The Impact of Ecolabels and Green Taxes on Market Outcomes

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Abstract

Ecolabels and green taxes aim to achieve more sustainable market outcomes by affecting suppliers' production and sales behaviour, consumers' purchasing behaviour, or both. In this chapter, we present the economic rationale for how these approaches may impact suppliers and consumers in various settings and review recent published empirical research on the topic. We focus specifically on examples where ecolabels and green taxes have been used to protect oceans and fisheries by reducing plastic waste and reducing purchases of less sustainable seafood. We conclude by discussing other possible policy instruments and highlight important avenues for future work in pursuing more sustainable market outcomes.

Keywords

Ocean sustainability · Plastic pollution · Ecolabels · Green taxes · Market outcomes · Empirical evidence

1 Introduction

The oceans contain less life and more plastic than many policymakers and academic researchers would prefer. In most marine fisheries, the rate of fishing exceeds the catch-maximizing and profit-maximizing rates, resulting in depleted ecosystems, less food for people, and lower profits for the world's 39 million fishers (Costello et al. 2016; Food and Agriculture Organization 2020). The 10 to 20 million tons of plastic that enter the ocean each year further degrades marine environments (United Nations Environment Programme 2014). Conservation organizations seeking to reduce pollution and over-fishing by promoting better fishing practices have increasingly turned to market-based mechanisms such as environmental sustainability labels (eco-labels), taxes, bans or other instruments, in order to shift patterns of suppliers and of household consumption.

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This chapter starts by laying out the economic rationale for how these market-based mechanisms may impact suppliers and consumers. Then it focuses on examples where ecolabels and green taxes have been used to protect oceans and fisheries. It ends by discussing challenges and other possible policy instruments to promote sustainable market outcomes in the oceans and fisheries supply chain.

2 Economic Theory and Policy

Private markets—those without government intervention—often fail to allocate goods in a socially optimal way. This is particularly true for environmental goods, such as oceans and fisheries, which are not owned by any one country or individual. When private markets fail or simply do not exist, economic theory provides a strong rationale for governments to intervene to correct the failures. In this section, we describe three ways in which markets fail with respect to oceans and fisheries and discuss policy tools that can be used to address these market failures.

2.1 Market Failure 1: Open-Access Resources

The first market failure we consider relates to property rights, or the lack thereof. Since nobody owns the oceans or fisheries, no one country or individual has sufficient incentive to protect these resources or to harvest them responsibly. This leads to overuse and overharvesting. Economists refer to these types of resources as open-access: anyone may access them, but one person's use of the resource depletes what is left for everyone else. The overuse problem that arises from open-access resources is commonly referred to as the "Tragedy of the Commons" (Hardin 1968).

The economic policy solution for open-access resources is to assign property rights to the resource. In other words, governments can use policy tools to convert open-access resources into resources such that users behave as if they "own" the resource. In the case of fisheries, the regulator sets a cap on the total quantity of fish that can be caught each season and distributes a portion of that cap to each fishing vessel. In addition to increasing economic profits, property rights-based instruments increase the size of fish populations and reduce the probability of fisheries "collapse" (Costello et al. 2008, 2016; Isaksen and Richter 2019).

2.2 Market Failure 2: Negative Externalities

A second way that markets can fail is due to negative externalities. Negative externalities occur when the consumption or production decisions of one person or firm negatively affect another person or firm without their permission or compensation. For instance, when firms decide how much plastic packaging to use and when consumers decide how much plastic packaging to buy, they often do not consider the costs that their plastic packaging waste will impose on society and the environment (in particular, oceans and the wildlife therein). It is estimated that 2–5% of plastic waste is mismanaged and enters the ocean each year (Jambeck et al. 2015). Once in waterways, plastic items do not biodegrade but, instead, break into smaller pieces, which sea animals can consume, mistaking them for food (Wilcox et al. 2016). Globally, the cost of plastic pollution in the ocean, from the consumer goods industry alone, is $13 billion annually (United Nations Environment Programme 2014).[1] Since the price of plastic packaging that firms and consumers see in the marketplace does not reflect these external costs, it leads them to produce and consume more plastic packaging than is socially optimal.

However, there are several economic policy tools for addressing negative externalities. First, there are *market-based incentives* which, by altering the prices seen in the marketplace, encourage

[1] Moreover, this cost estimate is most likely a significant underestimate because it focuses on direct plastic use and does not include certain downstream impacts, such as those caused by microplastics.

consumers and firms to adjust their behaviour. Taxes and fees can be used to increase the price of behaviours that are harmful to the environment (e.g., a 5-cent tax for using disposable plastic shopping bags) and thus discourage people from engaging in these behaviours. Similarly, subsidies and bonuses can be used to reduce the price of behaviours that benefit the environment (i.e., a 10-cent discount for bringing a reusable mug to your local coffee shop), and thus encourage green behaviours. Market-based incentives are often the preferred policy tool of economists due to their flexibility and the fact that they make polluters internalize the costs of their pollution. However, taxes can be politically challenging to implement, and subsidies can be expensive.

An alternative approach to market-based incentives are *command-and-control policies*, which set standards for which behaviours firms and consumers can and cannot adopt. For instance, command-and-control policies may ban certain actions or products, such as banning the use of Styrofoam in take-away containers or banning the catch of fish below a certain size. Command-and-control policies may also require the use of certain technologies or require technologies to meet specific standards, such as requiring shrimp trawlers to use turtle excluder devices in their nets. Command-and-control policies have the advantage of being simple to monitor; however, once their standards are met, they do not create incentives to find better ways to reduce pollution. Furthermore, they may lead to unintended consequences that undermine their benefits, such as when consumers and firms look for ways to circumvent the regulations.

A third set of policy tools are called *nudges*. Unlike market-based incentives and command-and-control policies, nudges do not forbid any behaviours or actions, nor do they change economic incentives through prices. Instead, nudges change the environment in which choices are made, so that a person will be more likely to make a particular choice or behave in a particular way. One example of a nudge policy is changing the default option. People tend to stick with the default option because there is more hassle involved in changing away from the default. If the default option is a behaviour that is good for the environment, then people will be more likely to adopt this green behaviour. For instance, restaurants often provide plastic straws with their beverages as the default. If the customer does not want to use a straw, they would have to ask the restaurant not to give them one. However, if instead beverages came without straws and people had to ask for a straw if they wanted one, this change in the default would most likely lead to many fewer plastic straws being used.

2.3 Market Failure 3: Incomplete Information

For markets to work, everyone in the market (both consumers and producers) needs to have complete information about what is going on in the market. For example, without complete information about a good, consumers will not know how much they value that good or how much of that good they want to purchase. If a person cannot tell whether a sandwich is a tuna-salad sandwich, a chicken-salad sandwich, or an egg-salad sandwich, they may not want to pay very much or they may not want to purchase the sandwich at all. Thus, incomplete information is another reason markets fail.

In the case of environmental goods, consumers cannot always tell if a product was produced in an environmentally friendly manner. Consumers may want to support businesses that act in sustainable ways, but if the consumers cannot tell which products are sustainably produced, there is no incentive for producers to create these environmentally friendly products. One policy solution to combat incomplete information is to develop ecolabel certification schemes. Ecolabels provide consumers with information about which products meet standards for environmental sustainability and which do not, which enables consumers to support companies that are stewarding the Earth's resources. However, for ecolabels to work, they need to be trustworthy and credible. Thus, third-party certifiers (i.e., not

the producers of the product) are often used to create industry standards and monitor the certification process.

3 Pollution Initiatives and Ecolabel Certification Schemes

Of the approximately 300 million tons of plastic produced each year, 10 to 20 million tons enter the ocean (United Nations Environment Programme 2014). Even if governments and firms meet 100% of their current commitments, a recent estimate in *Science* predicts this flow of plastic into the ocean will more than double by 2040 (Lau et al. 2020).

Plastic pollution in the ocean harms both people and animals. The damage caused by a single component of plastic pollution to a single region is striking: the cost of removing plastic from Europe's coastlines is €630 million annually (United Nations Environment Programme 2018). Globally, the cost of plastic pollution in the ocean is $13 billion annually (United Nations Environment Programme 2014). This estimate equals global cleanup costs plus the estimated damage to the fishing, tourism, and shipping industries. A recent review of the effects of pollution on marine animals found that 82% of impacts are due to plastic pollution (Rochman et al. 2016).

Several recent articles detail the numerous international, regional, national, and subnational regulations, laws, and initiatives to reduce plastic pollution in the ocean (Schnurr et al. 2018; United Nations Environment Programme 2018; da Costa et al. 2020). Figures 1 and 2 demonstrate the geographic breadth of plastic bag (Fig. 1) and microbead (Fig. 2) taxes, bans, and other regulatory interventions (Schnurr et al. 2018). Nearly 150 countries have implemented a plastic bag tax, ban, or other regulatory intervention (da Costa et al. 2020). Yet, given that the flow of plastic pollution into the ocean remains high, and is even predicted to more than double by 2040 (Lau et al. 2020), it seems that existing policies have yet to significantly reduce plastic pollution at the global level. However, national and subnational evidence of the effectiveness of plastic taxes and bans does exist. We summarize this evidence in the next section.

"Ecolabels" on seafood products help consumers make informed purchasing decisions. By signalling that a product originates from a sustainable fishery, ecolabels can increase demand for sustainable seafood products, increasing the share of fisheries that are managed sustainably.

The Marine Stewardship Council (MSC) is perhaps the most rigorous and best-known certification organization (World Wildlife Fund 2012; Miller and Bush 2015). Fisheries that wish to display the MSC logo on their products pay a third-party auditor to investigate their fishery and compare it to the MSC's standards. Certified fisheries pay for annual audits and recertification every five years, and they also pay MSC an annual licensing fee. As of 2020, 409 fisheries were MSC-certified. Together these fisheries represent 15% of the global marine catch (Marine Stewardship Council 2020). The cost of certification ($15,000 to $120,000), annual audits ($75,000 by one estimate), and the annual licensing fee (0.3% to 0.5% of revenue plus a fixed fee) preclude small-scale fisheries from receiving MSC certification (Bauman 2009; Marine Stewardship Council 2021a, 2021b).

Many other organizations also certify seafood with ecolabels, including the Monterey Bay Aquarium's Seafood Watch, Ocean Wise, and FishWise. Other certification organizations may use different standards to those of the MSC, may limit their certification activities to one country or region, and may certify fisheries "proactively", as opposed to requiring fisheries to pay a third-party auditing firm for certification. Given the many different types of co-existing seafood ecolabels, using one consistent ecolabel may be more effective at communicating clear information to consumers (Federal Trade Commission 2010). We summarize research on the effect of ecolabels on consumer purchases in the next section.

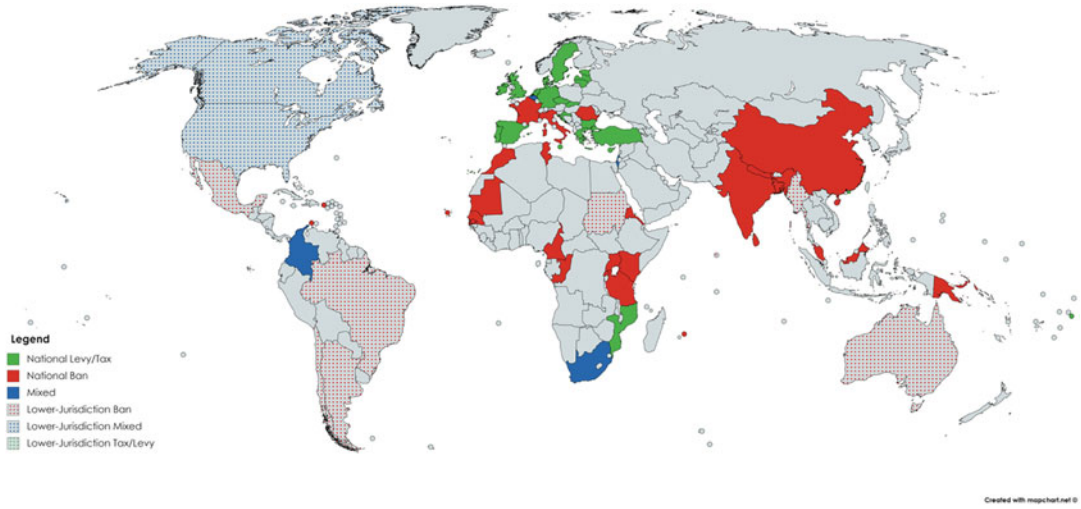

Fig. 1 Global plastic bag interventions, as of 2018. Reproduced with the permission of Schnurr et al. (2018)

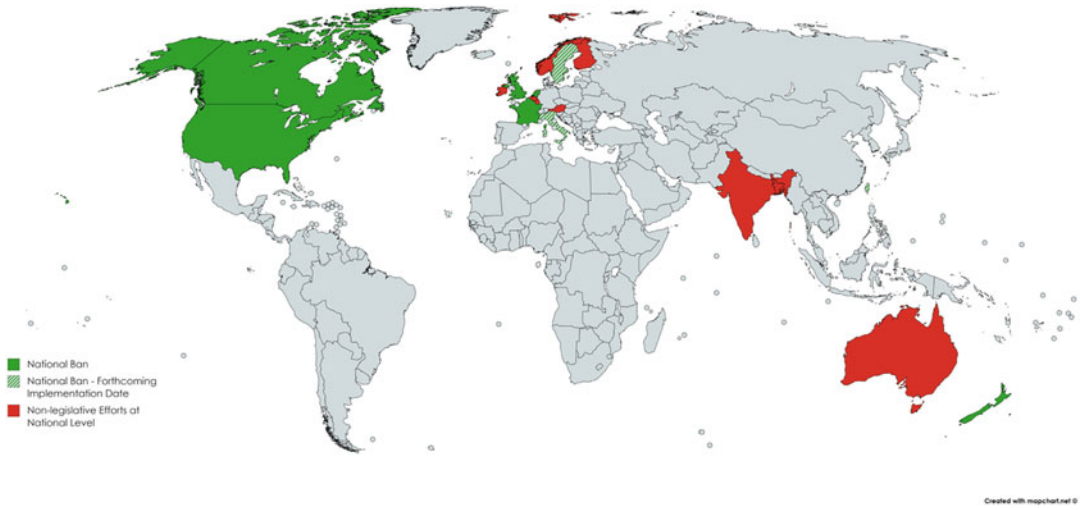

Fig. 2 Global microbead interventions, as of 2018. Reproduced with the permission of Schnurr et al. (2018)

4 Empirical Evidence on How Green Taxes and Ecolabels Impact Oceans and Fisheries

4.1 Evidence on Plastic Ban and Tax Policies

Plastic bans have been widely used with respect to disposable plastic shopping bags, plastic straws, and plastic microbeads in cosmetic products. These command-and-control policies ban products that do not meet certain standards. In the case of bag bans, these policies generally ban the distribution of plastic bags under a certain thickness (such as 2.25 thousandths of an inch thick). While bans have been shown to be effective in reducing the use of the item being banned, they can also lead to unintended consequences that undermine the effectiveness of the bans.

Bags bans in California reduced plastic shopping bag usage by 40 million pounds (over 18 million kilograms) per year (Taylor 2019). However,

this reduction was offset by a 12-million-pound (5.5-million-kilogram) annual increase in trash bag sales, since prior to the ban some people reused their plastic shopping bags as trash bags (Taylor 2019). This meant nearly 30 percent of the plastic eliminated by the ban came back in the form of trash bags, which are thicker than typical plastic shopping bags. Thus, the bag bans not only banned the 'brown' behaviour of using too many plastic shopping bags, but also banned the 'green' behaviour of reusing shopping bags as garbage bags (which is a green behaviour because it prevents the production and sale of an additional plastic bag). Another unintended consequence was that after California banned thin plastic shopping bags, the new default in many stores became paper bags. As a consequence, paper bag usage increased by 83 million pounds (37.6 million kilograms) annually (more than double the weight of the banned plastic bags) (Taylor 2019). While paper is less environmentally damaging than plastic as a source of litter because paper biodegrades, paper is much more carbon intensive than plastic throughout its lifecycle. Thus, the global warming impacts of paper as the new default are concerning.

Other studies have also found unintended consequences of plastic bag bans. For example, Chicago implemented a plastic shopping bag ban in 2015 and then repealed it in 2017. Counter to the policy's goal, stores bypassed the regulation by offering customers free thick plastic bags, which were roughly five times the thickness of the standard plastic shopping bags that were on offer prior to the ban (Homonoff et al. 2021). Thus, the ban shifted customers toward more environmentally harmful products.

An alternative policy to bag bans are bag taxes. Instead of banning plastic shopping bags, bag taxes impose a small fee (generally 5 to 10 cents) for using these bags. One study compared the outcomes of bag bans and bag fees and found that bag fees are as effective as bag bans at reducing disposable bag use, but they have the additional benefit of not increasing paper bag use (Taylor and Villas-Boas 2015). Similarly, an analysis comparing bag bans and bag taxes in Chicago found that the taxes did not lead to the unintended increase in thicker plastic shopping bags (Homonoff et al. 2021). Given these results, we recommend policymakers consider plastic taxes (market-based incentives) over bans (command-and-control policies). However, if a tax is not politically feasible, the design of bag bans can be improved if they also consider what substitutes consumers might switch to. For instance, bag ban policies can also require that all remaining types of bags on offer have a price so that thicker bags are not given out for free. Plastic bag taxes have also been shown to be effective policy tools for discouraging plastic bag use and encouraging reusable bag use in Buenos Aires (Jakovcevic et al. 2014), Uruguay (Cabrera et al. 2021), Toronto (Rivers et al. 2017), and Wales (Poortinga et al. 2013).

A few studies have also examined reusable bag subsidies and nudges. A study of the 5-cent reusable bag bonus in the Washington D.C. area found the bag bonus had no effect on the rate at which consumers brought reusable bags (Homonoff 2018). A second paper implemented a small field experiment using a charitable donation nudge (Penn et al. 2021). Shoppers who chose to forego the use of a plastic bag were given a token that they could use to make a donation to a charity (Penn et al. 2021). This field experiment found that the token-donation program reduced the probability of plastic bag use by 12 percentage points (Penn et al. 2021). Therefore, subsidies have not been found to be effective policies (with respect to reusable bag usage), while there is some evidence that nudge policies may be effective at reducing plastic bag use. However, the ability for this type of nudge to scale has not been studied.

In addition to plastic bags, lightweight plastic bottles are another major contributor to ocean plastic pollution with negative impacts on marine ecosystems (Barnes et al. 2009). Water and carbonated beverages, such as soda, are frequently sold in polyethylene terephthalate (PET) bottles that can end up in waterways and oceans. Policymakers have attempted to reduce littering and plastic bottle pollution using several tax-based and non-tax-based programs, with varying success.

One paper evaluated how a tax on bottled water in the state of Washington impacted consumers' bottled water purchases (Berck et al. 2016). Using weekly product-level sales data from large retailers in Washington and neighbouring states, these authors found that after the implementation of a tax of around nine percent, consumer purchases of bottled water fell by roughly six percent. When the tax was repealed, consumer purchases rebounded somewhat, remaining roughly three percent below baseline levels. These results suggest that consumer demand for bottled water is fairly inelastic, or insensitive to changes in price. Consequently, taxing bottled water seems to be a relatively inefficient way to reduce purchases of PET bottles. Furthermore, it is not clear that reducing purchases of plastic bottles would result in a similar reduction in plastic litter since consumers that contribute to plastic pollution may not be the same consumers who change their purchasing behaviour because of a tax.

An alternative policy targeting plastic bottle pollution relies on deposit-refund recycling programs. In these programs, consumers pay a small tax when they purchase a product and are then able to redeem the empty container for a tax refund. The California Redemption Value (CRV) is one such recycling program that currently pays five cents for a container smaller than 24 liquid ounces and ten cents for larger containers. Well-designed deposit-refund programs can replicate the effects of a pollution tax and are frequently easier to implement than a tax on litter (Fullerton and Wolverton 2000). Crucially, these programs provide an incentive for individuals to move plastic bottles from the waste stream and the natural environment to the recycling stream. Moreover, the original consumer does not need to be the person who claims the refund payment. In California's CRV program, for example, so-called "scavengers" play an important role in diverting recyclable material from the waste stream to local recycling centres (Ashenmiller 2009; Berck et al. 2018, 2021). By better targeting the negative externality (littering), deposit-refund recycling programs are likely to be more effective at reducing plastic waste than taxes on plastic bottles (Stevens et al. 2016).

4.2 Evidence on Ecolabels

In the context of shifting toward more sustainable fisheries, operators in the supply chain of commercial fishing consider demand side factors, such as customer sustainability preferences, as well as supply side forces pertaining to the management of species. They make strategic decisions on where and how much to fish subject to regulatory oversight across species groups and management bodies (Watson and Pauly 2001; Delgado et al. 2003; Costello et al. 2008; Smith et al. 2010). Taken together, they then make strategic choices on investments in sustainable practices and how to credibly convey to consumers the sustainable characteristics of these fishing and supply chain practices. Credible information that is valued by consumers results in product differentiation and, consequently, in the ability to incorporate into final prices any upstream costs of improvements in sustainability practices.

Environmental sustainability labels, or ecolabels, are the main means by which firms differentiate their products (Asche et al. 2015; Blomquist et al. 2015). In 2002, one of the early studies using consumer purchase data confirmed that the dolphin-safe tuna label increased the market share of canned tuna (Teisl et al. 2002). Beyond average consumer responses, subsequent research has found different impacts of seafood risk advisories for certain population groups (Shimshack et al. 2007; Teisl et al. 2011).

A large portion of the existing research on consumer-focused mechanisms, such as ecolabels and other product attributes associated with environmental sustainability, has relied heavily on attitudinal and knowledge surveys, consumer choice experiments, and experimental auctions (Johnston et al. 2001; Alfnes et al. 2006; Johnston and Roheim 2006). For instance, one 2001 study found international differences in factors affecting how consumers value ecolabels (Johnston et al. 2001). While these studies offer valuable

insight and methodological approaches, one potential weakness is that they capture consumers' stated preferences rather than their actual behaviours. There can be great disparity between consumers' stated preferences and their actual purchases (Hensher and Bradley 1993).

In the literature on revealed preference, based on actual market outcomes rather than surveys, hedonic price models have been used to estimate relative values for seafood product attributes, such as catch method, fishing gear choice, country of origin, product colour (of salmon), and environmental sustainability (McConnell and Strand 2000; Carroll et al. 2001; Jaffry et al. 2004; Roheim et al. 2007, 2011; Asche and Guillen 2012; Sogn-Grundvåg et al. 2013). Hedonic models relate the price of products to their attributes and estimate the marginal effect of sustainable attributes on prices, controlling for other factors. Another empirical approach is to estimate choice models using demand system analyses (Teisl et al. 2011; Sun et al. 2017), and case study approaches (Roheim 2003). In terms of the main conclusions drawn, the above-mentioned study on the dolphin-safe tuna label used consumer purchase data to confirm that the label increased the market share of canned tuna bearing that label (Teisl et al. 2011). Another study, from 2011, applied a hedonic price function approach to scanner data on the sale of frozen processed Alaskan Pollock in the London metropolitan market, to estimate a statistically significant price premium for Marine Stewardship Council certification (Roheim et al. 2011). Lastly, research from 2013 estimated quantity responses to a sustainability label system, and surprisingly found that sales of yellow-rated labelled products decreased significantly in treatment stores relative to controls, while red- and green-rated labelled products saw no change in the quantity sold (Hallstein and Villas-Boas 2013). The most recent published empirical work investigates whether consumers are willing to pay for sustainability in seafood purchases. This 2019 paper estimates consumers' dollar value willingness to pay (WTP) for the environmental information provided by the ecolabels and other product attributes (Hilger et al. 2018).

In conclusion, the empirical literature finds promising evidence that seafood ecolabels are associated with shifts in market demand toward more sustainable choices and away from less sustainable alternatives. The policy implication is that consumer-focused mechanisms, such as ecolabels and certification, have market-level impacts and are an effective tool for sustainable fisheries management.

5 Other Policy Instruments Promoting Sustainable Oceans and Fisheries

Countries have the exclusive right to harvest and manage all resources within their Exclusive Economic Zones (EEZs). The codification of EEZs between 1973 and 1982 at the third UN Conference on the Law of the Sea, and the declaration of EEZs by countries (mostly in the 1970s and 1980s), represent the most significant advance toward fisheries sustainability in world history because EEZs enable countries to manage their fisheries (Wilen 2000; Hannesson 2013). EEZs also incentivize fisheries enforcement because the more unauthorized fishing that countries prevent, the more fish available for the country to use (Englander 2019). EEZs typically extend 200 nautical miles (370 km) from a country's coast. Together, EEZs cover 39% of the ocean's surface and are the source of more than 95% of global marine fish catch (Pauly and Zeller 2015).

Prior to EEZs, countries were typically only recognized as having exclusive rights within three nautical miles of their coasts (Hannesson 2013). This condition of "open-access", which prior to EEZs applied to the vast majority of fishing grounds, leads to the depletion of fish stocks and the dissipation of economic profits because each fisher does not account for the fact that their fishing harms other fishers (by reducing the amount of fish available to other fishers). In open-access, fishers fish too much relative to the amount of fishing that would occur in a fishery in which the total amount of fishing was chosen to maximize total profit or total catch.

With EEZs, countries choose how to manage their fisheries. In a "regulated open-access" fishery, the regulator sets a total allowable catch (TAC) limit—the total tons or number of fish that can be caught that season by all fishers (Reimer and Wilen 2013). TAC limits prevent biological depletion, but they do not prevent the dissipation of economic profits because fishers "race to fish" before the TAC is reached, which increases fishing costs (Birkenbach et al. 2017). Regulators may also limit the entry of new vessels into the fishery, remove vessels from the fishery through "buy back" programs, limit fishing to certain time periods or areas, and limit fishing "inputs" (such as size of vessels or types of fishing equipment), but, similarly to the TAC limits, these measures do not preserve economic profits.

Property rights-based instruments distribute a share of the TAC to each vessel, which reduces the "race to fish" because each vessel knows they will (almost certainly) be able to catch their share, even if they fish more flexibly over time (Birkenbach et al. 2017). In addition to increasing economic profits, rights-based instruments increase the size of fish populations and reduce the probability of fisheries "collapse" (Costello et al. 2008, 2016; Isaksen and Richter 2019). Property rights-based instruments are perhaps the best tool available to countries to maximize the profit and sustainability of their fishing industries.

Beyond EEZs lie the high seas, or Areas Beyond National Jurisdiction. Regional Fisheries Management Organizations (RFMOs) regulate fishing for a particular region and/or species, but sustainable management of high seas fisheries is limited by RFMOs' decision-making process, which typically either requires consensus or allows countries to opt-out of regulations they disagree with (Haas et al. 2020). Furthermore, only the flag state (the country the vessel is registered to) can punish deviant vessels, and not every country is willing and able to punish their vessels.

The Agreement on Port State Measures, which was ratified in 2016, is one of the most promising tools for high seas enforcement because it permits countries (port states) to block vessels that have engaged in illegal, unreported, or unregulated (IUU) fishing from using their ports (Witbooi 2014). Denying port access to these vessels reduces their ability to sell their fish, which reduces the benefit to vessels of IUU fishing on the high seas in the first place. Additionally, the intergovernmental conference to create a new, legally binding treaty for the high seas held its first session in 2018 and its fourth session is scheduled for 2022 (United Nations General Assembly 2018). This potential treaty could create marine protected areas on the high seas for the first time (United Nations General Assembly 2021).

6 Challenges and Avenues for Future Work for Local and Global Communities

Protecting the oceans involves many complex challenges for local coastal regions, specifically, and for the global community in general. There has been a promising myriad of global and local initiatives to address overfishing and other illegal fishing practices, to improve traceability of the fishing supply chain, to address co-existing problems of human right issues, and to promote social responsibility and fair practices in fisheries. Some of the international initiatives have been decades in the making, while others are emerging as new issues are identified.

In Fig. 3 we can see the number of local and global efforts that world regions engage in to improve traceability, improve social responsibility, or reduce illegal, unreported, and unauthorized fishing. If we examine the number of global or local efforts in relation to a country's population or gross domestic product, we find that the degree to which countries participate in these efforts differs somewhat. While North America and Southeast Asia lead the world in terms of total efforts, Northern Europe ranks number one when total efforts are normalized by regional population or GDP.

At country level, the increasing use of property rights-based instruments to manage fisheries is a cause for optimism. Continued international

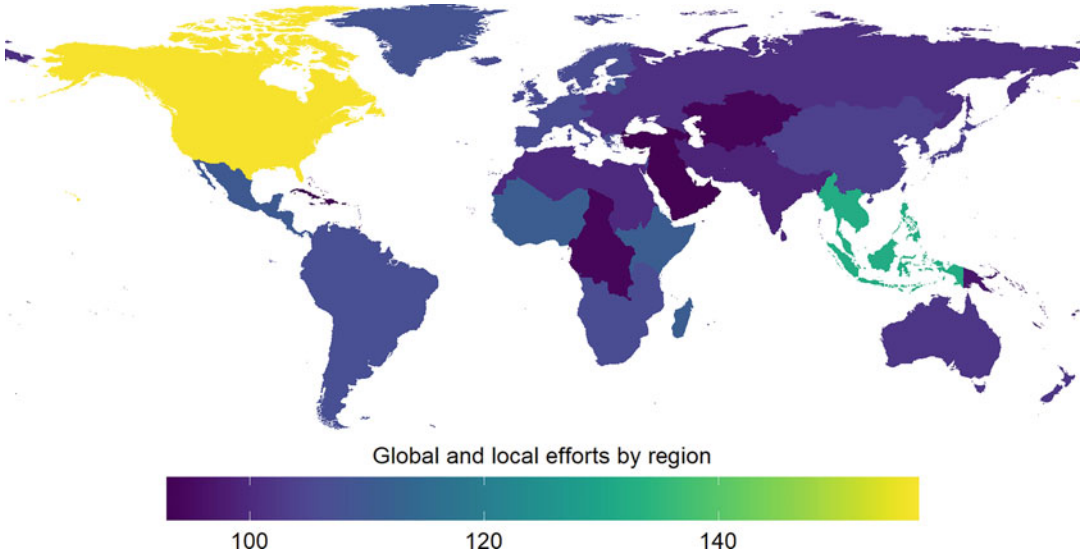

Fig. 3 Number of global and local efforts to improve traceability, improve social responsibility, or reduce illegal, unreported, and unauthorized fishing, as of 2021 (Map elaborated by us based on the data supplied by SALT—Seafood Alliance for Legality & Traceability, in www.salttraceabilty.org)

cooperation is needed to improve management of fish stocks that occur in multiple countries' waters or on the high seas. Promising avenues for international cooperation include the ongoing negotiations at the World Trade Organization to reduce fishing subsidies, the ongoing negotiations to create a new, legally binding treaty for the high seas, efforts to reform the decision-making process of Regional Fisheries Management Organizations, and the implementation of the Port State Measures Agreement. Finally, the increasing use of satellites to monitor fishing activity will enable countries to enforce the laws and treaties they enact and ratify.

There are also promising signs of progress toward reducing plastic pollution in oceans. In 2019, the United Nations amended the Basel Convention, which controls transboundary movements of hazardous wastes and their disposable, to include many forms of plastic waste. The 187 signatory countries will be required to track plastic waste outside their own borders and will be prohibited from exporting plastic waste unless they have obtained written permission from the recipient country (United Nations Environment Programme 2020). In 2020, the European Union passed a tax on nonrecycled plastic packaging waste equal to €0.80 per kilogram. The member countries can choose whether and how they pass a plastic tax of their own to recover the tax paid to the EU. How these policies will impact plastic demand and waste is an open question needing further empirical research.

While there are promising international plastic waste policies on the horizon, there is also a concerning trend of governments prohibiting the regulation of plastic. As of August 2019, 17 states in the US had passed preemption laws that prohibit local governments from regulating (i.e., banning or taxing) various plastic items (Treskon and Doctor 2020). Supporters of these preemption laws argue that local plastic regulations create a patchwork of laws that confuse customers and hurt businesses. However, there is little empirical evidence that the patchwork of local regulations itself harms consumers and businesses (Treskon et al. 2021). Thus increasingly, the policy tools available to local governments are limited when it comes to plastic waste.

7 Conclusion

Marketplace signals, such as green taxes, bans, and eco-labels are purported to economically reward successful stewardship and penalize pollution and overfishing. In theory, eco-labels provide consumers with easy-to-use relative information, allowing the differentiation of products. From the commercial fishery operation's perspective, the utility of eco-labels is their ability to differentiate their products along sustainable attributes. This differentiation may allow the passing of increased costs associated with best practices onto consumers who value sustainability.

Similarly, when addressing plastic pollution of the oceans, taxes may shift choices towards untaxed products, such as reusable bags, and lead to lower plastic ocean pollution. While empirical evidence is promising there are other instruments available to policymakers and international organizations to achieve lower pollution of the oceans and reduce overfishing. The challenges are many, but the rewards are healthier and more productive oceans.

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