



The illegal trade in European eels: outsourcing, funding, and complex symbiotic-antithetical relationships

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Abstract

Whilst traditionally, the study of the illegal wildlife trade has been focused on species that consider the role of the Western world as a consumer or transit hub, the study of the illegal trade in European eels is a landmark opportunity to deem the role of Europe as a source area for wildlife trafficking. Based on a qualitative methods research design, this case study delves into the nature of the illegal trade in European eels. In the context of globalization, a global eel market developed at the same time as stocks decreased sharply. The process of criminalization of the trade and fishing of eels, in combination with criminogenic asymmetries, has been facilitating opportunities for crime groups. In the legal-illegal continuum, upper- and underworld actors interact along the chain from rivers to worldwide consumers. This constant interaction fuels the illegal trade by providing the underworld with vital elements for its continuity, such as protection, finance, or laundering. In particular, this research focusses on the different legal-illegal interactions by looking at outsourcing, funding and complex symbiotic-antithetical relationships.

Keywords Green Criminology · European eel · Wildlife Crime · Pipeline Model · Legal-illegal interface

The “eel-phant” in the room

The illegal wildlife trade is increasingly recognized as a major area of crime, and has become an important topic for criminologists (e.g. Pires and Moreto 2011; Wyatt 2013; Nurse 2015; van Uhm 2016; Sollund 2019; Petrossian 2019; Wong 2019). An

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understudied topic is the lucrative illegal trade in European eels (*Anguilla anguilla*), but it is considered as an urgent topic, due to the involvement of sophisticated crime networks, the critical status of the stocks and the large number of fish affected (European Commission 2016; ICES 2017; Musing et al. 2018; TRAFFIC 2019). Whereas traditionally the role of the EU has merely been considered as either a consumer or transit hub (Engler and Parry-Jones 2007; Sollund and Maher 2015; van Uhm 2016), in this form of illegal wildlife trade, the EU is a source area (European Commission 2016).

This article aims to fill the empirical gap in knowledge regarding the illegal trade operations in European eels by applying an idealized *pipeline model*. The *pipeline model* is an ideal categorization that enables us to describe the cross-border movement of illegal commodities, by addressing the different stages, actors and networks involved in legal and illegal activities from the origin to the destination (Sevdermish et al., 1998). This has been used in previous criminological studies to describe the illegal movement of wildlife and other illegal goods, such as diamonds (e.g. Siegel, 2008; Van Uhm, 2016). With this *pipeline model*, we will address the ways in which eels move from European and Northern African rivers to Asia¹.

Contemporary developments in the study of environmental crime networks signal the expansion of grey areas of business where conventional and non-conventional crime groups overlap (Wyatt et al. 2020). The trade in eels is a prime example with licit, semi-licit, and overtly illicit economies that are constantly developing points of contact, common interests, and strategies. According to Passas (2002), and Van Uhm and Moreto (2018), the interconnectedness between the legal and illegal world consists of a variety of components. On the one hand, symbiotic relationships exist when interests are shared and enhance mutual benefits between the ‘underworld’ and ‘upperworld’ actors (Passas 2002). For instance, ‘outsourcing’ is a type of symbiotic relationship that occurs when a division of labour is agreed upon between legal and illegal actors, where one of the parties provides uniquely distinct services to the other. This can be the case of a crime group that orders poached fish from a local crime group (van Uhm and Wong 2021). ‘Funding’ relationships involve the procurement of essential financial support in order to carry out the illegal activities. Legitimate actors may also engage in a symbiotic relationship when interests are shared and enhance mutual benefits through many forms of ‘collaboration’ to successfully complete the same offense, or ‘reciprocity’, namely to acquire illegal goods and services. On the other hand, antithetical relationships can have, for example, an injurious or a predatory nature. ‘Injurious’ relationships occur when actors undermine, attack, or harm each other. In relation to ‘predatory’ relationships, legal actors with illegal activities or connection with the underworld may be involved in predatory practices in order to debunk legal competitors and to reach a monopolistic market position (Passas 2002).

Firstly, this study introduces the historical context of eel fisheries and the social construction of demand, followed by the methodological discussion. Secondly, the

¹Note that in the pipeline model the stages might be blurred and less structured in reality (Sevdermish et al., 1998). For instance, some actors like collectors are contingent, and stages can be overlapped, by-passed or repeated (e.g. smuggling of glass eels and then smuggling of eel meat).

main empirical findings are presented using an idealized pipeline model in order to describe the illegal trade process, and illustrate the different legal-illegal interactions by looking at outsourcing, funding, and complex symbiotic-antithetical relationships. Finally, the theoretical implications of the empirical findings are discussed.

Historical and regulatory context

The eel rush

Eel fishing has been practiced for millennia. Traditionally, eel fishing was considered a small-scale fishery in Europe (Gandolfi-Hornoyold 1933, 1936; Dekker 2019). Yet the invention of hot-smoking in the 1890s marks the onset of the major expansion of eel fisheries throughout Europe (Dekker 2019). In contrast *Glass eel* -the small, translucent life stage of eels- trade and its consumption followed a different pattern. At the beginning of the 20th century, glass eel fisheries and trade developed mainly in the south of France by exporting glass eels to the Spanish market. Spain, in particular the Basque Country, drove the commercial exploitation of glass eels since its consumption has a strong cultural root attached to festive seasons such as Christmas (Hanel et al. 2019; Anonymous 2014). The use of ‘hard’ fishing methods (e.g. boats with trawling nets) around the 1960s resulted in a large increase in glass eel landings. Another shift in the industry was characterized by the advent of modern intensive farming systems within Europe (Dekker 2003). This led to the development of an eel aquaculture industry that sources glass eels as ‘seed’ for farming adult eels principally in the Netherlands and Denmark.

Despite the European eel market, the global demand for eel products has historically been driven by the East Asian market. Especially, Japan counts with popular meals based on eels or *unagi* (うなぎ). This is in part due to the fact that, the Japanese eel, *Anguilla japonica*, have long been known² as a way of preventing summer fatigue and to keep up stamina due to its high fat content, vitamins and calcium (Frost 2001; Kuroki et al. 2014; Shiraishi and Crook 2015). The cultural importance of eel consumption in Japan is such that it accounts for up to 50–70% of the world’s eel consumption (Ringuet et al. 2002; Kuroki et al. 2014; Shirashi and Crook, 2015). Commercial eel farming of the Japanese eel began in Japan around 1890, and subsequently in Taiwan and South Korea during the second half of the twentieth century (Tesch 2003; Lee 2014; Shiraishi and Crook 2015). However, it is the rapid development of the eel industry in China particularly in Fujian and Guangdong provinces, that marked the collapse of their stocks³.

The lack of the Japanese eel stocks led the Chinese eel industry to begin sourcing glass eels of *Anguilla anguilla* (Crook 2010; Shiraishi and Crook 2015), which was

² It was during the Edo era (1603–1868) when the summer consumption of the most popular eel dish *kabayaki* was popularized during a special day in summer known as ‘Doyo no Ushi no Hi’ in late July (Ishige 2001; Kuroki et al. 2014; Minowa 2014; Ganapathiraju et al. 2019).

³ Consequently, prices for a kilo of glass eels have been rising drastically from USD11,800/kg (Luneau 1998) in 1996, to a skyrocketing market price of USD 33,240 per kilo in January 2018 after the lowest year in catches (Anonymous 2018).

cheaper and relatively abundant at that time. This led to an exponential increase in Chinese production at the expenses of importing European glass eels frenetically. Consequently, over these recent years, China has been the world's largest eel export country accounting for up to the 85%, worth over €1.2 billion each year (Ringuet et al. 2002; Crook 2010; Shiraishi and Crook 2015).

As a result, the rise of a global eel market led by Chinese eel aquaculture industry that heavily relied on sourcing European glass eels led to a sharp increase in valuation over the years. Whilst European glass eel prices increased, stocks started to decline from 1980s onwards to less than 10% of its historical level⁴, and have practically remained at this low state since 2011 (ICES 2017; ICES 2018; Dekker 2019; Hanel et al. 2019).

Regulation and criminalization

Due to the reduction of the number of European eel, the species was listed in Appendix II of the Convention on International Trade in Endangered Species (CITES) in 2007. CITES is a multilateral treaty to regulate the trade in endangered species. CITES is implemented within the EU through Council Regulation (EC) No. 338/97 (European Union Wildlife Trade Regulation), and *Anguilla anguilla* is listed in its Annex (B). Moreover, the EU adopted the *Council Regulation (EC) No. 1100/2007*, establishing measures for the recovery of the stock of the European Eel given the impact of the international trade to the stock depletion. These measures included the instruction to EU Member States to develop national Eel Management Plans by 2009 in order, *inter alia*, to set out of export quotas each year and issuing permits. However, although an export quota was established for the 2009/2010 fishing season, the EU concluded that eel does not meet conditions for a Non-Detriment Finding⁵ (NDF). This was due to lack of reliable stock assessment and concerns that the international trade was having serious impact on the species. Therefore, the EU imposed a zero-import/export quota policy banning all European eel trade to or from the EU that still remains in place whilst maintaining an asymmetrical management at national/federal level⁶ (Dekker 2019; Kaifu et al. 2019). Only trade within the EU is permitted, and any international trade in this species needs to be accompanied by a permit since then. This measure was apparently lobbied by the European eel industry in order to drive down the legal purchasing prices of glass eels that were skyrocketing due to the trade to Asia. With regards to other non-EU source countries like Morocco or Tunisia, NDFs were issued allowing the trade of a certain export quota of eels (CITES, pers. communication). In sum, the process of criminalization of the trade in favor of regulating the eel species

⁴This is set for the period comprising the average of eel recruitment between 1960 and 1979.

⁵This is a requirement for issuing permits for commercial trade in species listed on CITES Appendix II.

⁶Concerning National Eel Management Plans in the principal glass eel fishing countries, France sets a national quota every year distributed by river basin units (UNODC 2020). In the United Kingdom, fishing is highly restricted in methods, licenses, time and space (UNODC 2020). In Spain, eel management is regulated by the Autonomous Communities leading to a further asymmetrical system at federal level (UNODC 2020). Thus, glass eel fishing can be legally commercial, recreational or banned depending on the region. Finally, glass eel fishing is banned in Portugal except in Minho River -natural border with Spain- (Franco Amado 2019).

in combination with criminogenic asymmetries of economic, political, cultural, legal and ecological nature within and outside the EU, has been facilitating opportunities for crime groups to engage in this lucrative illegal business.

Methodology

The primary data used in this paper was collected based on a qualitative methods research design with semi-structured interviews and participant observations. On the one hand, qualitative data gathered during fieldwork between March and June 2020 was obtained through 19 semi-structured interviews and several informal conversations with over 30 informants from the main source and trading countries within Europe, namely Spain, France, Portugal, the United Kingdom and the Netherlands. Fishermen and poachers (4), middlemen (3), an NGO representative (1), a CITES authority (1), scientists (2), and law enforcement agents (8) were interviewed. Initial respondents were found through a purposive sampling technique through media and open sources, whereas further respondents were collected through *snowball* sampling. This technique is based on using existing participants to recruit further respondents from their network of contacts (Davies and Francis 2018: 520).

On the other hand, participant observation was also carried out during fieldwork in glass eel fishing and trading towns (Cudillero, San Juan de la Arena, Aguinaga, Arzal, Cordemais, Saint-Nazaire, etc.), rivers (e.g. Oria, Nalón, Loire, Vilaine), fish markets, shops and facilities of glass eel traders. Participant observation refers to the process of observing actively and participating in the activities of the participants in their natural setting (DeWalt and DeWalt 2011). This ensures the representation of naturalistic empirical data on the illegal eel trade in its unique cultural and socio-economic context (van Uhm and Moreto 2018; van Uhm and Wong 2019). The data collected (e.g. through pictures, videos or field notes) from observations provided a valuable contextualization, which eventually serves for corroborating or refuting the data derived from other qualitative methods (DeWalt and DeWalt 2011). Additionally, secondary sources were added to this data triangulation process.

Findings

Figure 1 illustrates the ideal pipeline model of the illegal trade in eels which includes the following operationalized stages. During an initial extracting phase, glass eels are principally caught legally or without being reported by licensed fishermen, or illegally by poachers. Then, glass eels may be gathered by a collector that sells them

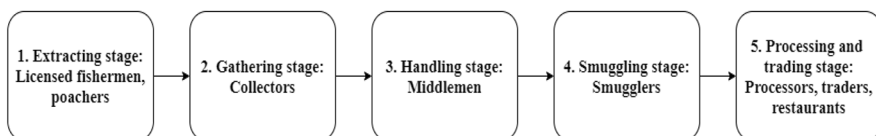


Fig. 1 Flow chart of the idealized pipeline model in the illegal trade in eels

directly to smuggling networks, or to a middleman. Middlemen in Europe and Northern Africa supply glass eels and occupy a relevant role in fluid networks that organize the smuggling stage through different connections with legal and illegal actors. In addition, smugglers are also part of a network that coordinates the movement of glass eels from the source to Asian farms. Finally, glass eels arrive to Asia where they are farmed to become adult eels, processed and illegally distributed by legitimate actors through legal channels to be consumed worldwide.

Extracting stage

The illegal trade in eels involves the smuggling of glass eels sourced both from legal catches and from Illegal, Unreported and Unregulated (IUU) fishing, with both licensed fishermen and poachers as the first actors in the supply chain (ICES 2016, 2018; UNODC 2020). The European eel fishing communities have always been fragile due to the limited resources available. Since the 2000s, the decline in stocks and the implementation of different national and federal Eel Management Plans affected the socioeconomic status of eel fishermen. For instance, the different regulations across the EU shortened the fishing season, reduced the fishing areas and number of licenses by more than half, imposed fishing quotas, or even prohibited any fishing activity, as in Portugal or Andalusia (Hanel et al. 2019).

The illegal and legal fishers have both common traits and differences. For example, they are intimately linked to the river or coastal environment in which they live, but glass eel poachers are generally locals, young, jobless, or with other seasonal jobs. Two types of poachers can be distinguished: opportunistic and organized poachers. For example, in Asturias, opportunistic poachers belong to local communities and they poach with hand-held sieve nets in river areas with difficult access. In these cases, the fishing yield varies considerably between 100 g to few kilos.

In contrast, more organized groups of poachers are mainly encountered in Portugal and France. In Portugal, poaching takes place in rivers like Douro, Mondego or Tagus principally (Ringuet et al. 2002). The poaching method is a much wider cone-shaped mosquito net or '*rapeta*'⁷. Poachers form groups of three or four individuals at night. They divided tasks of vigilance and net installation with boats, choosing places of difficult access for authorities like private areas (Garcia and Seixas 2014; UNODC, 2020). In the case of France, poaching has always been a major concern with organized groups of poachers, mainly in the vast Loire River, which concentrates the highest percentage of glass eel recruitment in Europe (personal observation, 25 June 2020). Interestingly, the 'traditional' poachers in France have been abandoning this practice due to its risk, being replaced by ethnic minority groups. For example Romani ethnic families living in caravans form extended family groups of poachers (Ringuet et al. 2002; Le Monde 2016) and members of the Chechen community are also involved in glass eel poaching with some links to Asian criminal networks

⁷These nets have a mouth that is 10 m wide and a length of 50 m, a 30-m body and 20-m tail, called the '*rapeta*' (Garcia and Seixas 2014; Franco Amado 2019). At the end of this net there is a bag, with a length of about 2 m whose mesh is 1 mm diameter, intended to trap all animals that enter it. These nets are then fixed to the bottom by anchors (Garcia and Seixas 2014).

established in Russia. In this sense, an informant explained in an interview that “they are organized in the sense that some of them do vigilance, and the others poach with handheld nets in dam sluices, or in the many canals of river estuaries”.

Gathering stage

The extracting stage is followed by the gathering stage. Once glass eels are extracted by either legitimate fishermen or poachers, the next actors in the chain are collectors and middlemen who connect directly to fishermen or throughout local fish auctions. Collectors gather glass eels from several fishermen or poachers in a certain area where they have connections at a local level with fishermen. According to a respondent, the collector “might be a fisherman, a former fisherman, but definitely someone from the river area and related to the activity”. They are contingent actors who may connect to a middleman for an end purpose of legal consumption or illegal export, or directly to the Asian networks. If a collector further connects to middlemen, only a small commission is applied. On the contrary, if the collector connects directly to a smuggling Asian network, the margin profit received from the illegal business is huge (e.g. buying price from poachers €50–150 vs. selling price €500–700), thus enjoying a fabulous economic status. Once a collector receive glass eels, these are moved as fast as possible to the next step to avoid detention. This actor is particularly relevant in areas with high recruitment (e.g. France) and where fishing is banned like some parts in the Iberian Peninsula, as Asian smuggling networks are keen to source glass eels in big quantities of illegal origin.

Handling stage

During the third stage, middlemen source glass eels from fishermen, poachers or collectors in order to launder or distribute them commercially within Europe or to illegally export the eels to Asia. With the advent of the international trade in glass eels to East Asia, the traditional glass eel traders started to export tonnes of glass eels each year and the legal business activity of European glass eel traders increased sharply until the export ban. This has attracted two types of middlemen: the traditional legal glass eel traders and other ‘instrumental’ middlemen. The involvement of legitimate actors means that this illegal trade in glass eels is strongly linked to the upperworld. Both types of traders are normally in contact with Asian criminal networks even though there might be different levels of responsibility, and roles in the criminal network.

With regards to the first category of glass eel traders, they basically use their legal infrastructure and legitimate business activities not only to transport and export glass eels to East Asia illegally, but also to launder or mis-declare glass eels. There are a limited number of them, and they are from Europe: French *mareyeurs*, Spanish *anguleros*, and, to a lesser extent, few Portuguese and British (Hanel et al. 2019). Accordingly, these traditional legal traders have been in the glass eel business for various generations and are normally family companies with no more than 20–25 employees. In terms of infrastructure, they may have one facility or various subsidiaries in different regions or countries with eel ponds located near fishing areas so

they can get closer to fishermen (Hanel et al. 2019). These companies might have refrigerated trucks, or fishing boats so that they can transport glass eels from many sources.

As for other middlemen, they also use their legitimate business to conceal glass eels among other fresh products in order to be illegally exported. These opportunistic middlemen started to emerge after the export ban, having in few cases some previous practice of smuggling other products. Even though they may have an instrumental role in most cases, some of them are moving several tonnes of glass eels. The criminal networks are getting fond of these front businesses as they are quite new companies without any previous involvement in illegalities, so they can use them to cover the illegal business. Interestingly, an increasing number of ethnic Chinese or Asian middlemen have recently been detected.

Smuggling stage

The smuggling phase takes place between the handling and the processing/trading stage. Glass eel smuggling involves a high degree of organization, rationality and sophistication since the transport must be successfully carried out in less than 40–48 h in order to ensure that glass eels survive. Thus, due to this time limitation, the smuggling phase always requires a step in which glass eels are shipped via air. In addition, smuggling modus operandi and routes have been varying a lot throughout the years in order to avoid detection (Musing et al. 2018).

The main smuggling methods to move European glass eels out of its source en route to Asia are: via air freight, whereby specimens are mis-declared or concealed among other refrigerated goods, mainly seafood products; via road/ferry to an EU neighbouring country where it is shipped via airfreight cargo to Asia; or hidden inside personal checked-in baggage at airports (European Commission 2016; Musing et al. 2018; UNODC 2020).

With regards to air freight cargo, glass eels with legal or illegal origin are transported within the EU through legal circuits where, at some point, documentation is changed, and shipment is smuggled via air freight. In particular, countries from Eastern Europe are constantly deemed as transit hubs in which glass eels are departing towards Asia. Profiting from the free movement of goods within the EU, the biggest legal traders involved in the illegal trade use these trade routes within the EU through Eastern European countries such as Romania or Bulgaria. To avoid exposure of the criminal network, a second instrumental middleman is normally in charge of changing the documentation and smuggling the glass eels. Since this method requires a legitimate export declaration and further logistics to cover the illegality, it is arranged by middlemen with different possible combinations of collaboration at different levels responding to a superior scheme designed by Asian networks. Other actors may engage opportunistically such as transport companies (Musing et al. 2018). A common variant of this method involves the transport of glass eels to a neighboring country via road or ferry where glass eels may quarantine for some days. Then, they are shipped by air freight cargo. For instance, this is the case of Morocco, or Russia (Kaliningrad) through the Polish border. In the case of Morocco, an ongoing illegal trade in glass eels may be lurking under legitimate channels by using ambiguous

commodity terms. Moreover, according to several informants, there is a significant discrepancy between the declared amount of glass eels exported from Morocco, the allowed fishing quota, and the stock available in that country since 2010 (EU trade ban). Therefore, it is likely that Morocco might be one of the most important neighboring countries that has been used as a transit country (Nijman 2017), as a law enforcement agent stated in an interview:

“Morocco is another exit route that is a black hole; once you place it in Morocco you can send it wherever you want. Morocco has a fishing quota of two tonnes, besides they can send elvers of more than 12 cm as many as you want. Do you think Moroccan authorities are going to start checking if it is an elver or a glass eel?”... “The Moroccan route is the stronghold of the biggest trader”.

Moreover, seizures and trade events of *Anguilla anguilla* have been increasing circa 2015 for Southeast Asian countries (Crook and Nakamura 2013; Musing et al. 2018, TRAFFIC 2019), being this trend further confirmed by many informants. Interestingly, these countries are not only used as transit nodes or source countries, but also as final destination where glass eels are farmed in subsidiary facilities subordinated to the big eel farms in Mainland China or South Korea.

Another method involves smuggling glass eels hidden inside personal checked-in baggage at airports (Stein et al. 2016; Musing et al. 2018). Asian smuggling networks source IUU caught glass eels and recruit mules to smuggle them directly through airports without middlemen. In this case, not only the organization is meticulously planned but also the method itself is highly sophisticated in order to ensure the survival of eels: Glass eels are put into plastic bags (one kilo in each bag) with high-pressure oxygen injected and a little amount of water inside the bag. Then, around 20 plastic bags, and a plastic bottle with ice are wrapped with a thermal blanket that maintains cold temperature inside each suitcase. Before being smuggled by mules, glass eels are kept in hidden ponds in underground warehouses or houses located preferably next to airports, as it was found out during Operation Black Glass carried out in Spain (ICES 2016; Musing et al. 2018; Kaifu et al. 2019). The Asian network may pay for the flight ticket, lodging expenses, or give some retribution for the smuggling job. Mules might be involved opportunistically or repeat several times the same year.

Processing and trading stage

The last stage involves the processing and trading of farmed eels. Once glass eels are smuggled, a significant amount of European glass eels are smuggled to China via Hong Kong. In Hong Kong, European glass eels converge with the other eel species like *Anguilla japonica*, *Anguilla bicolor* and *Anguilla rostrata* in a torrent of legal and mis-declared illegal batches. An expert interviewed from the United States described in an interview: “Hong Kong plays a huge role because is transferring a 100% of its glass eels to China, and there’s a mix of legal, illegal, mis-manifested eels filtering through that state”.

Then, unreported imports of European glass eels are officially distributed to farms mis-declared as other non-CITES species (Ringuet et al. 2002; UNODC 2020). The

same respondent also argued how European glass eels are moved mis-declared as American eel highlighting that these mis-practices should matter Chinese authorities:

“[T]here’s a whole trail of paperwork that has been falsely registered with the government, so when they smuggle EU eels they start the false manifestation in China right away, they start calling them American eels and registered. They transported them from Hong Kong to China as American eel and the whole cycle starts and there’s probably 10 to 15 illegal documents within China that were falsely manifesting their products and that should be important to China”.

Glass eels are mainly farmed in the colossal aquaculture industry of China located principally in Fujian and Guangdong provinces, but also in South Korea (Shiraishi and Crook 2015). It is estimated that there might be over 600 eel farms and 70 manufacturing/processing plants in China all operated by a handful of major legitimate Chinese family-owned companies (UNODC 2020).

Processed European eel meat is re-exported worldwide smuggled among meat from other eel species in legitimate refrigerated cargo without any CITES document, mis-declared and mis-labelled as simply “eel”, or as other *Anguilla* species, and involving a forged sanitary document (Shiraishi and Crook 2015; Musing et al. 2018; Richards et al. 2020). In order to circumvent controls, eel meat smuggling modus operandi is as follows according to the expert from the US: “In some cases we found this smuggling modus operandi where they put the CITES species on the back of the container but in all cases we had about 44% European eel of all sampling from the 16 refrigerated containers we seized”. Once the refrigerated container is cleared, it is distributed across the territory to minor wholesalers, retailers, supermarkets, or restaurants to be subsequently consumed among other popular Japanese dishes without any further questioning about a likely illicit origin (Vandamme et al. 2016).

Discussion: outsourcing, funding, and reciprocal relations and symbiotic-antithetical relationships

In the previous sections, we examined how different legal and illegal actors, motivated by different interests, constantly interact across the supply chain of European eels in myriad ways. These different interactions fuel the illegal trade and, subsequently, hinder the control of the illegal phenomenon, and this is especially relevant in the illegal wildlife trade where legal wildlife markets often collide (Passas 2002; Wyatt 2013; van Uhm 2016, 2018; Wyatt et al. 2020). This section discusses in detail three forms of interactions between legal and illegal actors that are of particular interest to understand the illegal trade in European eels.

First, the most common symbiotic relationship is through outsourcing, which refers to a division of tasks in which the Asian criminal networks delegate the smuggling stage to middlemen (van Uhm and Wong 2021). In this case, glass eel traders and middlemen transport the glass eels to another country within the EU during the handling stage (third stage). They do so by profiting from the free movement of goods within the EU. Outsourcing includes another layer of complexity: to avoid exposure of the criminal network, a second instrumental middleman is normally in charge of changing the documentation and smuggling the glass eels. The blame is externalized to the instrumental actor (i.e. the second middleman) if the direct offenders are ever

discovered (Passas 2002: 22). Since this method requires a legitimate export declaration and further logistics to cover the illegality, it is arranged by middlemen with different possible combinations of collaboration at different levels. Other actors may engage opportunistically such as transport companies (Musing et al. 2018). Finally, the second instrumental middleman changes the documents and smuggles (fourth stage) the glass eels mis-declared, or concealed among fresh products, mainly seafood. The arrangement of these collaborations is ultimately designed by Asian networks. In this sense, a law enforcement agent discussed not only how the different tasks are divided and carried out, but also argued that the Asian criminal networks organize every aspect of the illegal trade:

“The ones who manage everything, the ones who make the decisions, the ones who do all are in China and Korea. They are *the* big criminal organization. They determine how much amount of glass eels is bought, how much price is paid for them, and how glass eels are shipped. In 99.9% of the cases they design the trade routes, as it happened in Operation Abaia. Back then the network instructed: ‘send the glass eels to Greece and another middleman there will ship it through legal cargo’. Because trade routes are the most important thing in eel trafficking; if you have a good route you can slip tonnes through it. So these Chinese organizations contact middlemen and fix with them the amount of eel they have to send them, the prices and the routes”.

Second, another symbiotic relationship that is commonly found occurs when legitimate actors, in the form of corporate crime groups (Wyatt et al. 2020), provide funding and equipment (e.g. nets, pools and mechanic equipment to maintain glass eels, or suitcases) to organized crime groups of poachers in exchange of illegally sourcing glass eels (extracting stage). Legitimate actors also provide funding and equipment to Asian smuggling rings based in Europe in exchange of illegally procuring glass eels mainly through trafficking mules (smuggling stage). For instance, corporate crime groups offer nets to poachers through collectors as a discount to the price of glass eels so that the criminal network resilience increases and poachers further engage in the criminal activity. Indeed, the high resilience of smuggling rings and organized groups of poachers is due to their symbiotic relationship with these legitimate companies. Another law enforcement agent interviewed describes the role of aquaculture holdings behind the eel farms in China that have various satellite companies dedicated to provide all necessary equipment for the illegal trade:

“These companies they have like satellites. They have a core processing plant, and then this company owns another company that produces the nets. Then, it then delivers these big nets to the poachers in Europe. For instance, who produces the suitcases used by smugglers? The Chinese aquaculture company also created a company to produce them. The same goes for the pools; they have often companies to manufacture these pools used by smugglers, and they also have companies to produce all mechanic equipment to maintain glass eels alive before being smuggled. And they not only produce these equipment products for the illegal activity of the company, but also for the legal markets in other countries”.

Finally, there are also complex symbiotic-antithetical relationships, including relationships with an apparent symbiotic nature, but aiming at having an injurious impact on competitors. For instance, in relation to the example set out before in the case of

outsourcing and division of tasks, the referred law enforcement agent further continued explaining that:

“[T]he instrumental middleman was Greek and the trader was Spanish. The business share was equally distributed, but the Spanish scammed his Greek counterpart in relation to the cost price of the glass eels that the Spanish company had bought, so they retained a bigger share of the profits”.

Another example can be seen in the case of whistleblowing when the aim is to debunk competitors in order to reach a monopolistic market position. A middleman may collaborate with police authorities in order to neutralize competitors. The same respondent argued: “He is wiping out his competitors even though he claims to be collaborating with police, but he is actually eliminating competitors and washing his image”. In addition, due to strong competition, there are injurious antithetical relationships between the three main Asian networks. The informant continued arguing:

“When they figure out the trade route of another criminal organization they go to police in Europe, look for a confidant, so that police can dismantle the route of its competitor. For instance, if they know that in France there is a trade route, for example by Charles de Gaulle, they go to the Gendarmerie, if they know they are going through Italy, then they look for someone in Guardia di Finanza”.

Furthermore, French glass eel traders involved in the illegal trade may be involved in antithetical relationships with other legal traders based on predatory pricing. They may collaborate with fishermen by buying legally caught glass eels for high prices since those glass eels may be illegally traded, thus leading to an antithetical relationship with other legal traders not involved in the illegal trade and who cannot reach those prices. In this sense, a middleman interviewed stated:

“Imagine if you offer the fisherman 400 because you can sell it for 500, and another trader comes who is illegally exporting outside at 1,500 per kilo, obviously you cannot bid. You cannot compete with them in purchase. He may offer 498 euros to make it look less suspicious”.

Conclusion

The European eel population has dramatically decreased throughout the recent years. This is mainly due, among other causes, to loss of habitat and increasing overexploitation by fisheries over the years. This overexploitation has been demand-driven, principally by the East Asian countries like Japan, where eel consumption is deeply embedded in culture through different purposes such as medicinal, functional, social or as delicacy. As the glass eel trade to Asia was driving this species to extinction, there has been an increase in public awareness on an international scale which has resulted in regulation and criminalization processes.

By using an idealized pipeline model that categorizes the different stages throughout the legal-illegal continuum, this study describes the actors and their interactions along the chain from rivers to consumers. During the extracting phase, both licensed fishermen and poachers (opportunistic and organized) are involved in IUU fishing practices. After buoyant decades of exporting glass eels to Asia, involvement in illegalities might be related to the socioeconomic vulnerability of these fishing

communities fueled by the asymmetrical eel fishing regulation and criminalization established within the EU. In addition, collusion with collectors and middlemen fuels the involvement in IUU fishing practices. Glass eel traders agree beforehand with licensed fishermen upon buying a certain amount of both reported and unreported batches of glass eels. In the case of ‘organized’ poachers, Asian criminal networks fuel the illegal trade by providing them with funds and equipment (e.g. nets). Collectors, traditional glass eel traders, and other middlemen are linked to the core criminal networks in Asia by engaging in different illegalities. These intermediaries use their legal structure to facilitate the smuggling of glass eels to Asia by mis-declaring or concealing batches of glass eels among legitimate cargo. Once in Asia, a whole trail of mis-manifestations enables legitimate farming and processing companies to produce European eel meat, mis-declared as other non-CITES species or by means of forged CITES permits from Northern African countries. Then, a second smuggling phase occurs when processed European eel meat is re-exported worldwide, smuggled among meat from other eel species, mis-declared, or mis-labelled with ambiguous terms and in many cases accompanied with a forged sanitary document.

By drawing upon the legal-illegal interface, in connection to the nuanced description of stages and actors within the pipeline model, this study has aimed to understand the interconnection between the underworld and the upperworld. The embeddedness of crime in the upperworld is paramount to understanding why the illegal eel trade exists and continues as many legitimate businesses fuel the illegal trade by providing the underworld with vital elements for its continuity, such as protection, finance, or laundering. At this respect, it has been evidenced that legal and illegal actors interact in the form of symbiotic or antithetical relationships as per their interests. For instance, symbiotic relationships, such as outsourcing carried out by middlemen during handling and smuggling stages (stages 3 and 4), or collaboration between legal and illegal actors in the extracting and smuggling stages. In addition, antithetical relations based on a predatory nature take place between different actors for the control of the legal market during the extracting, gathering, and handling stages. However, this study has evidenced the difficulty in determining a relationship as either symbiotic or antithetical, as complex relationships among different actors can have an antithetical nature in an apparent symbiotic relationship. This illustrates why legal-illegal interfaces are essential in understanding the complex interactions between upper- and underworld actors behind the eel networks throughout the pipeline model. The conclusion extracted from the case of eels is that the nature of relations is determined by the fact that actors are ‘drifting’ from collaboration to competition (and vice versa) in relation to their specific, changing motivations.

Declarations

Compliance with ethical standards All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Conflict of Interest The authors declare that they have no conflict of interest.

Informed consent Informed consent was obtained from all individual participants included in the study.

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