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ARTICLES

Fish Consumption: Choices in the Intersection of Public Concern, Fish Welfare, Food Security, Human Health and Climate Change

Helena Röcklinsberg

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Abstract Future global food insecurity due to growing population as well as changing consumption demands and population growth is sometimes suggested to be met by increase in aquaculture production. This raises a range of ethical issues, seldom discussed together: fish welfare, food security, human health, climate change and environment, and public concern and legislation, which could preferably be seen as pieces in a puzzle, accepting their interdependency. A balanced decision in favour of or against aquaculture needs to take at least these issues into consideration. It is further argued that in the parallel discussion on increased livestock production animal welfare is an inevitable element both in relation to current legislation in many countries but also in relation to our perception of moral, whereas awareness of fish welfare is low. Both EU legislation and labelling concerning fish is mainly limited to environmental aspects. It is argued that EU shows a split perception of fish, on the one hand acknowledging scientific evidence of fish capacities but on the other excludes fish from detailed legislation. Combining the claim of the Treaty of Lisbon to pay full regard to animal welfare and scientific evidence fish are sentient it is concluded that fish welfare need to be considered in any farming practice and any ethical consideration of increased aquaculture. This might be facilitated taking a basis in our own vulnerability and interdependence, combined with moral responsibility to show sentient beings a 'loving kindness'—an extension of Cora Diamond's argument regarding mammals.

Keywords Fish welfare · Ethics · Food security · Public health · Public concern

H. Röcklinsberg (✉)
Department of Animal Environment and Health, Swedish University of Agricultural Sciences (SLU), Box 7068, 750 07 Uppsala, Sweden
e-mail: Helena.Rocklinsberg@slu.se

"Only the dead fish follow the stream" (pop song title; Louise Hoffsten et al. 2013).

Introduction

Aquaculture is the fastest growing food production in the world, and often regarded as one of the most promising solutions to food insecurity (FAO 2012; Subasinghe 2009). About 80 % of wild fish production is consumed by humans, whereas 20 % is processed for fish meal and fish oil (FAO 2010). Given the calculated global population growth paired with urbanisation and increasing standard of living, recent global food crisis and economic recession demand for fish products will increase. Due to "capture fish production stagnating, major increase in fish food production is forecast to come from aquaculture." (FAO 2010:87). Considering the population forecast, to maintain the current level of per capita consumption in 2030, an additional 23 million tonnes of aquatic production will be needed (FAO 2012:172).

Life cycle analyses of food impact regarding climate concerns state fish (and poultry) as a more sustainable alternative than beef or pork thanks to lower emissions and high feed conversion rate (Ellingsen and Aanondsen 2006; Nijdam et al. 2012), and "fish are without comparison the most efficient protein-transforming higher animals ever farmed by man. This is as true for modern salmon farming as it is for traditional poly-culture of tropical fish." (Kiessling 2009:309). However, a number of other issues need to be taken into concern. One is human health aspects. Fish oil containing omega 3fatty acids is regarded beneficial by e.g. reducing cardiovascular risk, and although there are some risks of contamination citizens are recommended at least one weekly fish meal, given a selection of species is made (e.g. Mozaffarian and Rimm 2006). However, recent studies question the positive effect (von Schacky 2014; Barman et al. 2013). Another relevant issue concerns legislation, which in the EU only partly covers fish farming. Further, an increase of fish farming probably includes not only a higher number of facilities but also an intensification of farming practice which in turn is related to farmer's working and living conditions, fish welfare and environment.

Given that aquaculture is considered to grow, this range of ethical issues need to be taken into consideration. In the present paper focus lies on issues mentioned by FAO such as environmental concerns (including climate concerns) and human health and farmer's situation, but also on fish welfare, an issue seldom discussed in combination with food supply through increased aquaculture. Herein it is discussed from the perspective of public concern and legislation regarding fishery and aquaculture.

In spite of increased media attention to compromised or low animal welfare in commercial farming systems, and as a consequence, a relatively high number of 'animal friendly labels' developed for the market, fish welfare has not yet reached common consumer awareness (Frewer et al. 2005), and in general such labels do not cover fish (Kalshoven and Meijboom 2013). A few exemptions are Friends of the Sea, Freedom Food and the Swiss organisation fair-fish international (www.fair-fish.ch), the latter also including welfare aspects. There are of course differences between fish farms (Nijdam et al. 2012), as are between farms in livestock

husbandry. In this study, aquaculture and capture are however seen as paradigm cases of food production and focus lies on aspects of special ethical relevance, some of which are the same as in other animal farming, some of which are different. By giving an admittedly sketchy picture the aim is to point at the interrelatedness of a number of the most intriguing ethically important aspects in fish consumption: food security, fish welfare, human health, biodiversity, climate concerns and public concerns. These ethical issues need to be related to each other to facilitate handling of potential value conflicts and decision making. A first aspect to consider is public concern for animal welfare, as this influence, and is supposed to be mirrored, in political decisions on regulation (Gavinelli and Ferrara 2009).

Growing Public Concern for Animal Welfare

In the EU, but also in other parts of the world, many citizens show a growing concern for animal welfare (Frewer et al. 2005; EU Commission 2006; Miele et al. 2011). By tradition, fish has however been counted in kilos, parallel to broilers, none of them treated or traded as individuals, but rather harvested crops, and seldom considered as objects of moral concern in animal ethics (Lund et al. 2007; Röcklinsberg 2012a). Regarding fish, this lack of concern most probably is related to three main reasons. One is the difficulty for humans to spontaneously bond or emotionally understand fish, due to fundamental differences in body shape, facial expressions and living conditions (Bergqvist and Gunnarsson 2013). Another is the scientific difficulty to create suitable approaches measuring fish capacities in general (Sneddon 2002, 2003, 2006) also regarding specific capacities such as cognition and emotion (Braithwaite et al. 2013). A third is normative: In most theories of animal ethics, there is a strong link between individuals being sentient and being considered morally relevant. I.e. these theories often have a sentientist view on who is morally relevant, which is then combined with a certain normative ethical theory like Deontology, Utilitarianism, etc. (Röcklinsberg 2001; Wild 2012). Hence, if fish are considered as not being sentient, then they are not included in the moral realm of direct moral significance (see also Bovenkerk and Meijboom 2013 for a discussion on moral significance and relevance regarding fish). Important to remember though is that concern for non-human animal's suffering is not new. In the Western tradition, already Greek philosophers and early church fathers argued for care for animals, some of them also including fish, e.g. St. Antonius (Preece 1999; Röcklinsberg 2012b). Much later the influential English Utilitarian Jeremy Bentham (1748–1832) argued "the question is not, Can they *reason*?, nor, Can they *talk*, but Can they *suffer*?" (Bentham 1789) against Immanuel Kant's criterion of rationality for being a moral patient. Bentham argued that instead the capacity to experience (pain and happiness) is relevant and has been not only in the midst of animal ethics, but also in the discussion on regulation of animal protection, consumption and legislation (e.g. Sandøe and Christiansen 2008; Vapnek and Chapman 2010).

However, fish has until recently been remarkably absent in modern animal welfare research, animal ethics or legislation (Chandroo et al. 2004; Lund et al. 2007; Schlag 2010). In the EU, wild fish is not protected by any legislation

concerning treatment and handling procedures, but rather considered an environmental issue. This should be no surprise, given that studies of EU citizens show a preference for taking environmental rather than animal welfare concerns, if at all, regarding fish (Verbeke et al. 2007). Although some studies indicated a growing interest in fish welfare, this is from a low level (Huntingford et al. 2006). In general citizens have a rather low awareness of fish welfare issues, and even lower interest in improving farming standards for fish (EC 2007; Frewer et al. 2005; Honkanen and Olssen 2009; Vanhonacker et al. 2011), and it is only a small segment of citizens willing to pay for fish welfare (Solgaard and Yang 2011). A Finnish study on consumer attitudes to farm animals including fish concludes that for some citizens, fish are 'semi-animals' and "that there is no urgent consumer pressure to improve the conditions of farmed fish in Finland." (Kupsala et al. 2013:133). Thus, it is no underestimation to say that growing public concern for animal welfare does not yet automatically include fish.

In contrast to this, it is interesting to note that Gavinelli and Ferrara (2009) argue for better animal welfare based on the view that a democratic system should mirror the evolving values and perspectives of its citizens. Policy-makers and legislators need to respond to consumers' demand of higher welfare standards (Horgan and Gavinelli 2006). Such a demand is valid for terrestrial husbandry (Eurobarometer 2007), but given fish welfare is of no or limited concern for citizens, there would be no claim for change to be mirrored. It does not follow though that there is no need for ethical reflection and political consideration. Before evaluating on a normative level, it is necessary to have a picture of what current regulation says.[1]

Legislation on Fish

The Council Directive 1998 (98/58/EC) *concerning the protection of animals kept for farming purposes* lays down minimum standards for animal husbandry, including fish, but does not cover all farmed animal species, nor all stages in farming. There are further EU-regulations on transport (Council regulation EC 1/2005) and on slaughter (Council regulation EC 1099/2009) as well as a recent directive on research animals (2010/63/EU). But many fields remain largely unregulated on EU-level such as e.g. companion animals or husbandry of dairy cows. Fish (as well as reptiles and amphibians) are however included in the EU Directive 98/58 EC and covered by Article 3: member states shall "ensure that the owners or keepers take all reasonable steps to ensure the welfare of animals under their care and to ensure that those animals are not caused any unnecessary pain, suffering or injury." Fish are excluded though from Article 4, which states conditions shall ensure each species is kept with regard to "degree of development, adaptation and domestication, and to their physiological and ethological needs in accordance with established experience and scientific knowledge". Hence legislation is less concerned with fish' physiological or ethological needs during farming than with mammals'.

[1] Here the focus is limited to the situation in the European Union.

In the slaughter regulation (Council regulation EC no 1099/2009) which applies from Jan 1st 2013, any person involved in killing animals, also farmed fish "should take the necessary measures to avoid pain and minimize the distress and suffering of animals during the slaughtering or killing process, taking into account the best practices in the field and the methods permitted under this Regulation." (Recital no 2). Contrary to mammals, stunning is not required (recital no 11). According to Chapter I article 1(1) fish is excluded from the detailed regulations applicable to other vertebrates. Only article 3(1) shall apply: "Animals shall be spared any avoidable pain, distress or suffering during their killing and related operations." Again a rather strong claim, but detailed regulations on farming, capture or slaughter of farmed fish is lacking on EU-level. There is however an interest in welfare at slaughter showed by e.g. scientific opinions on seven species, adopted by the panel of Animal Health and Welfare of EFSA (EFSA 2009), and legislation in Sweden (SFS 1998:534) and Norway (LOV 2009-06-19-103) requires stunning of farmed fish.

A legal incentive to these scientific opinions lies in the Lisbon Treaty from 2007 in which fish are included in terms of 'fisheries', implying recognition of the need for scientific knowledge. Article 13 reads as follows: "In formulating and implementing the Union's agriculture, fisheries, transport, internal market, research and technological development and space policies, the Union and the Member States shall, since animals are sentient beings, pay full regard to the welfare requirements of animals, while respecting the legislative or administrative provisions and customs of the Member States relating in particular to religious rites, cultural traditions and regional heritage" (EC 2007/C 301/01). Again, a strong claim.

Of further relevance is the opening up for citizen initiatives. "With the Lisbon Treaty the constitutional framework was reviewed and updated, holding the main aim to "enhance the efficiency and democratic legitimacy of the Union and improve the coherence of its action" [EC 2007/C 306]. One way of increasing democracy is the inclusion of "European Citizen's Initiative", meaning that at least one million citizens from a significant number of Member States can initiate a topic to be dealt with by the European Commission: […] There is also focus on increased safety and transparency, while making the EU a stronger international force […]." (Tjärnström 2010:7). Hence, if there would be a formulated public interest in fish welfare, there are ways to reach the Commission's agenda.

This picture of regulation concerning fish shows an ambiguity within EU. On the one hand, awareness of scientific results indicating that fish are sentient (Algers et al. 2009) and a directive claiming fish shall be treated without causing unnecessary suffering, similar to farmed species. On the other hand, farmed fish is excluded from any detailed regulation concerning farming, transport and slaughter, and there is no legislation regarding welfare at capture. A further interesting dimension is that EU, in spite of these limitations in regulation, goes ahead of citizens' values and views with regard to fish welfare, as these regulations are not a result of a Citizen's initiative—which would have been possible after the Lisbon Treaty—or any other form of large scaled consumer action. Even if there had been such a consumer action, ethical concerns regarding treatment of fish is not limited to

citizen views, and some political awareness of including fish in regulation is a useful point of departure for elaborating on how to balance the range of relevant issues in fish harvest, aquaculture production and consumption. Given that there is both an ethical and a political interest in restricting 'suffering, pain and injury' during farming practices, what then is to be considered, when including fish welfare in policies? What do we know about fish welfare, according to recent research?

Acknowledging Fish Welfare

In spite of the Lisbon Treaty and the OIE definition[2] of animal welfare including fish, welfare is an almost non-debated issue in fish farming and capture compared to legislation and debate about intensified production of farm animals. There have been far less studies on fish welfare than on other farmed animals and much knowledge still is to be gained, research on fish capacities, behaviour and welfare is not an entirely new field. The EFSA-report *General approach to fish welfare and to the concept of sentience in fish. Scientific Opinion of the Panel on Animal Health and Welfare* (Algers et al. 2009) summaries regarding pain perception and adaptation to the environment. They state, "Different species of fish have evolved highly sophisticated sensory organs to survive in changing and varied environmental conditions. There is scientific evidence to support the assumption that some fish species have brain structures potentially capable of experiencing pain and fear. The balance of evidence indicates that some fish species have the capacity to experience pain." (Algers et al. 2009:3). This opens for a need to understand what welfare means in relation to fish species. Thanks to explorative research a more nuanced understanding of fish capacities, behaviour and welfare is in sight (e.g. Sneddon 2002, 2003, 2006; Ashley et al. 2009; Braithwaite 2010; Huntingford et al. 2012).

Biologically, fish are divided into three major groups: *Agnatha* (hagfish, lampreys), *Chondrichthyes* (sharks, rays, sturgeons) and *Osteichthyes* (bony fish). Most aquaculture finfish species are *Teleosts* (EFSA 2009), and consumption fish belongs also to the *Chondrichthyes* (Jalmlöv et al. 2011). There are about 55,000 species of vertebrates and more than half of them are fish. Hence, knowledge is still limited about most species and conclusions cannot be drawn from one fish species to another. I.e. research is bound to be species-specific not only in mammals, but also in fish research (Braithwaite et al. 2013; Colin 2013). It is however crucial to remember that "absence of sound scientific evidence at present should not be seen as evidence of absence of suffering in farmed fish, and this fundamental principle is entrenched in the Treaty." (Algers et al. 2009:5; see also Lund et al. 2007:112). One

[2] The OIE Resolution (Article 7.1.1 of the Terrestrial Code): Animal welfare means how an animal is coping with the conditions in which it lives. An animal is in a good state of welfare if (as indicated by scientific evidence) it is healthy, comfortable, well nourished, safe, able to express innate behaviour and it is not suffering from unpleasant states such as pain, fear and distress. Good animal welfare requires disease prevention and veterinary treatment, appropriate shelter, management, nutrition, humane handling and humane slaughter/killing. Animal welfare refers to the state of the animal; the treatment that an animal receives is covered by other terms such as animal care, animal husbandry, and humane treatment (OIE 2009).

way of handling this risk of a too limited idea of how to investigate fish capacities is to use "a bottom-up approach, based on phylogenetic relationships and models of behaviour in which emotion and cognition play a role both for human and non-human animals." (Braithwaite et al. 2013:10). By use of analogy of the role of behaviour and needs, researchers can deduce what brain structures and motivational systems are used by the non-human species, rather than starting with interaction between human brain and behaviour. (Wild 2012; Braithwaite et al. 2013). Using this method, it has been shown e.g. that a dominant rainbow trout change its behaviour with respect to how much pain is showed for conspecies depending on context, i.e. whether in familiar or novel environment (Ashley et al. 2009).

Independently of the exact level or degree of pain perception or behavioural change, there is ample evidence that the species used in research—which to some extent coincides with the ones used for food e.g. Atlantic salmon, gilthead sea bream, sea bass, rainbow trout, carp and European eel—have capacities to experience pain, fear and adapt their behaviour to the context. These capacities make fish welfare a valid legislative concept, and calls for fish being included in animal ethics, but the normative question remains: to what extent ought fish welfare be considered if also other ethically relevant issues are at stake? In the following, first some climate and environmental factors in fish production and thereafter aspects of food security and health issues are discussed.

Environmental Impact in Fish Capture and Fish Farming

In a hypothetical situation, where all fish welfare needs were met, other ethical challenges would still remain. Food production is a major factor in climate change (Smith et al. 2014) and any attempt to mitigate this by increased aquaculture calls for an ethical analysis. Here differences in environmental impacts between fish farming and wild capture need to be mapped. Although a comparison between these systems is difficult and differences are not always as expected (Ziegler et al. 2012), a few key points can be extrapolated (Huntingford et al. 2012). Here overfishing, feed issues and stock density are discussed, and finally some other are listed.

Increase of aquaculture is largely due to decrease in wild stock, i.e. overfishing has led to reduced catch, compensated through farmed fish. Aquaculture is however not independent of wild capture, as carnivore species like salmon is (or at least used to be) farmed at large and need fish-based feed (Naylor et al. 2000, 2009). Although the ratio of wild fisheries input to carnivorous farmed species conversion is significantly lower than in the mid-90s, it is still higher for salmon than for other farmed fish in general including omnivores and herbivores (Naylor et al. 2009). This calls for alternative feed, which is consequently currently an explorative research field (Pelletier and Tyedmers 2007; Langeland 2014; Ryckebosch et al. 2014.

Not only regarding welfare, but also in life cycle analyses of fish and seafood 'a fish is not a fish' as wild caught fish and aquaculture have their own specific factors of climate impact (Ziegler 2006, 2009; Ziegler et al. 2012). In capture species-specific behaviour and location matter; species living tight together in a mid-water level are more energy efficient to catch than bottom-dwelling (demersal) fish. Also stock

density—in biological terms—matters: low-density fish stocks require more time and fuel per kilogram landed fish. This is related to another crucial factor. Differences in biological status, stock situation, of the species; catch of those on the red list might be less efficient. Studies have shown an increased use of energy at catch (Tyedmers 2004), which is timely interrelated with over-fishing (Ziegler 2008). Diesel for fuel is regarded as the largest single factor for climate impact in the life cycle chain from catch to consumer, and there is a correlation between amount of diesel used and status of the species (Thrane 2004; Ziegler 2006, 2008). Further fishing gear ('active' or 'passive') has an impact on energy use. "In other words, in addition to the fishing method, the stock situation is a key factor in determining the energy efficiency of fisheries." (Ziegler 2009:343). Above this, Ziegler stresses the cooling equipment having a substantial negative environmental and climate impact. Freon is frequently used in spite of its documented negative effect, and high level of documented leakage on 50–80 % on a yearly basis on larger ships (See Ziegler 2008) and Ziegler et al. 2012).

In aquaculture on the other hand, "the proportion of marine inputs in the feed is a key factor for future improvement" (Ziegler et al. 2012:10) as feed production is the largest factor of climate impact for carnivore fish species as salmon and rainbow trout. Some calculations showing up to 90 % of all energy used in salmon farming is feed production (Pelletier and Tyedmers 2007; Ziegler 2009; Kiessling 2009). Here the use of diesel to catch raw material (for fishmeal and fish oil) is significant and another key factor lies in emissions from agrarian production as "fish feed based on at least 50 percent agricultural products such as wheat, maize and soybean." (Ziegler 2009:347). A challenge for aquaculture farming carnivore species seems to the production of feed that will be based neither on wild captured or exploited fish stocks, nor on resource intensive land based production. It is important to bear in mind though that there is no clear cut division between land-based or aquatic feed in terms of climate and biodiversity. *Rather*, "the range within both marine and crop-based inputs is large and there is some overlap; the most intensive crop-based inputs have higher GHG emissions per kilogram than the most efficient marine inputs." (Ziegler et al. 2012:10; see also Ziegler 2009). According to Pelletier and Tyedmers (2007:414) "potential substitution of vegetable meals and oils in place of animal-derived ingredients do offer substantial opportunities to decrease the environmental cost of salmon farming, and to vastly improve resource use efficiency." Hence, there are relevant differences between farming herbivores (often tropical) or carnivores (cold-water). Although decrease of use of marine based feed—e.g. by farming herbivores—as such is positive as it saves already exploited wild stock, increased agrarian fish feed has impact on nutrition quality and fish behaviour (Langeland 2014), has social and economic relevance (Gillund and Myhr 2010) and is directly related to a region's food supply and land use for human production and survival (see below).

Further, climate change will affect e.g. water quality, temperature and sea-level, but also behaviour, habitats and food webs (Alistair and Evans 2013; Shelton 2014), and have to be handled in addition to 'older' challenges such as chemical discharge leading to eutrophication or pollution; waste of feed, poor water quality due to high density in farming facilities, which in turn may decrease immune system and lead to increased use of medical treatment of the fish; loss of habitat for wild fish at farming sites; ecologic competition between wild and escapees; spreading of diseases from farmed

to wild fish; escape of genetic modified individuals; invasion of exotic organisms (Bergqvist and Gunnarsson 2013; Huntingford et al. 2012). Summing up, one can conclude that to enable a consumer to make a real choice with respect to fish consumption it is as necessary to ensure transparency about the behavioural differences between fish species, stock status, capture methods and, last but not least, feeding regimes and production methods. This should be similiar to processes that enable consumers to make an informed choice with respect to meat, milk or egg from intensive or extensive, conventional or organic produce.

Environmental Labelling and Consumer Demand

To facilitate purchase based on informed choices transparency in the food chain is crucial. Labelling is a way used by the producers to meet this demand of transparency and to help consumers come to well-founded conclusions. Current labels for fish are in general covering impact on the environment or the climate, in terms of sustainability, and less on animal welfare. Although a growing branch, organic aquaculture is less than 1 % of total fish farming. Welfare concerns are restricted to slaughter issues regarding conventionally farmed fish and welfare of wild fish is not considered at all (Kalshoven and Meijboom 2013; Council regulation 1099/2009/EC). I.e. labels fit well with findings on consumer interest mapped by Kupsala et al. (2013), and does not 'pay full regard to the welfare of animals' as regulated in the Treaty of Lisbon. Labels might have an impact on consumption among consumers who are interested in sustainability issues, but most probably its impact lies in a rather restricted field of business-to-business where one fish buyer chooses certified fish in order to meet a demand from another buyer (e.g. retailer), not directly a consumer demand (Kalshoven and Meijboom 2013). Given this analysis is valid, a question of the 'hen and the egg' arises. Is the limited focus on fish welfare a result of lack of consumer demand, or is the lack of consumer demand a result of lack of available certified products? It seems reasonable to suggest that a 'standard consumer' is not aware that, except for organic produce, current labels used on the market in Europe are *not* covering fish welfare above slaughter of farmed fish (on a level of EU-regulation, see above), nor human health aspects, food security or labour and business situation for farmers in developing countries.

Given fish farming increases in the near future, and only environmental aspects are covered by current labelling, such a labelling system cannot be taken as a comprehensive 'ethical guideline' for consumers. Above animal welfare, an ethical balance mirrored in such a hypothetical guideline would need to take fair working conditions into concern. Fair production conditions and fair trade of fish would need to be covered to ensure production is beneficial also for farmers and villages, not only for buyers' health. If current labelling could be broadened to social and economic sustainability, what aspects would be important to consider?

Fair Fish Farming and Human Health

On a global scale, supply of fish and fish products reached 148 million tonnes of fish and fish products in 2010, and preliminary 154 million tonnes in 2011. In 2010

hereof 88,6 million tonnes came from capture and 59.9 million tonnes from the steadily increasing aquaculture sector (FAO 2012). Given an expanding world population fish production need to stay at a high level, and moreover, according to FAO, future production increase will have to come from aquaculture. Although discrepancies between regions, in Asia fish constitute on average 20.7 kg/year per capita, in Africa it is between 9.1 kg whereas in Europe it is 22 and 24.1 kg in North America (FAO 2012). Sub-Saharan Africa is regarded a potential region for expansion of aquaculture: if integrated with agriculture it can contribute to stabilize and diversify farm output and increase also food security on family or village level (Hambraeus 2009). Hambraeus stresses however, that although interest in aquaculture increases and it has great potential for improving food supply, increased specialization in fish farming is a challenge. If it aims at cash crop for export it might constitute a potential threat against increased food supply in a certain region (Hambraeus 2009). Ababouch offers a detailed analysis of the effects of increased global trade with fish and concludes it is a highly complex phenomenon. Among a number of effects of global trade he argues that on the one hand it might be beneficial for poor fishers in non-fish-eating communities to export the fish. On the other hand, export of fish leads to deprivation of a necessary source of food and to higher prices in areas where a fish diet is an integral part of the culture and hence might cause food insecurity (Ababouch 2009). Over 90 percent of the global capture fishers work in small-scale fisheries, with a crucial, albeit difficult, role in food security (FAO 2012). The structure of fish farming in Asia is currently under change, where small family farms are incorporated in larger companies, largely restructuring the farming conditions leading to decreased self-governance and reduced possibilities to make a living on small farms (Bremer et al. 2012). Building on FAO and UN reports Sharma (2009) describes that also traditional small-scale fisheries struggle with unfair and unsafe working conditions and women are in many respects disadvantaged and discriminated. Implementation of certain rights of small-scale and indigenous fishing communities to e.g. cultural identity, human dignity and traditional knowledge systems; to access to territories and water on which they have traditionally depended; to social security and safe and decent working conditions; to participate in decision-making ensuring free, prior and informed consent to management decisions would improve the situation (see also e.g. FAO 2012; Umesh et al. 2010 for further examples).

While improving consumer information it has to be taken into account that in general developed countries set the agenda for global trade by regulation and subsidies. Given that producer's working conditions are ethically important cultural aspects and local knowledge need to be taken into account, in line with Ababouch's argument mentioned above. Further it is necessary to calculate what lack of respect for small farmer's conditions would cost in terms of reduced social and economic stability. Labels based on standards not including aspects of local food security are lacking in relevance for any consumer who wants to make sure the own fish consumption is not at the cost of someone's living. Given that aquaculture has a potential for reducing poverty, the production systems need to be structured to ensure implementation of human rights, integration in cultural patterns, and regional

food security by increased diversification of farm output. Hence, several aspects of sustainability are crucial in fish farming for a global population.

Above these concerns, it is necessary also to include the aspect of fish actually being a food item—and hence should not be dangerous but rather nutritious to consume. Everybody knows one 'should eat healthy food'. Given that fish constitutes a substantial part of a given population's diet, health issues become strongly relevant. Fish not only contributes to food security in many regions of the world, it is also an important source of animal protein (FAO 2012:82). In some countries a slight decrease can be seen, but in 2009 for developing countries "the share contributed by fish was significant at about 19.2 percent, and 24.0 percent for LIFDCs [Low-income food-deficit countries]." (FAO 2012:5). According to Hambraeus, this can be beneficial for health since "seafood represents a valuable source of essential nutrients […]. This has led to an increased interest in their potential to decrease the incidences of cardiovascular, cancer and inflammatory diseases." (Hambraeus 2009:325). At the same time recommendations of restricted fish consumption are given by e.g. governmental agencies. Pregnant and breast feeding women in Sweden are advised not to eat certain wild fish species (herring, perch, pike and walleye) due to high levels of PCB, dioxin and methyl mercury (Swedish National Food Agency). This view is shared by Hambraeus stating that "some of the seafood items may contain potentially hazardous compounds and be carriers of various exogenous toxicants from environmental pollution" (2009:326). Such toxins are stored in the body for a long time, which increases the risk of toxic reactions. A further health issue related to global trade is food safety. In a scientific opinion from EFSA food safety issues in slaughter of farmed fish are mapped, stressing the connection between fish welfare, pre- and post-slaughter handling (Andreoletti et al. 2009). Ababouch relates the safety issues to fish trade and argues in favour of a fish food safety strategy for both capture and aquaculture. Inherent in global fish trade, there are "risks of cross-border transmission of hazardous agents. Likewise the rapid development of aquaculture has been accompanied by the emergence of food safety concerns, in particular residues of veterinary drugs" (Ababouch 2009:394). Also the increased resistance to antibiotics needs serious consideration (COM 748) in recommendations to aquaculture farmers (e.g. ICUN 2007).

Concluding Discussion

As discussed in this article, increased fish aquaculture is a multi-dimensional issue. If farmed fish is a more efficient protein-transformer than any other farmed animal, it might seem self-evident that aquaculture should be promoted as means to reduce global poverty. Such a stance builds on a decision whether or not to accept animal husbandry for human consumption, an issue that has not been elaborated in this paper. Instead certain ethically relevant aspects related to increased fish production have been mapped, that need to be taken into consideration before one can draw such a conclusion. These are: public concern and legislation, fish welfare, environmental and climate aspects, food insecurity, food safety and health aspects to mention the ones discussed here.

In developed countries, citizens take for granted they can choose what to eat and although fruits, fish, meat and vegetables are transported over the globe, a person's choice of food is strongly influenced by cultural and social conditions. To a large extent, health is also an issue of socioeconomic status (Guede et al. 2014). In democratic developed countries, information about health threats and risks are available, and most citizens have the freedom of choice to buy healthy food products if they wish, whereas the opposite might be true for the vast majority of citizens in developing and/or non-democratic countries. Here lies an inherent question about the scope of responsibility carried by the stronger part (e.g. Marinoff 2007) and the possibility to act (von Barun and Mengistu 2007). Are we obliged to inform the less fortunate, and are we even obliged to make sure only healthy food is available? Morally, yes, but in a global economy the answer seems to be no. In the debate on globalisation within philosophy and political science, views differ on how to prioritise in a situation of two intertwined problems: poverty and inequality. What is of the greatest importance—are human material needs to be fulfilled first, or are efforts to create a society, and even world, guided by equality (e.g. by democratic organisation and absence of corruption) more essential hoping this would help reducing poverty in the longer run (see e.g. Rawls 1971)? Collste argues that in a situation where both problems cannot be solved, reducing poverty is to be in focus first, and reforms for increased equality should be put in force as soon as poverty is eliminated (Collste 2004). This might be problematic for at least one reason: as history has shown—in an unequal society a person having privileges seldom give them up by free will, implying the risk that 'after poverty' will never occur. Also, a starving population might perhaps neither have a preference for equality nor have the power to demand a societal change. In such a dilemmatic situation, those in power have a responsibility not only to cause as little harm as possible for the unprivileged, but also to help with at least one of the two—reducing poverty by ensuring healthy products or supporting strives for equality. Here the kind of codes of conduct reflecting the human rights related to fishermen/women's working conditions mentioned above become highly relevant.

Given the profound and global character of the challenges, we need political initiatives that aim to raise awareness of all involved parties and formulate long-term responsibilities. Such political initiatives, translated into financial arrangements and official regulations should aim to minimize the struggle of small scale farmers and help individuals who suffer from food insecurity. It is beyond the scope of this paper to elaborate on the concrete outline of such initiatives. However, the above suggested broad and transparent labelling of fish products could be seen as one key part of it. Important steps can be taken by consumers and citizens asking for fair production conditions and respect for animal welfare. By remembering the opposite of working for improvement—giving tacit consent to a system one knows challenges farmers' working conditions, climate, food security and fish welfare—inspiration to contribute might be evoked.

As shown there are legal 'tools' in the EU to work for improved fish welfare. Article 13 of the Lisbon Treaty is a political signal of animal, including fish, welfare to be of ethical importance. The view that regulation need to be a democratic mirror with public awareness as lowest possible level (Gavinelli and Ferrara 2009)

encourages policy makers to make decisions based on an ethical balance of relevant issues (not else covered by the EU-goal of free trade between member states). To achieve implementation of the claim in the Lisbon Treaty with regard to fish at least three processes are needed. Firstly, further investigation of fish capacities and welfare in combination with continuous compilation of present studies to a state of the art-reports possible to disseminate to a broader public (EFSA-reports are good examples); secondly an ethical scrutiny of whether there is and if yes, how to define, an 'acceptable level of 'necessary' fish suffering'; and thirdly developing strategies for political measurements to implement farming methods ensuring this defined level of 'no unnecessary suffering' is met in both legislation, implementation and compliance. According to Bovenkerk and Meijboom (2013), special difficulties arise for how to relate empirical data and standpoints (here step one and two), to each other regarding fish since this field still depends on relatively high scientific uncertainty. Is there enough scientific evidence on fish capacities for legislation to set limits between necessary and unnecessary fish suffering in fishery and aquaculture? According to the scientific studies mentioned in this paper there is ample scientific evidence fish species used for consumption are sentient, can adopt their behaviour to a context and can experience fear, but not to what degree, or what level of cognition they have. Without doubt, translation of this science-ethics-interplay into legislation is complicated. Science base is not all to assess 'necessary suffering' though, as decisions on what is 'unnecessary' entails a clear ethical dimension. Here, the often used argument of 'giving the fish the benefit of the doubt' is in place (Sneddon 2006; Lund et al. 2007), as scientific uncertainty about fish capacities does not equal lack of prevalence of certain capacities (Lund et al. 2007; Algers et al. 2009).

Regarding the second process, ethical scrutiny of 'necessary suffering' one can easily see different definitions. Above considerations of compliance with legislation, or what is regarded economic necessity, it can be defined in terms of a hedonistic framework including 'suffering at all'; suffering caused by somebody's evil intentions or bad character; any suffering not in the interest of the animal; suffering extending a certain degree, or suffering beyond what is necessary in fulfilment of human interests (Behdadi 2012). Although fishery and aquaculture take place for the sake of human interest and hereby is an issue for evaluation, considering fish welfare as ethically important opens for taking suffering 'at all', beyond animal interest or above a certain degree into consideration. Animals can be kept without causing them stress or pain, but, at a much higher monetary cost for both producers and consumers, but possibly lower environmental and climate costs due to less intensive or concentrated production systems. Hence, arguing that some fish suffering is necessary in farming, equals taking the point of keeping other costs low as even more necessary. If this 'other cost' is keeping pace with decreasing global food insecurity, the balance has to be made very carefully, and issues of healthiness of fish products in question and of environmental, social and economic sustainability are not only relevant but also interrelated and interdependent. Without social and environmental sustainability, economic sustainability will be possible only a short phase, and without economic sustainability, social and environmental aspects will not be paid due concern.

Further, in none of the referred articles or reports on fishery and aquaculture focussing on food security, climate challenges or health, fish are considered as individual animals with 'well-being of their own'. Since also terrestrial farm animals' welfare is compromised in modern husbandry and fish are regarded 'semi-animals' such considerations might seem farfetched. So, how make the range of different stakeholders responsible for handling fish as non-sentient beings reconsider fish capacities and their own impact on individual fish welfare?

Motivation to safeguard high animal welfare is often based in acknowledging them being sentient, combined with either empathy with them or logical reasoning about unjust treatment, perhaps in terms of harmed rights. The philosopher Cora Diamond's approach is relevant here by combining these motivational factors in a somewhat new way. She argues for the relevance of taking the interconnectedness between our insight of our own vulnerability and an animal's, both being sentient and with a well-being of its own, as a point of departure. Here empathy is central, but will not suffice. To respond to another person being harmed requires the capacity to really see what it means to be harmed, and to perceive it as an injustice towards that very being. Hence, the *insight* in one's own vulnerability becomes crucial—both to include animals and to react when injustice occurs. This claim differs from focus on 'rights to something' or injustice as an abstract share of a limited good. For Diamond 'injustice' relates to the context and is unlimited. The task of the moral agent is to show 'a kind of loving attention' towards the being in need (Diamond 2001). Although we have this insight, we are limited by language and time when expressing the reality we experience, i.e. reality is hard to conceptualise. This is especially crucial when it comes to suffering and the wide range of perceptions of an animal's suffering (Diamond 2008). Inarguably there is a special challenge showing fish loving attention. But, a necessary challenge, given sentience matters morally.

Relating this to consumer responsibility in fish purchase I'd support the view presented above that consumers are not knowledgeable on fish capacities, adding that most are also not willing to see, to gain the insight that fish welfare is challenged in fishery and aquaculture. A change of perception is needed, to see fish as sentient beings with individual well-being. It is a challenge to show 'loving attention' towards a fish in a dark basin, or deep sea. Much less so however when feeding them, or handling them at vaccination or slaughter as this forces one to realise the very reason for performing such procedures is they are alive and sentient, with an individual well-being.

It is a complex task to implement welfare concerns for animals in contexts where also human welfare is compromised. This does not make the animal issue less important though. In societies where fish is an essential large part of animal protein intake, production systems and its impact on human health via farming environment are crucial, and the same goes for consumption of some species of wild fish by pregnant women. Increased aquaculture entails a range of difficulties to be overcome, where the most crucial one perhaps lies between food security and all other issues, i.e. between having and not having enough food. Intuitively food security might seem to over trump all other concerns, i.e. that it might be acceptable in spite of being detrimental to environmental, health and animal welfare. As

shown, also these are valid claims, and hence arguments for increased aquaculture need to be related to this range of morally relevant issues. Although they are interrelated, fish consumers can possibly not meet all aspects at once, not least as a crucial guide, labelling is limited to environmental issues. However, a starting point could be to take available information on e.g. fish welfare and farmer's conditions into account.

Knowing there are unfair producer conditions and heavily compromised fish welfare in fishery and aquaculture wealthy consumers might be motivated by shifting focus from one's 'self-evident' right to eat what is on the market, to opening for empathy with persons far from such a possibility and with animals farmed or 'harvested' without any welfare considerations. Although potentially challenging, showing 'loving attention' to unknown fish farmers and fishermen as well as to the fish and the environment through conscious purchase of products could be one step towards implementing the awareness of one's own vulnerability not claiming the right to an unjust treatment of others. Given that animal welfare is a self-evident moral concern in farming of sentient beings, and current scientific research shows that fish belongs to this group a shift in perception is needed. Considering fish welfare in any evaluation of the benefits or disadvantages of aquaculture and fishery to reduce food insecurity is an adequate and responsible step forward.

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