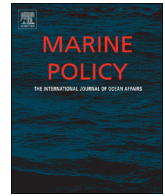




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Out of control means off the menu: The case for ceasing consumption of luxury products from highly vulnerable species when international trade cannot be adequately controlled; shark fin as a case study

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ABSTRACT

As luxury consumer markets in wildlife grow, many of the desired species targeted are declining, with some at elevated risk of local or even global extinction unless their trade networks are controlled and the necessary laws and regulations established and enforced. Application of the precautionary principle is strongly called for. The well-documented international trade in shark fins for high-end seafood consumption, selected as an illustrative case study, is no exception. For shark fins, and other threatened luxury wildlife, only a tiny proportion could be managed sustainably, much of the international trade is uncontrolled or currently uncontrollable, laundering and poaching are rife, criminal networks are often involved and there is scant government or consumer appetite in major demand centres pushing for sustainable and legal trade. In the case of shark fins, the sourcing of which is the major driver of shark overfishing, it is proposed to be taken off the menu before further declines in shark populations, and possible extinctions, occur, or until exploitation (including bycatch) and trade in fins is controlled to within their biological limits.

1. Introduction

The escalating consumption of endangered and vulnerable species, and their parts, associated with mounting demand for luxury wildlife products is placing heavy pressure on a range of species little able to sustain heavy exploitation and global trade. Combined with weak resource management capability, poor enforcement, inadequate laws, powerful vested interests and *laissez faire* trade controls in source countries and/or demand centres, conservation risks to many such species are growing, most notably so when value increases with rarity. While there are multiple examples globally, as identified below, shark fin is used as a case study to illustrate many of the issues and challenges because its trade is relatively well-studied, shark fin consumption is being widely discussed, and because its trade illustrates many of the problems faced.

Shark fin soup is a prestigious dish to ethnic Chinese, both in China and its diaspora. Sustainably produced shark fin is not feasible at this time because it is not scalable and considering current enforcement

capacities, international trade frameworks and management issues in major shark fin source and demand centres. Hong Kong has traditionally been a major consumer of shark fins as well as the principal gate of entry for about 50% of globally traded dried shark fins [1–3], much of which is re-exported to the People's Republic of China (mainland China).

Imports of dried shark fins into Hong Kong grew six-fold between 1960 and 2002, declining thereafter to one-third of 1960 levels by 2016 – almost 6000 t (Fig. 1). This trend is also reflected in exports from Hong Kong; over the last decade Hong Kong government data show a drop in shark fin re-exports to China of > 80% [3,4]. Although these figures suggest a reduction of shark fin trade, overall consumption outside mainland China has not declined significantly, nor has commercial fishing pressure on sharks [5–7]. Moreover, although trade through Hong Kong appears to be declining, possibly due to consumer and retailer responses to campaigns around shark fin consumption in the city, there is evidence that other trade hubs, such as Macau and Vietnam have become alternative hubs, although this trade may still

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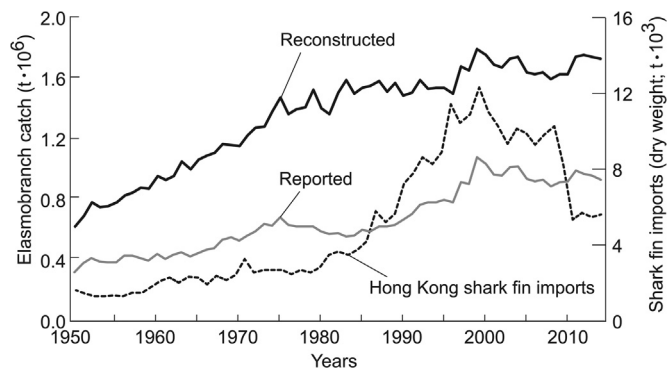


Fig. 1. Officially reported catch (in t, solid grey line) of elasmobranchs (sharks and rays), contrasted with the reconstructed, i.e. including illegal, unreported and undocumented (IUU), catch (in t, solid black line) of these taxa (see www.seaaroundus.org). Also shown are the officially reported dry/preserved weights of shark fins imported to Hong Kong (in tm dashed black line) (Hong Kong Census & Statistics Department).

include Hong Kong routing [3,7].

Interest in shark fins remains strong at a global level despite progress made in Hong Kong and mainland China among young consumers, many of whom now either eschew shark fin or substitute it with bird nests, artificial shark fin or other luxury seafood products such as fish maw i.e., the dried swim bladder of larger bony fish [7,8]. Public awareness campaigns and a ban on luxury seafood in government banquets in mainland China (to reduce corruption) reduced consumption while the CITES listing of several species since 2002 and transport bans by several companies reduced imports to Hong Kong [7,8]. Moreover, while in Hong Kong, over 80% of set menus for banquets, Lunar New Year, or high-end restaurants still include shark fin dishes, much of this appears to be passive consumption (fin being part of set menus) rather than diners asking specifically for shark fin, possibly also reflecting a declining appetite for shark fins [8]. On the other hand, suppliers and consumer markets for shark fins are emerging in various regions. For example, Thailand has, since 2016, been the world's top shark fin exporter, and also caters not only to a new and growing local market of both ethnic Chinese and Thai consumers, but also to tourists, mostly from mainland China [7]. Meanwhile, Macau has become one of the top importers of shark fins from Hong Kong since 2016, not only for local consumption in restaurants and banquets, but also for tourists, particularly as part of set menus in the casino sector [9]. Increasing exports and domestic demand is likewise occurring in various other countries, e.g., Vietnam and Indonesia [3,7].

While the demand for shark fin, overall, has not abated much outside of mainland China, the current level of shark fishing pressure worldwide has increased [5]. Shark catches, which currently amount to approximately 1.4 million tonnes (www.seaaroundus.org), are unsustainable – as demonstrated by many populations being threatened due to overfishing according to the International Union for Conservation of Nature (IUCN) [2,10–13] and an increasing number of shark species of conservation concern being listed on CITES Appendix II. Only 37% of shark species are presently not threatened, the lowest proportion among all vertebrate groups studied to date [11]; the major driver of shark overexploitation is the sourcing of their fins.

Similar patterns of massive demand-supply discrepancy are observed in other luxury wildlife products which have driven their source species into various conservation threat categories. The African elephant, for example, has been poached heavily and unsustainably across its range for its ivory, with international criminal trade being a major driver for declines. Increasing illegal ivory seizures and escalating black market ivory prices in Asian markets have perpetuated poaching which persists despite decades of attempts to control it [14,15]. The enormous sale value and high desirability of caviar (eggs) of the Beluga sturgeon

contrast starkly with the natural scarcity of this species; tellingly, prices can be so high for illegal wild-sourced, as opposed to legal farmed-produced, caviar that 'black-washing', whereby farmed products are marketed as wild, occurs [16,17]. The species is designated as Critically Endangered [18] and is also listed on the Convention on International Trade in Flora and Fauna (CITES) Appendix II, as are other sturgeon species [16,19]. As for the African elephant, illegal fisheries ('poaching') and organized crime networks contribute massively to the problem, as does a vicious cycle, namely the "anthropogenic Allee effect", whereby rarity raises market prices and thus provides incentives for continued exploitation [20,21]. This same pattern is seen for a range of other increasingly threatened animal species, from rare exotic birds and various pets, to reptiles, pangolins, aquarium fish, toothfish, South African abalone, totoaba and Napoleon wrasse [21–26]. Not only are these species at risk but their losses would also negatively affect livelihoods at the local level, from tourism to food use and domestic trade.

2. Enforcement issues; source countries

The global catch of elasmobranchs (sharks, rays and chimaeras) in the early 2010s was about 1.8 million t per year (Fig. 1), as reconstructed based on FAO landings plus other information on IUU catches [27]. The potentially sustainable catch of elasmobranchs, meanwhile, has been estimated at around 200,000 t annually [28], or 12% of the total elasmobranch catch. This potentially sustainable catch (total weight of sharks) would comprise, according to Simpfendorfer and Dulvy 33 [28] out of the 537 (see www.fishbase.org) extant shark species. Estimating a mean fin-to-body weight ratio of 5%, and a wet to dry weight ratio of 0.43 [29], the 200,000 t would convert to just 4300 t of potentially sustainably produced dried fins per year, available in international markets such as Hong Kong's, alongside about 25,000 t of dried fins from other largely unsustainable, and many illegal fisheries [30].

In support of the rationale for efforts to establish sustainable shark fin fisheries it has been argued that sharks (and hence fins) are difficult to avoid because most come from bycatch (i.e. incidental catch or non-targeted catch) in several of the major fisheries that supply fins and, moreover, in which shark-discard-associated mortality is high [28]. For example, bycatch from tuna and swordfish fisheries includes millions of sharks and rays (and other wildlife) every year [5], while sharks comprise over 25% of the total catch of longline tuna and billfish fisheries in multiple countries [31,32]. Yet, there are ways to mitigate shark bycatch. Several approaches can reduce shark (among other taxa) bycatch, ranging from temporal and spatial measures to changing from shallow sets to deep daytime sets, to removing wire leaders and modification of bait use [31,33,34]. Indeed, it is not improbable that efforts to reduce shark bycatch might even be resisted because of the high value of the fins from animals taken incidentally.

Even if there were legal shark fisheries (either directly fishing for sharks or from specified bycatch retention rates for shark fin in other fisheries), illegal bycatch and shark fishing would still occur concurrently with, and in addition to, the proposed sustainable fisheries. Moreover, just making some level of shark bycatch legal (for example allowing a limited shark bycatch) does not necessarily mean that level is biologically sustainable. Illegal shark fishing is already practiced at a much larger scale than purported sustainable shark fishing, and the majority of shark finning occurs in the open seas with little-to-no oversight, or in remote ports dispersed across thousands of islands [35–39]. In the world's biggest shark trading hub, Hong Kong, it is estimated that over 50% of shark fins are from oceanic species, likely caught in the high seas by distant fishing fleets and almost impossible to police [2,5,13].

While Simpfendorfer and Dulvy argue that sustainable shark fisheries are predominantly those operating in the Exclusive Economic Zones of USA, Canada, Australia and New Zealand which, in turn, are assumed to manage their fisheries sustainably, the overwhelming bulk

of shark fins traded globally originate from the unmanaged fisheries of less economically developed countries [28]. In 2009, over 50% of all shark catches were made by ten countries; Indonesia, India, Spain, Taiwan, Mexico, Pakistan, Argentina, USA, Japan and Malaysia [40]. In 2017, Hong Kong Customs seized a combined 2646 kg of restricted oceanic whitetip and hammerhead dried shark fin from India, Egypt, Kenya, Peru, Senegal, Guatemala, Indonesia, Somalia and the United Arab Emirates. The largest shark fishing country in the world, Indonesia, has an annual catch exceeding 100,000 t per year – landed across its 17,000 islands [39]. In this part of the world, elasmobranchs are particularly threatened and overfished [11] and fishery management largely absent. Also, developing countries are more at-risk of illegal fishing, and it would be difficult to effectively monitor their fisheries, and implement, fund, and enforce fishery management [40].

These huge, established shark fisheries will not simply disappear, and capacity-building to manage and monitor them requires resources and motivation that are severely lacking. The suggestion by multiple workers that developed countries should assist the global transition to sustainable fisheries is unrealistic because independent or national environmental agencies are severely under-resourced, and many countries are now overwhelmed by international treaties and agreements to implement [28,41–43]. Moreover, to pass this responsibility to relevant international management bodies, such as Regional Fisheries Management Organizations, most of which have no strong management mandate or authority, leaves policy decisions subject to corruption, bias, political interference and limited financial resources in its member states rather than relying solely on the best available science [44]. At the very least, transition would take a long time – which is unfortunately not a luxury that many sharks have, fished as they are by the tens of millions annually, and with a quarter of species already threatened with extinction. As just one example, a 2017 study looking at the species composition of shark fins sold at Hong Kong's dried seafood stores found at least 76 species of sharks, rays and chimaeras, almost a third of which are listed as threatened by IUCN [11–13]. Worryingly, CITES-listed sharks remain among the top in the contemporary fin trade [45].

Finally, the value of sharks for ecotourism is a major consideration in multiple source countries with multiple estimates of the value of live sharks for diver viewing compared to their value to the country after death, for meat but particularly for fins. Economic benefits from shark-watching, and associated tourism, can be substantial compared to landed value in some countries [46–49].

3. Enforcement issues: international trade, hubs and traceability

Even if separating legally from illegally caught shark fins were possible – shortly after capture, for example – such separation is not practical in current international markets, given consolidation by traders along the trade chain, including in cargo consignments. As experience shows with other species, the existence of parallel legal and illegal markets for wildlife products severely undermines enforcement, due to difficulties differentiating legally harvested products from illegally poached and laundered products, and enables license and permit falsification (e.g. ivory and Napoleon wrasse) [22,50]. Operating parallel markets for 'sustainable' and 'unsustainable' shark fins opens up such loopholes, since problems persist with species identification, unregulated fishing, and with poor traceability in general. The same is seen in toothfish and in the fish maw trade, live coral reef fishes, as well as with other internationally traded seafood products [24,51–54].

A major challenge is the apparent lack of appetite by many governments to rein in illegal wildlife trade in its global hubs, tackle associated money or commodity laundering, or sufficiently penalize it [55,56]; illegal wildlife trade is not a high priority on the political or enforcement agendas of most countries trading shark fin which means that manpower, investigative capacity and other needed resources are typically insufficient or even lacking. On the export side, high value

wildlife trade is often run by criminal or organized business networks, whether for caviar, traditional medicine products, totoaba maw, Barbary macaques, or a wide range of other fauna [24,57] making it very difficult to control. On the import side, Hong Kong remains a massive and well-organized smuggling centre for seafood, both into and out of the city, with regular reports of laundering of a large range of imported, protected and threatened, species [22,48,54]. Several CITES-listed species are regularly traded illegally with multiple seizures reported [58–61]. Recent attention to ivory highlights the issues; Hong Kong ivory traders, for example, have been extensively documented laundering poached ivory into legal stock. “All my things are legal. When ivory was outlawed in 1989, we registered our stocks with the Hong Kong government...all materials were registered, but the record was not in detail. They only record the weight (quantity) of my raw materials and finished products. So I can simply exchange with anything. After I sell an [ivory] item, I can use illegal ivory to make another item to top up my stock again. The Government officials have no idea on how to govern.” [62]. Calls to acknowledge the serious criminal component of wildlife trade in Hong Kong, however, have largely gone unheeded in the city, limiting investigation capacity and resources [63] and hindering the ability to understand trade networks or major players, although one positive development was that penalties for wildlife crimes were increased in May of 2018.

Even if enforcement is improved at export and import, mixing of catches and complex trade patterns would still hamper traceability. To determine whether a shark fin was taken from a sustainably managed stock, for example, the species and stock must be identified. Many sharks are morphologically similar, and taxonomic identification of detached fins is only reliable for very few species – such as the whale shark, or oceanic white-tip shark [64]. Although technology for on-site DNA testing is improving, it is in many cases prohibitively slow and costly, and is difficult on processed fins as the DNA degrades with processing (i.e. bleaching and drying). It is also worth noting that current DNA testing technology cannot identify the stock of a shark species [65]. Even if DNA testing could assign a species to its general ocean area, there may be multiple fisheries operating in those areas, some legal, some not. Moreover, while some species, such as hammerhead shark and oceanic whitetip, are particularly valued for their fins, and have declined by over 90% in recent years largely as a result, fins of many species are generally interchangeable in the retail sector [5].

Hong Kong imported approximately 1360 t of processed shark fins per year in the early 2000s [66], constituting a sizable and effectively unmonitored market within which laundering could occur and which trade would be challenging to police. In 2015, over 5.7 t of shark fin were imported to Hong Kong via sea (92%) and air (8%) (Hong Kong Census & Statistics Department), and it is unrealistic for the Hong Kong Customs to perform genetic testing on all these fins. This scenario has enabled traders to easily smuggle the fins of sharks caught in unregulated or unlicensed fisheries inside larger consignments of legal fins [66].

A clear sign that trade cannot be adequately controlled are the actions of companies seeking to adopt responsible trade practices. In 2015, United Parcel Service (UPS) cited unenforceable CITES regulations as the main reason for banning shark fin shipments “due to concerns about the enforcement capabilities of the authorities and potential inaccuracy of visual inspection used by experts as part of the CITES certification process. The potential for misidentification presents an unacceptable business condition for UPS to continue carrying shark fins.” UPS joined a growing list of private companies to discontinue shark fin transport services, including DHL, 17 global container shipping lines and 44 airlines, notably Cathay Pacific Airways, Air China, China Eastern Airlines, China Southern Airlines, Iberia, Kenya Airways, American Airlines, Thai Airways, Singapore Airlines, Philippine Airlines and Garuda Indonesia.

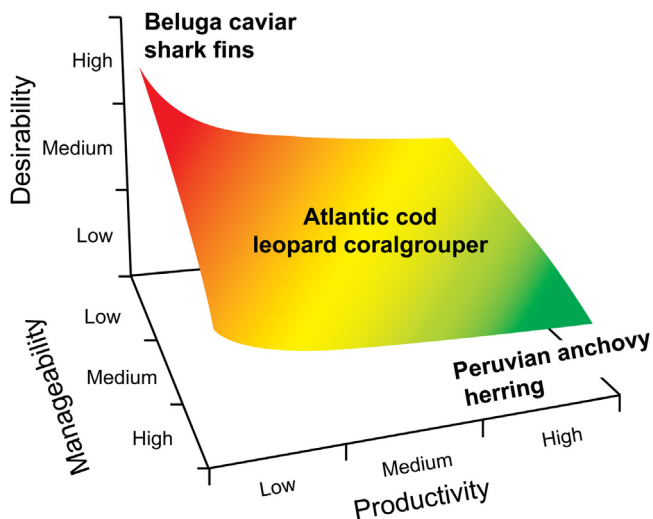


Fig. 2. Qualitative relationship between the desirability of luxury natural products (a function of their high price and the rarity of the source species), the natural productivity of the source species and the effectiveness of the system by which its exploitation is controlled (manageability). Only aquatic examples are provided but the concept also applies to terrestrial species.

4. The urgency of dealing with international trade in luxury wildlife

Three key characteristics are here highlighted in relation to commodification of species, or parts of species; natural productivity, manageability and desirability (Fig. 2). The greatest challenge to achieving sustainable fisheries arises when species or their parts are both highly valued and very limited in natural supply (productivity) relative to consumer demand. This situation is exacerbated where control systems are poor (manageability) and particularly when their market value is enhanced by rarity (desirability), i.e. where consumers have an almost unlimited capacity and willingness to pay steep prices. Here, the issue is not whether sustainable exploitation is possible, it is about what is feasible and achievable given the available systems of monitoring and control, their enforceability, and an increasingly wealthy consumer base that seeks exclusiveness but rarely considers or is unaware of sustainability. With sustainable seafood a relatively new concept in a major luxury seafood consumption country like China, expanding only slowly, and interest in legally caught fins a largely unexplored notion the role of consumers in reducing demand and calling for legal trade in any seafood product is very limited [67].

The challenge of balancing high demand and prices (desirability) against low natural supply (productivity) of valued species or parts thereof goes to the very core of the capability (enforceability) of national and international institutions and trade controls to manage natural populations and control for legal wildlife trade in a range of species. Again, using Hong Kong as an example, as a modern city with a strong rule of law, Hong Kong cannot successfully control this trade, and as other major trade hubs similarly struggle with illegal seafood trade, from Japan to the USA, then countries and regions with less capacity are surely even less able to regulate it, especially when trade networks involve organized crime [52,68]. Hong Kong, as many other key trade centres, is clearly hard-pressed to put into practice the principles of international accords and conventions to which they have committed, from CITES to the Convention on Biological Diversity and the United Nations Convention against Transnational Organized Crime, let alone address the many challenges and pressures associated with achieving sustainable and legal shark fin trade or handle the growing number of species being listed under CITES. The reason is that illegal wildlife trade is not a high priority for the Hong Kong authorities, and there persists a lack of political will in the city to treat wildlife crime as

serious crime or to acknowledge the city's role as a major trade hub [58].

It is evident that adequate controls on international trade in highly valuable and severely limited natural resources, for which there is high consumer demand, are beyond the scope of most economies and institutions actively involved in such trade today. Shark fin, amongst other examples, is no exception. The reasons are multiple, from the high trade volumes and multiple means to hide shark fin, challenges to identify fins to species level, minimal penalties involved relative to the value of the trade, weak enforcement framework, limited legal capability with little investigative capacity, loopholes in the law or regulations that are outdated or not fit for purpose, and high consumer demand as a strong incentive for illegal practices.

Progress towards increasing controls on exploitation and trade and removing shark fin (and similarly threatened species or their parts) from menus and retail markets to move towards a more balanced relationship with nature will require action in many parts of society. Internationally, there need to be policy dialogues around the issue of luxury wildlife commodities, their sustainability and legality. Such commodities represent a distinctive class which sets them apart from other commodities due to the risks of extinction, high prices, and the close links to illegal trade. Like the trade in drugs, these are special cases that need special attention and are issues relevant to societal and cultural norms as well as to livelihoods. Where and how are such commodities at risk and how can they be identified and prioritized? In addition to the need for greatly improved monitoring of international trade (shark fin is, again a good example) activities associated with CITES are also highly relevant [69]. But even many CITES signatories are hard-pressed to accurately reflect supply, address the complexity of demand and trade, or consider the impact of trade controls [70]. Other relevant institutions and bodies that need to be involved go well beyond those in conservation, from human rights (transnational issues) and organized crime to the United Nations and other development bodies. At the national level, it is clear that shark populations need to be effectively managed with sufficient resources for surveillance and enforcement, appropriate penalties and adequate legislation. Practical approaches to managing international trade may require all sharks to be listed on CITES given how difficult many are to distinguish from each other, especially their fins; note that multiple taxa, including pangolins, seahorses and mobilids are listed collectively under CITES already due to look-alike challenges [71]. Since exports of CITES Appendix II-listed must not be detrimental to source populations, and hence calls for sustainable fisheries exploitation, there is scant reason for opposition to such listings by source countries which should already be seeking to effectively manage their fisheries [71].

On the import side, in addition to improved international trade, monitoring and control capacities, government and private sector actions set important benchmarks and examples, while consumer education is essential for better awareness that can lead to demand reduction and changes in eating habits. Again, shark fin provides some useful examples and lessons. In Hong Kong, the government no longer permits shark fin (and several other threatened species) to be sold at government functions, customs officials are trained to identify shark fins, while a growing number of businesses have removed shark fin from their menus entirely or only provide it on request [71]. Public surveys are showing that people often only eat shark fin because it is part of a set menu (i.e. passively-they do not select it themselves) and are increasingly seeking sustainably sourced alternatives for important events such as weddings [72]. Education is essential for dispelling myths, such as the belief that shark fins grow back after being removed, and environmental reasons are now commonly cited by young people for giving up shark fin [72]. NGOs, the media, celebrities and educational institutions play an important role in improving understanding and awareness around shark fin consumption and linking consumption practice with the environment and these elements will be important for garnering support when legislators seek means to better control or to

ban shark fin (for example as happened in Hong Kong with the recent ivory ban) [73,74]. However, despite changing attitude among young consumers, government regulations and actions will play an important role in China where demand for luxury seafood is rapidly growing and public perception is that responsibility for environmental protection lies with the government, rather than the market [67]. For example, although enforcement in Hong Kong is improving, considerably more resources are needed to screen imports and reexports and to investigate criminal networks. Also, mainland China will need to effectively implement CITES App II for commercial marine species, including sharks.

The struggle to save the African elephant and the reasons that ivory trade is being banned by an increasing number of countries is widely known, and there are, similarly, many ongoing challenges from trade in a wide range of other valuable and increasingly rare wildlife [15,21,75]. There is no reason to believe that shark fins are any different. Elephants are particularly appropriate analogues for sharks because elephant meat is valuable for some local communities for food, just as shark meat is consumed domestically in many countries, and both also have value alive for tourism income. However, it is the international trade in ivory that drives the killing of elephants, not elephant meat, just as it is the valuable shark fin trade, rather than domestic trade in shark meat, that predominantly drives the overfishing of sharks. In the case of shark fins, the extent of this challenge is clearly reflected in the decision by major hotel brands, transportation and logistics operators and express parcel carriers to ban the carriage of and trade in shark fins outright rather than attempt to trade in or carry only sustainably sourced fins. Experience has taught us that activities related to prestige or tradition, unless there are changes in such mindsets, may require dramatic regulatory actions with particularly strong regulations and this is at its most extreme when desirability and profits are very high and enforceability and natural productivity very low, as for shark fin, ivory and other examples provided [21].

To be clear, it is not legal and sustainable trade that is at issue here; it is illegal and uncontrollable trade, particularly internationally, and the lack of robust systems, political will or capacity to ensure both biologically sustainability and legality. This situation appears to be worsening as wealth grows, demand for and marketing of luxury items becomes more aggressive, and rare and luxurious species/parts are being more intensively, and often illegally, sourced from a widening range of sources. A severe inability to control the trade in key exporting countries and in major wildlife import hubs, such as the example of Hong Kong given here, preclude the traceability and oversight that could support biologically sustainable wildlife trade.

5. Conclusion

Until institutional systems can effectively control the exploitation and trade of wildlife destined for luxury markets, international trade in vulnerable and threatened species, or their parts, should cease before populations are extirpated, or species driven further towards extinction; the situation is urgent, and the message clear. Society must draw a line between what is acceptable and what not when it comes to luxury, vulnerable, uncontrolled species, and shark fin soup is a prime example of a cultural practice that is worth abandoning. Indeed, flamingo tongues or stuffed dormice are no longer eaten, as the wealthy in ancient Rome did, and these are not missed. As for several other luxury, vulnerable and poorly or unmanaged species, national and international control systems, political will and consumption patterns are unable to limit shark fin supply to within sustainable levels. Without an adjustment of the relationship of humans with the natural world, declines will continue as yet new patterns emerge and produce serial losses of luxury species driven largely by market forces. The rapidly increasing use of mobulid rays, is a taste of what is to come; pushed by aggressive marketing it is touted as a recent 'tradition', already threatening several species, with a recent CITES listing for the taxon and recommendations to restrict fisheries and trade [76,77].

Traditions and habits constantly change with shifting values and fashions and enhanced environmental understanding and concerns and it is clearly now time to consider carefully what the natural world means to modern society and what can be realistically sustained. Few countries, for example, now condone or practice the hunting of blue whales and fur coats of threatened species are largely stigmatized. Eschewing shark fin trade is an option, just as many countries decided, in the case of ivory, that banning trade is the only feasible solution if African elephants are to have a future. Extinction must not make the decision for us.

"In the end we will be defined not only by what we create but also by what we refuse to destroy" (John Sawhill).

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