>mn. – monetary data</p>
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Summary of findings

In total, twelve recent data sources addressing marine pollution have been summarized above. However, there are additional (potential) data sources, which are more difficult to access.

Requests for data and additional info have been sent to IMO, Intertanko and P&I clubs. We received a reply from IMO, which informed us that IMO itself does not have information on the topic, but that INTERPOL could be in possession of such data, or could be able to gather information through the Member Governments. We have not received replies from Intertanko and the P&I clubs. Furthermore, reinsurers such as Munich Re and Swiss Re may have (probably confidential) data on some of the costs related to e.g. offshore oil pollution and specific incidents. In the US, the Coast Guard collects data on breaches of the Oil Pollution Act.

There is also a database called the Worldwide Offshore Accident Databank, operated by Det Norske Veritas (DNV): see <http://woad.dnv.com>. It contains more than 6000 incidents since the year 1975. WOAD collects its data from publicly available sources such as Lloyds Casualty Reports,

newspapers and official publications. To access this database, an account and password are needed. Access to this database is not free. Some of the sources summarized above include data taken from the WOAD database.

Available data

Available data generally relate to specific geographical areas, notably the U.S., Baltic Sea, UK, (parts of) the EU and Norway. Data on accidents are inherently 'incidental': they relate to particular accidents e.g. with offshore installations. There is not a real trend to be discovered either in the number or scope of such accidents.

Quality of data

Some sources contain fairly detailed data on marine pollution, particularly when compared to some other subject areas such as illegal timber trade. See the comparative table above for more information. It can be said that data sources analysing smaller geographical areas are usually more up to date and detailed.

Availability of data

As mentioned in the previous section, there are no readily available data providing a general or global overview of the phenomenon. Sources are not numerous; however, more data could be retrieved by having access to the WOAD database and by further internet research.

Environmental impacts seem to be covered in almost all reports, both from the quantitative and qualitative perspective. Only a few sources provide data on social impacts, and even fewer make quantitative data available. There is a good number of sources providing data on economic impact, especially from the qualitative perspective.

Overall, qualitative data seem to be more available than quantitative data; many of the sources used do not simply report statistics, but also analyse these statistics.

Conclusions

There seem to be no systematic studies relating to a large area, and data appears to be available only for brief periods in particular regions. Qualitative data appears to be more abundant than quantitative data, and it can be noted that studies which provide for quantitative considerations sometimes draw on information retrieved from the WOAD database.

Nevertheless, we can conclude that this area of environmental offense is interesting to develop further, first by collecting data on the number and impact of the various incidents (Task 2). Whether it is suitable also for economic analysis (Task 3) remains to be seen.

2.12 Timber

Illegal logging is a global issue, affecting most forested countries. Estimating the scale of illegal logging is, due its illicit nature, challenging. However in-depth investigations into forestry practices from around the world, as well as research into the timber trade, all indicate that it is a substantial problem.

For example, a 2004 report (Seneca Creek Associates & Wood Resources International, *table #15 below*) estimated that between 5 and 10% of the value of the global wood products trade was likely to have been illegally sourced. More recently, research by Chatham House (Lawson & MacFaul 2010; *table #8 below*) concluded that illegal harvesting represented 35-72% of logging in the Brazilian Amazon, 22-35% in Cameroon, 59-65% in Ghana, 40-61% in Indonesia and 14-25% in Malaysia. Extrapolating from these figures, it was estimated that more than 100 million cubic metres of timber are harvested illegally each year. However, on a more positive note, the same study also found that illegal logging had reduced significantly between 2000 and 2009, perhaps by nearly a quarter of global illegal timber production.

Living forests are vital to mitigating climate change because they absorb carbon dioxide from the atmosphere. Logging and clearing forest land, however, seriously contribute to climate change by releasing that carbon dioxide back into the atmosphere.

Deforestation accounts for an estimated 17% of global carbon emissions, a percentage around 1.5 times greater than from global air, road, rail and shipping traffic combined (*source unknown*).

National and international frameworks exist to protect forests, reduce illegal logging, support sustainable practices and reduce emission – for example, the international climate finance mechanism known as REDD or REDD+, which is supported by UN and World Bank initiatives.

However, while recent years have seen increased concern for sustainable forestry, around only 8% of the world's forests are certified as sustainably managed.

More than 90% of these certified forests are in North America and Europe, while the majority of the deforestation and illegal logging continues to take place in the tropical forests of the Amazon Basin, Central Africa, and Southeast Asia.

It is estimated that illegal logging accounts for 50-90% of the volume of forestry activities in key producer tropical countries and 15-30% of all wood traded globally (*source unknown*). It is also estimated that illegal logging still occurs in many formally protected forests, especially in tropical countries.

Clearly, if left uncontrolled, illegal logging will undo the global community's efforts to reduce carbon emissions from deforestation and forest degradation.

In addition to the environmental damage, the trade in illegally harvested timber is highly lucrative and estimated at USD 30 billion annually (*source unknown*).

The criminal gangs behind these crimes damage local communities through loss of income, livelihood and life-threatening environmental damage. They are also responsible for the corruption of officials, fraud, money laundering, extortion, threats of violence and even murder.

Environmental, social and economic impact of illegal logging and timber trade

Based on our research into the impact of illegal logging and timber trade (see section 2 below), we can provide the following classification:

- *Environmental impact*: damaged ecosystems; unsustainable resource use; environmental damage to local communities; increased risk of natural disasters (also leading to health risks, i.e. overlapping with the category of social impact).
- *Social impact*: abuse of political power (corruption); armed conflicts; violence, threats and atrocities against indigenous forest-living people; negative impact on livelihood; health risks (see above).
- *Economic impact*: loss of government revenue due to illegal activities; limiting development of tourism; loss of revenue for (local) population in countries where illegal logging takes place.

Systematic reporting of the available data

We found 14 reports and 1 article containing relevant data:

1. OECD, 'Illegal Trade in Environmentally Sensitive Goods' (2012)
2. INTERPOL and UNEP, 'Green Carbon, Black Trade: Illegal Logging, Tax Fraud and Laundering in The World's Tropical Forests' (2012)
3. TRAFFIC, 'Traffic Bulletin Seizures and Prosecutions: March 1997–October 2013' (2013)
4. TRAFFIC - Chatham House Workshop: Tackling the Trade in Illegal Precious Woods, 'Precious Woods: Exploitation of the Finest Timber' (April 2012)
5. OECD, 'The Economics of Illegal Logging and Associated Trade' (2007)
6. WWF, 'Failing Forests: Europe's Illegal Timber Trade' (November 2005)
7. ITTO, 'Annual Review and Assessment of The World Timber Situation' (2012)

8. Chatham House/Royal Institute of International Affairs, 'Illegal Logging and Related Trade Indicators of the Global Response' (2010)
9. EIA, 'Appetite for Destruction: China's Trade in Illegal Timber' accessible at (2012)
10. CIFOR, 'Cross-border timber trade in Indonesia: critical or overstated problem? Forest governance lessons from Kalimantan', International Forestry Review Vol.9(1) (2007)
11. TRAFFIC, 'Opportunity or Threat: Role of the EU in Global Wildlife Trade' (2007)
12. EFI, 'Impacts of Reduction of Illegal Logging in European Russia on the EU and European Russia Forest Sector and Trade' (2005)
13. WWF, 'Illegal Logging - Cut it Out!: The UK's Role in the trade in illegal timber and wood products' (2007)
14. BfU and Max Planck Institute, 'Organised environmental crime in the EU Member States' (2003)
15. Seneca Creek Associates & Wood Resources International, "'Illegal" Logging and Global Wood Markets: The Competitive Impacts on the U.S. Wood Products Industry' (2004)

See summary tables #1-#15 and the comparative chart below for details.

There seem to be no data sources that systematically (i.e. for a long period of time) register data.

Table 4. Comparison of the key data sources on impacts relating to illegal timber

WP3 TIMBER (# of the report)	Available data (qualitative/quantitative)– key impacts		No available data – key impacts	Limitations on the available data (e.g. time, geographic area)	Comments on the quality of the data	Comments on the availability of the data
1.	ql. EN, SO, EC	qn. SO, EC	qn. EN	Temporal limitation of 12 years.	<p>Some information is rather outdated and requires review and comparison to the current trends of illegal trade in timber, i.e. if there is a decline in illegal timber trade.</p> <p>The source itself indicates that there are no reliable sources of data on environmental crime and it is impossible to measure the volume or value of illegal environmental trade directly; valuation based on extrapolations, proxy measurements and educated guesses.</p>	Little information is provided on environmental impacts (this is explained throughout the report as owing to the character of the environmental crime).
2.	ql. EN, SO, EC	qn. EN, SO, EC	mn. EN	<p>Temporal limitation of 9 years.</p> <p>Geographical limitation to the most affected countries.</p>	The data are often mere estimates and only a range of value is provided.	Little information is provided on environmental impacts. Data from the recent period are missing.
3.	ql. EN, SO, EC	qn. SO, EC	qn. EN, mn. EN, SO	Temporal limitation of 10 years.	Primary focus on environmental significance and volume of imports	Quantitative and monetary data on the environment are lacking.

				Geographical limitation to the most affected countries and the main importer.	from specific territories.	
4.	ql. EN, SO	qn. EN, SO, EC	ql. EC, mn. SO	Temporal limitation of 9 years.	The data provided are very detailed and precise. Information is recent and provided in chronological order.	Qualitative data on economic impacts and monetary data on social impacts are missing.
5.	ql. EN, SO, EC	qn. SO, EC	qn. EN, mn. EN, SO	Temporal limitation of 9 years.	Specifications as to the trade distribution of wood products in particular countries are provided.	Quantitative data on environmental impacts and monetary data on environmental and social impacts are missing.
6.	ql. EN, SO, EC	qn. EN, EC	qn. SO, mn. EN, SO	Temporal limitation of 5 years.	Primarily focused on trade-related data and little information given on other aspects.	Quantitative data on environmental impacts and monetary data on environmental and social impacts are missing.
7.	ql. EC	qn. EN, EC	ql. EN, SO, qn. SO	Temporal limitation of 1 year (annual report).	Focus predominantly on economic and statistical data.	Qualitative data on environmental and social impacts and quantitative data on social impacts are missing.
8.	ql. SO, EC	qn. SO, EC	ql. EC, qn. EC, mn. EN, SO	Temporal limitation of 3 years.	Primary focus on economic data.	Qualitative and quantitative data on the economic impacts, and monetary data on environmental and social impact are missing.
9.	ql. EN, SO, EC	qn. EC, EN	qn. SO, mn. SO	Temporal limitation of 1 year.	A lot of data taken from other sources, e.g. INTERPOL – UNEP, Word Bank, TRAFFIC, CIFOR, Global Witness etc.	Quantitative and monetary data on social impacts are missing.
10.	ql. SO, EC	qn. SO, EC	ql. EN, qn. EN,	Temporal	Predominantly	Qualitative,

			mn. EN	limitation of 4 years. Geographical limitation to South East Asia and China.	economic and other quantitative data.	quantitative and monetary data on environmental impacts are missing.
11.	ql. EN, SO, EC	qn. EN, SO, EC	mn. EN	Temporal limitation of 7 years.	The report is addressing more types of environmental crimes.	Monetary data on environmental impacts are missing. It addresses environmental, social and economic impacts in proportion.
12.	ql. N/A	qn. EN, SO, EC	ql. EN, SO, EC, mn. EN	Temporal limitation of 9 years. Geographical limitation to European Russia.	Very detailed quantitative data from one sector, i.e. illegal logging in a specific geographical area, i.e. Russian Federation. Less information is provided for some of these areas. Focused mostly on economic data.	Qualitative data are not addressed. Monetary data on environmental impacts are missing.
13.	ql. EN, SO, EC	qn. EC	qn. EN, SO, mn. EN, SO	Temporal limitation of 5 years.	Trade related data dominate. Illegal logging as an environmental crime per se not addressed.	Quantitative and monetary data on environmental and social impacts not addressed.
14.	ql. EN, SO, EC	qn. SO, EC	qn. EN, mn. SO	Temporal limitation of 10 years.	Statistical data on timber trade are not very precise, which makes it difficult to come up with reliable estimates. More data is provided on other environmental crimes.	Quantitative data on environmental and monetary data on social impacts are missing.
15.	ql. SO, EC	qn. SO, EC	ql. EN, qn. EN, mn. EN, SO	Temporal limitation of 2 years.	Focus is on quantitative data. Contains estimates, since it is	Data on environmental impacts are missing. Monetary data on

					impossible to gather hard data.	social impacts are also missing.
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Legend:

EC – economic impacts

SO – social impacts

EN – environmental impacts

ql. – qualitative data

qn. – quantitative data

mn. – monetary data

Summary of findings

In total, fifteen recent data sources addressing illegal logging and timber trade have been identified.

Available data

Nine of these sources contained qualitative data on *all* types of impacts, i.e. environmental, social and economic impacts. Three others focused on environmental and social impacts, one addressed economic and social impacts, one addressed only economic impacts and one contained no qualitative data at all.

Quantitative data on all types of impacts were found in four sources. Seven other sources addressed social and economic impacts, three addressed economic and environmental impacts, and one addressed only economic impacts.

Examples of data that were found include the number of people arrested and the amount of confiscated timber, data on fluctuations in illegal logging, monetary data on loss of government revenues (tax evasion) and the value of imports and exports of illegal timber. Some reports presented data on the scale of deforestation.

Non-available data

Non-availability of data concerned mostly environmental impacts, while limited data on social impacts were available and data on economic impacts dominated.

Limitations on the available data

Temporal limitations of the sources varied from one year (annual reports) to twelve years. The majority of sources had a global coverage and two of them were limited to the most affected areas. One data source was geographically limited to South-East Asia and China, and one was limited to European Russia.

Quality of data

The data we found are often based on estimates. The vast majority of sources contained predominantly economic data. Only two sources included rather detailed data.

Availability of data

Data which are missing in most of the sources primarily concern monetary data on environmental and on social impacts.

Conclusions

There seem to be no data sources that systematically (i.e. for a long period of time and for the same geographical area) register data on the impact of illegal logging and timber trade. Data on economic impacts dominate, while data on social and (especially) environmental impacts are more difficult to find. Often, data are estimates.

Various organizations have already attempted to quantify (specific aspects of) the impact of illegal logging and timber trade and have also indicated that further quantification will be extremely difficult. It is unlikely, therefore, that within the framework of this Work Package we can add much to the work done by, notably, the OECD, INTERPOL, TRAFFIC and Chatham House.

3 Conclusions

The survey of data sources within Task 1 of WP3 of EFFACE has shown that the data on environmental crime are usually highly dispersed with limited detailed data collations. The most likely sources of consolidated data are international institutions (such as Conventions and the EU). However, even here data are often limited. For many Conventions data collation is limited to those data reported by Parties and such data are often limited, of uncertain quality and with significant gaps. At EU level there has been limited data gathering on this issue (in contrast to other data sets on environmental quality and pressures). Perhaps the best data set at EU level identified concerned fires.

While consolidated data sets are uncommon, there are many examples of data on impacts in specific cases, such as for individual countries, individual instances, sites, etc. As a result it is not possible to provide a robust estimate of the overall impacts of environmental crime. There are simply too many gaps for this to be done with any confidence. Even doing this for certain areas of environmental crime is problematic. Therefore, it is important to focus on quantifying the impacts of environmental crime in areas where there are sufficient data for this to be done robustly and with confidence.

Following the examination of the data sets described in this deliverable, partners met to discuss which areas would be most suitable for quantitative and economic analysis given the availability of data. The analysis in this deliverable has shown that for some areas of environmental crime cumulative quantitative assessments of impacts are highly problematic. This is the case for example, with pollution incidents (which are highly location specific, inadequately reported and impossible to bring together), CITES (for which data on impacts on species populations are highly problematic except in rare instances) and timber (in this case due to differences in country-level data and comparability). As a result, it was agreed that the quantitative and monetary impact analysis of this WP should focus on those areas of environmental crime where there are likely to be sufficient data to perform such analysis and which could lead to robust conclusions. This would, therefore, be done for the following issues:

- Waste shipment
- Fisheries
- Protected areas
- Fires
- Marine incidents

This quantitative and economic analysis will form the next stages of work of WP3 and the results will be set out in the next WP3 deliverable.