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Ghoti aims to serve as a forum for stimulating and pertinent ideas. Ghoti publishes succinct commentary and opinion that addresses important areas in fish and fisheries science. Ghoti contributions will be innovative and have a perspective that may lead to fresh and productive insight of concepts, issues and research agendas. All Ghoti contributions will be selected by the editors and peer reviewed.

**Etymology of Ghoti**

George Bernard Shaw (1856–1950), polymath, playwright, Nobel prize winner, and the most prolific letter writer in history, was an advocate of English spelling reform. He was reportedly fond of pointing out its absurdities by proving that 'fish' could be spelt 'ghoti'. That is: 'gh' as in 'rough', 'o' as in 'women' and 'ti' as in palatial.

Overlooked impacts and challenges of the new European discard ban

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Abstract

Discards are the portion of animal and plant material in the catch that is dumped back at sea. The Common Fisheries Policy plan proposed by the European Commission for 2014–2020 presents a controversial goal: to enforce the landing of fishing discards as a measure to encourage their reduction. This historical and political decision will shape the future of the fishing exploitation in European Seas. Discards generated by European fleets are not negligible, and its reduction is an ecological, socioeconomical and moral imperative. However, it must be achieved through the reduction in discards at source and the promotion of selective and non-destructive gears. We argue it is doubtful that this discard ban will result in an effective reduction of discards. The proposed measure may, in fact, negatively affect ecosystems at all levels of biological hierarchy by disregarding the Ecosystem-Based Approach to Fisheries and the Precautionary Principle. It could negatively impact several species by increasing fishing mortality, also commercial species if discards are not accounted in the total allowable catch. Communities preying on discards will likely be affected. The role discards currently play in the energy turnover of current ecosystems will be modified and should be fully evaluated. The landing of discards will likely generate new markets of fishmeal due to the growing demands for

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marine living resources. The ban will require substantial public investment to deal with technical problems on board and to control and enforce. Therefore, this measure should be only implemented after rigorous scientific and technical studies have been developed.

Keywords Common Fisheries Policy, discard ban, Ecosystem-based Approach to Fisheries, European Seas, landed discards, Precautionary Principle

The new European Common Fisheries Policy and its discard ban

In 2010, approximately 130 million tonnes of seafood were produced for consumption (both from capture fisheries and aquaculture; FAO 2012). Currently, seafood is a key component for nutrition of human populations (Sumaila *et al.* 2012; Teh and Sumaila 2013) as it globally contributes 16.6% of the consumed animal protein feeding over three billion people (FAO 2012). Increasing consumer demands for marine resources, caused by an increasing human population, render urgent the establishment of successful sustainable fisheries management policies (FAO 2012).

Worldwide, and in the European Union (EU), there is a constant discussion in recent years on how to achieve a fisheries policy that moves towards more efficient regulation and conservation of fishing (FAO 1995, 2003; Department of Justice Canada 1996; EC 2002; US Commission on Ocean Policy 2004). However, the result of past policies, as the EU recognizes itself, is far from satisfactory, and most of the fisheries resources of the North-east Atlantic and Mediterranean Sea are currently fully exploited or over-exploited (Froese and Proelß 2010; FAO 2012; Colloca *et al.* 2013).

One of the main reasons for this failure is the pressure that the fishing industry, the media and other lobbies exert on the European Commission. They frequently result in scientific recommendations being diminished because of socioeconomic and political interests (Froese 2011) and of the 'revolving door' principle (Tsikliras *et al.* 2013), the interchanging roles of personnel between legislation bodies and the industry affected by such legislation.

The promotion of a sustainable marine environment is now on the agenda of several European actions, such as the new Common Fisheries Policy (CFP) and the Marine Strategy Framework Directive (MSFD; EC 2008). The CFP plan, recently presented by the European Commission (EP 2013) for the

period 2014–2020, aims to overcome some of the limitations of previous fisheries plans (EP 2011a). Its objective is the reform of fisheries management to prevent the collapse of the fishing sector and ensure a sustainable exploitation, something that has been long awaited and celebrated by stakeholders. The main aim of the MSFD is to achieve a good environmental status (GES) in EU marine waters by 2020.

The European Parliament agreed on that the new CFP plan should be approved after negotiations between the Council of Ministers, the European Commission and the European Parliament (EC 2012). Negotiation ended in June 2013 and the CFP will soon be approved. The CFP plan includes the enforcement of landing of several commercial species that are currently being discarded aiming at the promotion of the reduction in discards. This decision, undoubtedly historical, will shape the future of fishing exploitation in the European Seas. Being aware of the importance of this decision, we discuss its severe limitations and challenges and ask for rigorous scientific studies and open debate before the implementation of this measure.

Overlooked problems and challenges of the new discard ban

Discards, or discarded catch, is the portion of the total organic material of animal or plant origin in the catch, which is thrown away, or dumped at sea, because of several reasons (FAO 1996): the fishing quota is exceeded, they are unwanted or they are composed of immature or undersized organisms, of illegal species that cannot be landed due to trade regulations or of species that have little or no commercial value (Kelleher 2005). Discards may be dead or alive (Suuronen 2005; Broadhurst *et al.* 2006).

The discarding of marine organisms is not negligible and represents a worldwide problem for the sustainable management of marine fisheries

(Kelleher 2005). From an ecological and ethical point of view, discarding is controversial. Ultimately discards are products that are wasted and that in many cases could be perfectly consumed or used otherwise. Discards can impair the sustainable management of fisheries as many stocks subjected to total allowable catch (TAC) regulations are discarded in large quantities, and thus, fishing mortality is underestimated. Ecologically important species such as habitat-provider species and invertebrates, species at risk or small fish are also affected by discarding. The Food and Agriculture Organization of the United Nations (FAO) through the Code of Conduct for Responsible Fisheries (FAO 1995) claims the need to reduce such an unsustainable practice. Discards generated by the European fleets can be more than 60% of the biomass captured in demersal fisheries (Kelleher 2005). As a result, it is reasonable that the European Community is determined to end this practice.

Yet, the proposed strategy the EU decided on how to reduce discards is problematic: by enforcing their official landing. The EU expects that forcing fishers to land discards of several species will convince them not to generate discards, while the products that will be landed could be of some use and may be commercialized. We question this strategy based on two pillars of fisheries management: the Ecosystem-Based Approach to Fisheries (FAO 2003; Pikitch *et al.* 2004; Rice 2011) and the Precautionary Principle (EC 2000), both widely and officially supported by national and international organizations. Below, we list six important points that should be thoroughly discussed and evaluated in the context of the European discard ban.

Effects of the discard ban at different levels of biological organization

At the population level, not all discarded individuals are dead. In fact, there is a number of species the individuals of which are returned alive to the sea having high probability to survive after being discarded. This is especially relevant for many invertebrates and small fish (Suuronen 2005; Suuronen and Erikson 2010) and may be of special importance in highly diversified ecosystems of southern Europe, such as the Bay of Biscay, Iberian coast and the Mediterranean and Black Sea. Thus, the discard ban could have negative effects

at the population level by increasing fishing mortality on these species and on overall biodiversity.

At the community level, discards are a source of food for several organisms embedded in both the pelagic and demersal exploited ecosystems. Discards that sink to the bottom of the sea are consumed by a variety of species adapted to prey on this source of energy (e.g. invertebrates, fish, marine turtles; Tomas *et al.* 2001; Bozzano and Sardà 2002). Discards also play a key role in the feeding of several marine seabirds, including endemic species (Bicknell *et al.* 2013; Votier *et al.* 2013). Thus, even though this is an unnatural source of food for marine species, several species have adapted to it for decades, and thus, the substantial reduction in discards from exploited marine ecosystems will have direct and indirect effects on these species that need to be properly evaluated.

At the ecosystem level, fishing affects both the structure and function of the ecosystems, including the energy flows (Murawski 2000; Worm *et al.* 2006; Roux *et al.* 2013). Discarded biomass is a source of energy that is removed and immediately returned to the exploited ecosystem. Should discards be landed their energy equivalent will be lost from the ecosystem and will be exported to land, increasing the net loss of biomass and production from marine ecosystems. This could impact the resilience of the already exploited ecosystems and accelerate their deterioration by reducing secondary production and recycling of energy (Coll *et al.* 2008; Libralato *et al.* 2008), which, in turn, may have indirect and unexpected effects on the survival and productivity of targeted species themselves. Thus, the role discards play in the energy turnover of ecosystems should be fully evaluated before such a measure is adopted, especially in less productive ecosystems.

Economic, operational and technical challenges of the ban

The landing of discards will likely create new markets of fishmeal to feed the growing demands of aquaculture, agriculture and livestock industries (Mullon *et al.* 2009; Merino *et al.* 2010). This may be enhanced if the already depleted commercial stocks do not recover, a fact that will increase fishers' needs for a complementary or compensatory source of income. This, in turn, could generate a perverse effect on the generation of discards. Thus, the discard ban could actually encourage, rather

than discourage, the production of discards. This entails an important risk to increase the fishing pressure on less exploited species and on the whole ecosystem. The generation of new markets for discards should be banned if such risks are to be minimized.

Landing discarded products could lead to technical and operational problems for fishers, who would be obliged to land a product of little value. Fishers may have to cope with a reduction in the capacity to land products of higher economic value and with increased costs associated with the manipulation and storage of discards on board. Such additional operational costs will, most probably, be paid with public money through subsidies. Public subsidies to fishing are highly criticized (Sumaila and Pauly 2007; Froese 2011) and have been shown to be both detrimental for the ecosystem and for the profitability of European fisheries (e.g. North Sea: Heymans *et al.* 2011).

If there are no or little economic incentives to land discards that have little market value, and given the technical/operational problems discussed above, the enforcement of the discard ban will be a real challenge, and the associated monitoring and controlling costs (e.g. observers to prevent fishers from discarding when at sea) will most probably be very high, especially if the norm is complex and exceptions to the norm are numerous. Given that compliance with fisheries laws and recommendations is already low or very low worldwide and also in Europe (Mora *et al.* 2009; Pitcher *et al.* 2009), this is not an unrealistic scenario. In Scotland, surveillance on fishing vessels has been suggested, but it is not clear whether all European fishers will accept policing in this way. In contrast, if public economic incentives would be implemented to encourage fishers to land discards, this would increase the cost that the European society is currently paying to maintain its already inefficient and unprofitable fisheries (Froese 2011; Heymans *et al.* 2011). Adding these costs to the costs that have already been invested to increase the selectivity of the gears operating in EU in the last decades (EC 2011; EP 2011b), the total public cost of the new discard ban could become shameful.

Alternatives to the discard ban

The main problem in the EU is (i) the over-capacity of its fleet and the high impact of destructive and

unselective fishing practices (e.g. bottom trawls), and (ii) the low control and enforcement of regulations, both of which are directly responsible for the depletion of commercial species, the generation of large amounts of discards and the degradation of marine ecosystems (Roberts 2010; Thurstan and Roberts 2010; Froese 2011).

At the EU level, but also worldwide, there is an urgent need to advance towards a more sustainable fishing practice. The reduction in discards, both of species under TAC regulations (so fishing mortality is not overestimated), as well as of the remaining discarded species, is a must. However, it is contradictory to avoid discarding by promoting their landings and not by reducing discarding at source. The new obligation to land discards in European Seas may have unpredictable and unwished ecological, socioeconomic and operational impacts and may contribute to the impoverishment of the marine ecosystems. Therefore, it is very unlikely that the measure will contribute to prevent the collapse of the fishing sector and ensure a sustainable exploitation.

Its potential impacts may be dramatic for the southern European ecosystems (e.g. Bay of Biscay, Iberian coast, Mediterranean and Black Sea), where a large part of discards is already composed of juvenile fishes with body sizes smaller than the minimum landing sizes and of invertebrates. In Northern European Seas, fish stocks under TAC regulations may suffer in particular because of over-quotas and an increase of fishing mortality and of upgrading practices (i.e. discarding perfectly consumable fish with lower value to keep higher value ones).

The real reduction in discards can be achieved by the promotion of not destructive and selective gear, with emphasis on bottom trawls, and the enforcement and control of regulations. Currently, the size at first capture for many target species as well as minimum landing sizes is not only too low but also smaller than the size at first maturity (Stergiou *et al.* 2009; Colloca *et al.* 2013) and in many cases are illegally commercialized. In this context, new technological improvements could play a major role to allow the identification of the marine species that are targeted before capturing them in the water to increase selectivity. The new CPF reform should put especial emphasis on the technology needed to select fish and other marine creatures in their environment and thus develop a proactive policy.

Discards can also be directly reduced by effectively reducing the overall fishing capacity and by implementing areas closed to fishing, such as important areas for recruitment, or high habitat and species diversity areas, and marine protected areas.

In our opinion, the EU is pushing for a new CFP plan that takes one step forward but two steps backwards, with unintended consequences for the recovery of the marine ecosystems in European Seas. In the current context of economic crisis, the influence of various lobbies and media can be powerful and can notably influence the EU to legislate considering socioeconomic pressures rather than scientific and technical criteria that should be the basis of the sustainable management of marine resources. It is thus mandatory to investigate the impacts of the new discard ban from a scientific and technical perspective before its implementation. A rigorous and open scientific debate on key issues should be promoted, while, at the same time, we invest in the elimination of discards at source by increasing selectivity, reducing overcapacity and enforcing legislation.

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