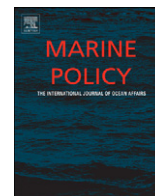




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Whitefish wars: Pangasius, politics and consumer confusion in Europe

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ABSTRACT

Rapid growth in production of the farmed Vietnamese whitefish pangasius and its trade with the European Union has provoked criticism of the fish's environmental, social and safety credentials by actors including WWF and Members of the European Parliament and associated negative media coverage. This paper reviews the range of claims communicated about pangasius (identified as a form of mass mediated risk governance), in light of scientific evidence and analysis of data from the EU's Rapid Alert System for Food and Feeds food safety notification system for imported seafood. This analysis shows pangasius to be generally safe, environmentally benign and beneficial for actors along the international value chains that characterise the trade. The case is made that increasingly politicised debates in Europe around risk and uncertainty are potentially counterproductive for EU seafood security and European aquaculture industry, and that the trade in pangasius can contribute to sustainable seafood consumption in a number of ways. Transparent evidence-based assessment and systems for communicating complex issues of risk for products such as pangasius are required in order to support continuance of fair and mutually beneficial trade.

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1. Introduction

Europe's fish stocks are in a poor state, with consumption levels maintained by imports [1]. This trade, originally based on wild fish but increasingly including those of farmed origin, has recently attracted considerable media attention, much of which has been negative. In particular, 2010 saw both continued increases in imports of a key farmed species, pangasius, to the EU and a spike in critical media coverage of the trade.

Vietnamese production of pangasius for export has developed at a rate unparalleled by any other food crop in any other location [2]. The fish, which has become an increasingly ubiquitous item of seafood in European markets in the past five years, was placed on the World Wide Fund for Nature's (WWF) 'red list' in late 2010, effectively branding it a no-buy for environmentally conscientious consumers. Further controversy was ignited shortly afterward by the Member of the European Parliament (MEP) Struan Stevenson (Senior Vice President of the European Parliament's Fisheries Committee) when he attacked the fish's environmental, social and safety credentials during an address to the European Parliament [3]. This speech attracted considerable media attention,

and culminated in the Vietnam Association of Seafood Exporters (VASEP) inviting the MEP to visit Vietnam in 2011 on a 'fact-finding mission'. VASEP's strategy was evidently effective as following the visit Stevenson publicly stated that his earlier assertions about the safety of the fish, the quality of the water in which it is produced, and the labour conditions of the workforce had been 'misplaced' [4].

These cases, along with other negative media coverage of pangasius linked to the WWF and national political interests in Germany and the Netherlands¹, can be understood as examples of what de Krom and Oosterveer [5] label 'mass-mediated' risk governance. This refers to the increasingly 'democratised' process of risk identification, communication and management in Europe, which has set 'expert' knowledge against that of diverse societal actors at multiple levels, where perceptions and evaluations of risk reflect a diversity of knowledge and evidence claims, value

¹ A German Television documentary called "*The Pangasius Lie*", which prominently featured a WWF fisheries expert and advanced a series of sensationalist claims similar to those made by Struan Stevenson, aired in Germany in March 2011. A report on pangasius commissioned by the Dutch fishing lobby and presented to the Christian Democrat party attracted negative media coverage to the fish in the Netherlands in early 2010, despite a flawed methodology based on a limited collection of samples from pond water, sediment and feed from Vietnamese farms. Pesticides, algae and heavy metals were detected, but none were higher than accepted EU levels.

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commitments and political interests. Rather than a dialogue based on reasoned argument and shared understanding, much of this discourse tends toward the polemic and rhetorical, and reproduces the views of entrenched interest groups. Unravelling claims such as these thus requires consideration of a range of political, social and economic standpoints, and of the sum of the interests of the actors making them along with those of the networks of supporters whom they represent [6].

Analysing claims of this nature therefore raises a series of questions pertaining to what Beck [7] refers to as the ‘relations of definition’ of seafood risk: who is responsible for what knowledge; how do they determine the hazardousness of a product; who has the right to demand and get what information from whom; and what counts as ‘proof’ when knowledge is contested and probabilistic? Placing these questions in the wider context of the international pangasius trade also implies questions of power and equity, both from the perspective of the EU as a net importer of fish and as the most valuable seafood market for Vietnamese pangasius producers. Furthermore, the case indicates that – as Mansfield has observed in relation to controversies over the effects of farmed fish on human health – debates regarding the sustainability of aquaculture must now also be understood as both an outcome of and an influence on changing political economic conditions’ [8, p. 415].

The mass-mediated exchanges around pangasius are also evident of a wider trend to compartmentalise the impacts of aquaculture, both in Europe and Asia, from the broader debate of sustainability of fisheries. Interestingly the 200,000 Mt of pangasius entering EU markets annually from Vietnam over the last few years approximately equals the size of the ‘fish deficit’, which the EU currently makes up by buying fishing rights in third country EEZs, mainly those of less developed countries [9].

The paper sets out in greater detail the background to and nature of the claims made regarding pangasius and their validity, or lack thereof; explores their ethical and governance implications and contextualises their importance within the broader landscape of European food (fish) security over the medium to long term. This achieved, it concludes by drawing attention to the increasingly politicised nature of risk and uncertainty around seafood in the EU and more widely.

2. Trade and sustainability: the EU, the MEP and the WWF

Struan Stevenson had been a long-time critic of pangasius, having raised concerns through the Scottish media and questions in the European Parliament since 2009 [10]. His comments at the end of 2010, made during a keynote speech at a conference in the European Parliament regarding aquaculture’s contribution to food security in Europe, reproduced a set of narratives about pangasius, which had featured repeatedly in the European media over the preceding two years [11]. These claims were arranged around the themes of food safety, environmental performance and social equity. Firstly, he stated that the Mekong, “is one of the most heavily polluted rivers on Earth”, and that “factories along its banks daily pump thousands of tonnes of contaminants into its slow-flowing waters”. He then asserted that, “the water in which pangasius is being farmed is teeming with bacteria and poisoned with industrial effluents including arsenic, mercury and DDT”. Finally, he turned to social concerns, arguing that the only reason pangasius can compete in Europe is because “Vietnamese fish farm workers are paid around \$1 per day”, which, according to him, amounts to “slave labour ... ruthlessly exploited by some major multinational companies” [12].

However, Stevenson subsequently acknowledged that his earlier claims (including one that “Panga fish are the most unsustainable food you could possibly eat” [13]) were ‘misplaced’, following a series of discussions with Vietnamese diplomats and European

academics. On returning from a visit to Vietnam in May 2011 during which he observed the industry first hand, he went on to state that,

“Far from finding a dirty, unhygienic and polluted business, Vietnamese pangasius is a new industry, meeting world-class welfare and hygiene standards and producing a quality product under first-rate conditions. It also provides secure jobs, social security benefits and pension provisions for millions of desperately poor people in the Mekong Delta” [4].

The political motivation for Stevenson’s original claims, that pangasius is an unsafe, unsustainable and socially irresponsible product, is readily apparent. Pangasius is a strong competitor in the European white fish market, and has been perceived as a cause for concern among European fishermen (see Fig. 1). However, other sections of the industry, notably processors, have welcomed the product’s availability as it provides much needed raw material to meet market demands. This success is attributable in part to the fish’s white flesh colour, mild taste, texture, quality and consistency, which are delivered to EU markets at highly competitive prices. This positive set of attributes has made pangasius a close substitute for traditional marine species in the EU, the sustainability of which has been beset by ineffective management [e.g. [14]].

Aquaculture has attracted substantial criticism for the negative impacts on marine ecosystems wrought by the use of fish derived products in feed. This argument is particularly pertinent to the high trophic level fish species, which dominate farm production in the EU [15]. However, pangasius possesses a comparative advantage in this respect, being a fast growing omnivorous species which requires very little fishmeal and oil in its diet. In addition, unlike many of the species farmed in Europe, research on and uptake of improved nutrition, genetics and management for pangasius, which are likely to further enhance productivity, are yet to occur. Even at this early stage in its development, pangasius has competed effectively in virtually every global market it has entered. However, many of these positive attributes and messages are lost in ‘mass mediated’ risk assessments of pangasius, which have created negative perceptions that are difficult to challenge once in the public domain.

Whilst Stevenson’s earlier stance may be explained by a mixture of limited knowledge and political expediency, the position adopted by WWF is more difficult to account for. WWF led a series of ‘pangasius aquaculture dialogues’ (PAD) with key stakeholders in the Vietnamese industry from 2007 to 2010, as part of a wider effort to develop certification standards for a variety of aquaculture commodities; the ultimate purpose of which was to produce mutually agreed upon standards based on independently verifiable performance metrics to improve the

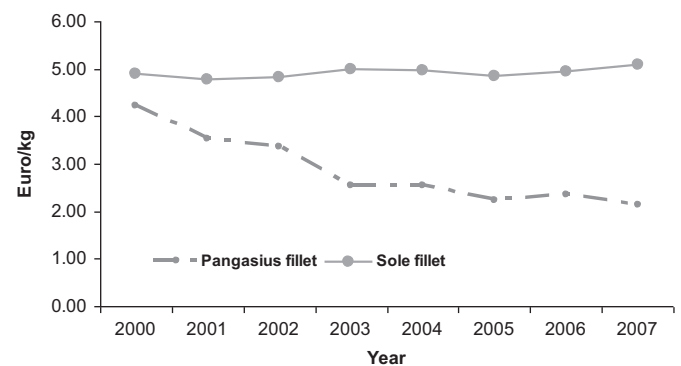


Fig. 1. Pangasius and Sole fillet frozen fillet prices 2000–2007. Source: [11].

sustainability of aquaculture production. These standards are to be implemented by an independent certifying body, the recently formed Aquaculture Stewardship Council (ASC) [16]. As outlined in the PAD Standards,

“... it is essential that the process is not dominated by one or a few stakeholder groups ... [and] critical that aquaculture standard-setting processes and certification schemes adequately incorporate the experiences and expertise of a broad and diverse group of people who are interested in aquaculture ... in an inclusive, transparent process” [17, p. 6].

Perversely, just at the point where the PAD's initial goal of arriving at a mutually agreed performance standard had been attained, another group in WWF working with the UK based Marine Conservation Society (MCS) and the Dutch North Sea Foundation chose to list pangasius as 'red' in their 'traffic light' recommendation list (or 'wallet card') intended to influence the European public's decisions regarding sustainable fish purchasing. These changes, based on a new 'common assessment methodology' (CAM) for the WWF, were claimed to bring the aquaculture dialogues (which focussed mainly on technical parameters such as feed and water quality) more closely into line with the capture fisheries methodology used for Marine Stewardship Council (MSC) certification by placing greater emphasis on the existence and effectiveness of state 'governance'.

The outcome was the reclassification of pangasius from orange to red, largely on the basis of what WWF claimed was a 'lack of available information' [as stated throughout the CAM notes [18]], adopting an essentially precautionary stance.² To add to the confusion, WWF elsewhere determined that organically certified pangasius should be marketed with a 'green light'. Responding to these mixed messages at the end of 2010, just weeks after Stevenson's keynote speech, and following deliberations between WWF and the Vietnamese government, the organisation retracted pangasius' red-list status and placed it in an entirely new, and undefined, category called 'moving towards certification', adding further to the already substantial likelihood of consumer confusion.

Although such discussions may have little direct impact on most consumers' perceptions when restricted to scientific and policy fora, high profile media coverage may have bigger implications. A high profile WWF-supported documentary titled '*The Pangasius Lie*', which aired on German TV in April 2011, focussing in a sensationalist manner on food safety concerns, had an immediate impact on sales in Germany [19]. Subsequent exchanges between WWF and the media have been confusing, in particular with regards to responsibility for the editorial balance of the programme, which was a matter of dispute between WWF and the TV production company involved. The view expressed by the WWF Aquaculture Dialogues programme director that such publicity is good as it 'will lead to a significant amount of certification (of pangasius) in Vietnam' [quoted in [20]] suggest mixed motives however, and appears contradictory to the participatory stakeholder approach earlier espoused by the organisation as its approach to promoting sustainability.

The efforts of WWF to link emerging standards for aquaculture with fisheries also ignore potential sustainability gains for fisheries, since if EU consumers were to substitute fish such as pangasius, raised on low fish meal/oil diets, for wild and farmed

higher trophic level species, pressures on marine resources would be reduced. WWF's vision in this instance thus appears to reflect a narrow sectoral and geographical understanding of sustainability and its communication, which has also been apparent in its approach to other aquaculture dialogues [21]. It also appears that the industry level assessment of the WWF recommendation list may contradict the logic of the auditable farm level PAD standards. This criticism reflects the difference between the narrow downstream value-chain scope of recommendations lists targeted at consumers as compared to standards systems, which seek constructive engagement with the producer-base [22]. The implicit adoption of the precautionary principle, 'in defence of consumer interests' (WWF International pers. comm.) should also be made explicit, as well as its implications for the rest of the value-chain.

3. Testing the validity of the claims

3.1. Environmental performance

Claims regarding the negative environmental impacts of pangasius production exploit uncertainty over a still emerging industry, scarcely a decade old. Intensification of any form of food production implies environmental impacts [23] and there is a need for pangasius to be assessed in terms of both its current status as a newly emergent system and its future potential. The available scientific data on pangasius farming is somewhat limited as indicated by the dearth of published performance data [24], but information that exists points to the industry being relatively benign and to having intrinsic characteristics that make further rapid improvements likely. While the fish's feeding efficiency is in line with that of other major cultured species, its key advantage is an ability to utilise starch allowing production to be based on low-cost, low energy diets [25]. Such diets mean that, compared to other fish species, a larger range of local feed ingredients can be used to support pangasius production, reducing the requirement for imported high quality animal source feed ingredients such as fishmeal. Whereas most livestock can substitute in or out of fishmeal use depending on price and preference most fish cultured for the European white fish market cannot [15]; pangasius is one of the few exceptions [26]. Preliminary Life Cycle Analyses suggest that such a strategy is likely to significantly reduce overall environmental impacts compared to alternative fish species [27].

Increasing nutrient use efficiency is a cornerstone for enhancing the sustainability of all food production systems [23] and the potential for pangasius to become a net fishmeal producer has been demonstrated [28,29]. Pangasius processing by-products are thought to already support significant pig and other animal production in the Mekong Delta, but with technology development this could be greatly enhanced and supplemented by production of a range of added value by-products [30]. Recent studies of effluents from production and processing of pangasius also suggest that the contribution to overall nutrient loadings is limited at less than 1% of the total suspended solids (TSS), nitrogen and phosphorus in the Mekong Delta [31,32]. When all factors are considered, the overall environmental burden of pangasius is relatively minor compared to that of numerous other systems of food production [33]. Placed in the context of the wider 'sustainable seafood movement', claims made over pangasius may therefore hinder a species with the potential to deliver greater sustainability gains than most other globally traded fish of either farmed or wild origin.

Perhaps unsurprisingly then, major European seafood importers, processors, retailers and foodservice organisations, which

² Pangasius was listed as orange or red on the various national WWF sites. All decisions are based on a new universal methodology and common database within WWF. See for example, <http://www.goedevis.nl/Search>; http://www.wwf.ch/de/tun/tipps_fur_den_alltag/essend/fisch/fischfuhrer/?category=cat2; <http://www.wwf.de/themen/meere-kuersten/fischerei-und-fischzucht/jeder-kann-handeln/ein-kaufsratgeber-fische-meeresfruechte/pangasius/> (All accessed: 14/08/11).

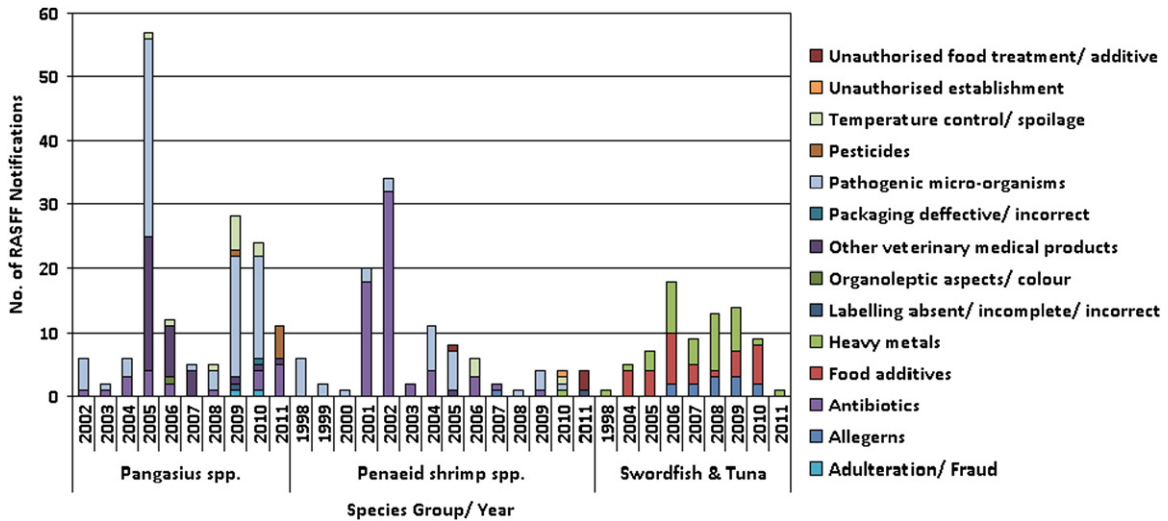


Fig. 2. EU Rapid Alert System for Food and Feeds (RASFF) food safety notifications for pangasiid catfish and other seafood groups exported from Vietnam to the EU-27 group of countries, 1998 to June 2011.

have invested in promoting their association with sustainable sources of white fish, have also publically rejected the claims made against pangasius. It seems unlikely that businesses of this nature would have backed pangasius in the face of such criticism without having first assured themselves of its full compliance with their core brand equity values.

3.2. Food safety

Attempts to portray pangasius as contaminated and unsafe to consume are also misleading. The EU hygiene rules, which protect public health, are some of the strictest in the world and imported pangasius must conform to them. The water quality of the Mekong, which remains largely un-industrialised, is clean compared to that of most European rivers [34]. Independent European laboratories have also screened pangasius for various contaminants and found levels to be extremely low. One Dutch assessment found concentrations of a range of halogenated contaminants in pangasius to be lower than those in wild fish and trout and salmon farmed in the EU, with the latter species deemed responsible for (97%) human exposure to the sum of the contaminants investigated [35]. A separate Italian study reported the quality of samples analysed to be 'good', and well within the normal range found for fish sourced in Europe [36]. Other studies confirm the safe nature of exported frozen pangasius fillets from Vietnam [e.g. [37]]. The recent discovery of pesticides in pangasius fillets is serious,³ and suggests that testing procedures within both national and EU food safety systems need review and improved communication with stakeholders.

Fig. 2 shows trends in food safety notifications associated with pangasius imports to the EU over the last decade (i.e. covering the period of the emergence of the Vietnamese pangasius export sector). Trends for two other Vietnamese seafood groups exported to the EU over a longer time period are also shown for comparison. These are penaeid shrimp spp. (*P. monodon* and *L. vannamei*), which are grouped together, as are two important capture fishery species swordfish (*Xiphias gladius*) and yellowfin tuna (*Thunnus albacares*). Pangasius recorded 56 RASFF notifications in its worst

year, 2005. This figure is particularly significant given the lower volume of imports into Europe at this time. More than half of the notifications in 2005 were associated with microbiological contamination (implicating processing as well as production methods), while a further 38% were associated with 'other veterinary products', principally malachite green. The frequency of notifications tailed-off thereafter, but peaked again during 2009 and 2010 at 24 and 28 per year, respectively. These later notifications were predominantly associated with detection of microbiological contamination by *Listeria* and *Salmonella* as a result of increased stringency in EU threshold limits. In contrast to 2005, when notifications stipulated only information sharing, most of the latter notifications resulted in border rejections, reflecting a hardening of attitudes within the EU.

Although there were no microbiological notifications recorded in 2010, banned antibiotics (nitrofurans metabolites) and pesticides (chlorpyrifos, an insecticide, and trifluralin, a herbicide) were detected, each on five occasions. The pesticide residues were linked to the use of these chemical as algacides to control water quality in pangasius ponds by the Vietnamese authorities, which resulted in their moving swiftly to ban the chemicals and recommending alternative management options to farmers (MARD Directive No. 64/2010/TT-BNNPTNT, 4 November 2010).

For Vietnamese shrimp, the highest numbers of notifications recorded for antibiotic contamination were in the years 2002 and 2003 (18–32 per year). Thereafter the rate declined significantly to less than five per year since 2007. The most recent incidents have been associated exclusively with post-harvest issues (labelling and unauthorised product treatments, particularly irradiation). The problem of heavy metal contamination evoked by Stevenson was restricted exclusively to marine capture fisheries, with the swordfish/tuna combination worst affected.

To meaningfully assess food-safety risks, notification rates must be viewed in the context of trends in import volumes and inspection frequencies and protocols. Inspection frequency is related to imported volume and therefore to some extent self-controlled. However frequency also relates to perceived risk associated with species, product type and origin. Inspection frequency can increase to 20% of all consignments in the worst instances, thereby increasing likelihood of detection in such cases. Given the difficulties in obtaining the data to control for such effects, the risk analysis presented in Fig. 3 considers only the most important of these factors i.e. the volume of imports from Vietnam to the EU. This figure shows the ratio of total annual notifications to the corresponding live weight

³ The programme Kassa presented results where three out of eight fillets were contaminated with banned substances Trifluralin and Chlorpyrifos from pesticide use. The Dutch Food and Consumer Product Safety Authority responded that while serious, the contamination posed no direct risk to public health at the concentrations identified. See <http://kassa.vara.nl/tv/afspeelpagina/fragment/pangasius-verontreinigd-nwva-gaat-vis-testen/speel/1/> (Accessed: 14/08/11; in Dutch).

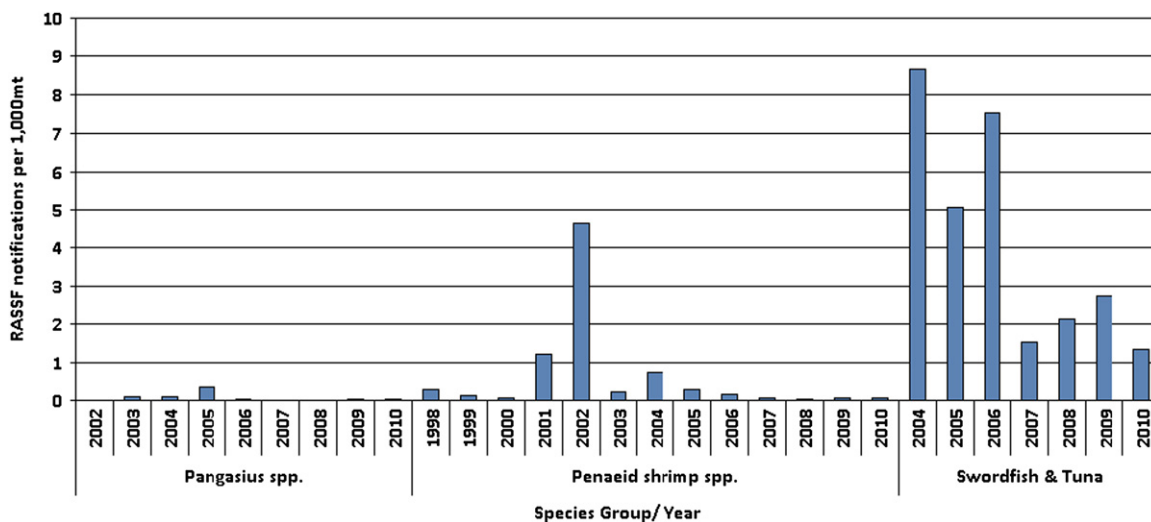


Fig. 3. RASSF notifications per 1000 Mt of pangasiid catfish and other seafood groups imported from Vietnam to the EU-27 group of countries, 1998 to June 2010. Notes: Data sources: A. EU RASSF notifications for all species groups (<http://ec.europa.eu/food/food/rapidalert>); B. EU-27 import data for pangasius spp. and penaeid shrimp spp from Vietnam (<http://www.vasep.com.vn/vasep/eCustomer.nsf/BaiMoi>); C. EU-27 import data for swordfish and tuna from Vietnam (<http://epp.eurostat.ec.europa.eu>); Import data prior to 2007 extrapolated for recent EU ascension countries; Processing yield estimations for live weight equivalent (LWE) calculations: pangasius spp.=35% (fillet skin-off), penaeid shrimp 60% (head-off, cooked), swordfish=65% (head-off, gutted) and tuna=73% (fillet skin-off).

equivalent (LWE) of product exported from Vietnam to Europe based on the same species groups and time period reported in Fig. 2.

For pangasius, the trend of decreasing notification frequency against rising imports is clearly very positive. As an example, 28 notifications in 2009 (the worst of the last five years) resulted in rejection of the same number of 20 Mt container loads, representing just 0.3% of total import volumes. Although Vietnam has become less reliant on the EU as a market for its shrimp exports, the same basic trends prevail. Despite significant problems with antibiotic residues in the first half of the decade, farmed shrimp demonstrates a similar trend in and level of improvement, with approximately one notification per 18,000 Mt of product compared to one per 25,000 Mt for pangasius by 2010. The swordfish and tuna capture group also shows a marked reduction in notifications set against increasing import volume over recent years. However with one notification per 365 Mt and 740 Mt LWE of imports in 2009 and 2010, respectively (Fig. 3), safety performance remains far behind that of the two farmed species groups. The subjects of the notifications have also remained more persistent compared to farmed species and include the serious problem of heavy metal contamination (mercury and cadmium: Fig. 2). Furthermore this problem has been associated exclusively with this group and other marine capture species, and never with pangasius as implied by Stevenson.

These observations point to a defining benefit long claimed for aquaculture over capture fisheries, namely the ability to regulate the environment and thereby progressively improve quality under managed production conditions. It is also pertinent to observe that the notification trends for both farmed shrimp and pangasius overlap with a consolidation of the farm-producer base into fewer and larger units [38], a process that has been particularly accelerated over the last few years in the case of pangasius.

3.3. Labour matters

Stevenson's claims regarding labour practices are also unsubstantiated, but have led to a wider perception of cheap and exploited Asian labour creating an unfair playing field for EU producers and processors. Whilst wage rates in Vietnamese aquaculture, as in other sectors of the economy, are much lower than those in Europe, the same can be said for virtually any imports to the EU originating in the Global South. More

specifically, neither is there evidence to suggest that labour conditions in pangasius production are less favourable than in any other comparable sector of the Vietnamese economy, nor is Stevenson's reference to ruthless multinational companies accurate. All farms and the entire processing and export industry are domestically owned and operated, with the state itself retaining substantial shares in a large number of formerly state owned joint stock seafood companies [39]. In fact, average wage rates for those working on farms and in processing plants are typically above the local norms, and the sector has created broad-based benefits for communities in the Mekong Delta (Table 1).

The rapid rise of the industry has resulted in heavy investment in processing capacity designed to satisfy the demands of international buyers and conform with contemporary international standards, including the EU's own 'code requirements' [40]. Processing plant investments have also provided significant employment opportunities, involving a range of skills levels, in related supply chains. This investment has enabled access to global value chains supplying international markets and has ensured an ability to respond to any adverse conditions by diversifying elsewhere. Vietnamese awareness of European and other key market demands provide a considerable impetus to continually monitor and improve the performance of its value chains, by rapidly incorporating requirements such as traceability and, somewhat ironically given the behaviour of WWF, compliance with evolving certification schemes.

4. 'New' food ethics and the turning tide of fish trade

This is not the first time that the credibility of Vietnamese pangasius has been contested [41]. Europe only became a major market for pangasius in the mid-2000s in the wake of similar claims made by the domestic channel catfish farming lobby in the United States (which, at the time, represented the biggest market for pangasius) in response to the competitiveness of Vietnamese product. These focussed first on environmental quality, then nomenclature and subsequently on alleged dumping. This political pressure resulted in the ruling that Vietnamese product could not be labelled catfish (a decision recently reversed as it became apparent that this did little to tarnish the fish's appeal

Table 1
Incomes of workers from different sectors in the Mekong Delta.

Item	Type of labour						
	Catfish farming	Catfish harvesting	Mud removing	Rice-farming	Aquatic processing factory	Aquafeed factory	Other human food processing factory
Gross income (\$/day)	2.5	7.7	5.5	5.0	3.8	4.5	2.7
Cost of accommodation (\$/day)	Free	Free	Free	Free	0.3	0.3	0.3
Cost of meal (\$/day)	Free	Free	1.6	1.1	1.8	1.2	1.2
Net income	2.5	7.7	3.9	3.9	1.7	3.0	1.2
Characteristics of work	Full time, water, feeding, exchange monitoring water quality	Seasonal job (part-time), net income is dependent on quantity of harvested fish, heavy work, needs excellent health	Seasonal job (part-time), net income is dependent on volume/quantity of removed mud, needs excellent health	Seasonal job (part-time)	Seasonal job (part-time), net income is dependent on quantity of final products	Full time	Full time

and actually made it subject to less stringent legal control than the American product), and the imposition of heavy financial penalties on Vietnamese pangasius imports. The outcome of these events is also somewhat ironic, in that these actions only briefly slowed the flow of Vietnamese product into the US, and did nothing to halt the long term decline of its domestic catfish industry. This experience also prompted VASEP to adopt a more market-oriented strategy, resulting in a more concerted international focus, which included the targeting of European markets. But for this impetus, the Vietnamese sector might well have continued as a more passive price-taking commodity exporter.

The lessons from this trade war reveal the range and scale of benefits that Northern countries enjoy. Although much opposition to pangasius originated from southern States where the embattled domestic catfish industry is located, many other US stakeholders also gained from the trade which emerged. These included not only value-seeking consumers and the food outlets that supply them, but US farmers producing soybean and other crops exported to Vietnam for use in pangasius feed, and many other supply chain actors. Despite the imposition of tariffs ranging from 37% to 65% to ensure Vietnamese catfish had no price advantage in the market [42], pangasius entered the list of top ten most consumed seafoods in the US in 2009 [43], and now competes successfully with a wide range of farmed and wild caught 'white fish' in various market segments.

Both naked protectionism of this variety, and actions such as WWF's red-listed reclassification of pangasius, send strong negative messages that risk undermining the substantial progress towards safe and sustainable seafood production made to date. In governance terms there is a danger that, rather than prompting further upgrading of performance, the continual reassertion of unfounded claims regarding safety and sustainability will undermine the viability of an industry, which already generates considerable public goods and produces rather limited negative externalities in both Vietnam and Europe. These potential consequences would seem to warrant a corresponding degree of caution concerning the production and reproduction of such messages by representatives of both the European public and civil society.

However, whereas MEP's are ultimately beholden to democratic process, WWF lacks ultimate accountability for the consequences of its decisions and actions. It would therefore do well to consider the quality of its internal 'governance', or risk the conclusion that downgrading pangasius was intended to pressure

the industry into adopting its own standards. The subsequent compromise between WWF and the Vietnamese government to avoid the red listing by creating a new category named 'Moving Towards Certification' appears to further contradict the spirit of transparent evidence-based dialogue, which WWF claims differentiates it from other standard setters.

Mass-mediated relations of risk definition of the type evident in the case of pangasius have potentially far reaching implications for the EU. In response to a series of food scares including mad cow disease, European food governance has been transformed into a range of hybrid state and private food safety mechanisms [44]. The RASSF system, analysed above, and the range of measures taken by importers and retailers, represents an effective front line in averting food risks, but despite the apparent robustness of such measures food risks still present rich territory for politicised responses by an ever widening pool of 'stakeholders'.

The emergence of credence qualities such as sustainability has further complicated claims and counterclaims around food and resulted in an ever widening 'battlefield of quality' [45]. It is within this globalising battlefield that contested imported products to the EU such as pangasius are disadvantaged by their geographical, as well as their social and political distance from open spaces of deliberation and debate [46]. This is not to say that EU food safety and sustainability concerns are misplaced. Instead we argue that the 'safety' and 'sustainability' of aquaculture must be understood in the context of the wider political economy of increasingly broad networks of actors involved in risk definition, especially when European systems are imposed on products from regions such as Asia.

The wider politics of risk around pangasius also have implications for Europe's position in the global seafood trade. Over the long term, the misrepresentation of the quality and safety of farmed Asian fish puts the EU in a precarious position with respect to securing adequate fish supplies. The highly income elastic character of fish [47] implies that as Asian, and other developing country, economies grow, so will demand for seafood. The rise of an Asian middle class, with an almost insatiable appetite for not only more but higher quality and value added seafood [48], means that Europe will face increasingly greater competition for a share of global fish trade. It is predicted that Asia's share of the global middle class (defined by a daily per capita purchasing power parity income of between \$10 and \$100) will rise from 28% in 2009 to 66% in 2030, while Europe's will

shrink from 36% to 14% [49]. China, by far the world's largest seafood producer (accounting for 62.3% of global aquaculture output), became a net importer of seafood in 2010, and domestic Chinese seafood prices are equal or better than those for exports [50]. European-led definitions of safety and quality risks around global aquaculture products are therefore likely to reorient trading opportunities, and ultimately the incentives for increasingly 'cosmopolitan' aquaculture producers in countries such as South-east Asia [51].

At the same time, in the EU 'fish stocks are in an unprecedentedly poor state' and are shrinking further whilst growth in European aquaculture is stagnant, with the result that one-half of fish consumed by member states is imported [1, p. 3]. If Asian growth continues as anticipated, Europe's food security (or at least its fish security) may thus be severely compromised within the foreseeable future, particularly if ever greater demands continue to be placed on producers and exporters with an expanding range of opportunities to sell elsewhere. The strength of these emergent Asian markets is also reflected in their status as the fastest growing targets for European produced salmon, and the opportunities for the associated sectors to develop partnerships and cross investment in technologies are immense. The relative rates of growth of aquaculture in Europe and Asia increasingly mean that if EU companies do not invest in Asia they risk global marginalisation, further undermining opportunities for growth in EU aquaculture—a situation which should be of considerably more concern to actors such as Stevenson.

5. Conclusion

There is an important ethical dimension to these on-going debates, which demand a frank and open response. Europeans increasingly define themselves by what and how they consume. During the economic downturn consumers have tended to become much more price sensitive, thus heightening interest in lower price fish products of an acceptable quality. Arbitrary and unsupported judgements by powerful interests, be they elected or self-appointed, about what European consumers should purchase, need to be challenged or risk damage to the sustainability of trade between Europe and its partners in Asia.

The case of pangasius also reflects the politicised nature of risk and uncertainty around food in the EU and more widely. The implication of 'mass mediated' risk assessment is that market relations between producers and consumers are increasingly influenced by wider societal interests, whether expressed through politicians or civil society organisations. This not only reflects Mansfield's observation that seafood risks are part and parcel of changing political economic conditions [8], but also highlights the consequences of 'democratised' risk governance for free, fair and sustainable seafood trade to Europe. The role of evidence-based assessment and transparent systems of communicating complex issues need to be continually honed. Ensuring accurate representations within Europe is difficult enough, but when these assessments include producers outside the EU pathways for accountability are made significantly more complex. Politicians can perhaps periodically be chastened by their electorate or through diplomatic channels, but whether and how NGOs can be held to account for any negative consequences of their actions is less clear.

Societal responses to risk and uncertainty are not new to food debates in Europe. However, aquaculture products like pangasius are particularly prone to societal risk judgements because, despite producing increased quantities of food fish, the growth and intensification of the industry will likely lead to new risks and uncertainties [8]. Where evidence remains thin and political interests align with economic uncertainty, understanding the relations of definition of risks becomes imperative in separating

perceived and material safety and quality hazards. Defining the level of hazard associated with any product when knowledge is contested and probabilistic is therefore as much of a function of whose knowledge counts as it is one of fairness and equity in global trade.

In other food sectors, cooperation for overcoming food safety risks in Europe has been achieved by the reorganisation of public and private food safety institutions [44]. However, the shift to governance of credence qualities like sustainability (which are both environmental *and* social in nature) presents a new landscape of risk and uncertainty and opens up new areas of strategic uncertainty and ambiguity. Within the wider arena of risk governance, politicians and NGOs possess opportunities to either exploit these uncertainties for strategic gain or place themselves in more constructive positions, which build pressure towards more ethical, albeit mass mediated, change.

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References

- [1] NEF. Fish dependence—2011 update: the increasing reliance of the EU on fish from elsewhere. London: New Economics Foundation; 2011.
- [2] Belton B, Haque MM, Little DC, Sinh LX. Certifying catfish in Vietnam and Bangladesh: who will make the grade and will it matter? *Food Policy* 2011;36:289–99.
- [3] Stevenson S. Food miles, greenhouse gas emissions and society issues. Paper delivered at how can aquaculture contribute positively to food security in Europe? In: Proceedings of the Conference of European Parliament, Brussels; 9 November 2010. <http://www.struanstevenson.com/parliamentary-work/debate/how_can_aquaculture_contribute_positively_to_food_security_in_europe/2010>.
- [4] Stevenson S. Scots MEP welcomes lessons learned on Vietnam aquaculture visit. <<http://qualasaexpertise.wordpress.com/2011/05/25/struan-stevenson-eating-humble-fish-pie/>>; 2011.
- [5] de Krom MPMM, Oosterveer P. Contesting risk and responsibility: European debates on food and agricultural governance of avian influenza. *Nat Cult* 2010;5:175–95.
- [6] Renn O, Klinke A, van Asselt M. Coping with complexity, uncertainty and ambiguity in risk governance: a synthesis. *AMBIO: J Hum Environ* 2011;40:231–46.
- [7] Beck U. *World at risk*. Cambridge: Polity Press; 2009.
- [8] Mansfield B. Is fish health food or poison? farmed fish and the material production of un/healthy nature* *Antipode* 2011;43:413–34.
- [9] Ponte S, Raakjær J, Campling L. Swimming upstream: market access for African fish exports in the context of WTO and EU negotiations and regulation. *Dev Policy Rev* 2007;25:113–38.
- [10] Stevenson S. Beware the Panga fish. Paper presented at the EU Parliament October Brussels Briefing, Monday; 5th October 2009, [online] <http://www.struanstevenson.com/media/monthly-bulletin/october_brussels_briefing/2009>.
- [11] Bush SR, Duijf M. Searching for (un)sustainability in pangasius aquaculture: a political economy of quality in European retail. *Geoforum* 2011;42:185–96.
- [12] Stevenson S. Scottish shoppers unwittingly buying catfish farmed in filthy Mekong River. <http://www.struanstevenson.com/media/news-release/scottish_shoppers_unwittingly_buying_catfish_farmed_in_filthy_mekong_river>; 2010 [accessed 14/11/2011].
- [13] Stevenson S. How can aquaculture contribute positively to food security in Europe? <http://www.struanstevenson.com/parliamentary-work/debate/how_can_aquaculture_contribute_positively_to_food_security_in_europe>; 2010 [accessed 14/8/2011].
- [14] Daw T, Gray T. Fisheries science and sustainability in international policy: a study of failure in the European Union's Common Fisheries Policy. *Mar Policy* 2005;29:189–97.
- [15] Naylor RL, Hardy RW, Bureau DP, Chiu A, Elliott M, Farrell AP, et al. Feeding aquaculture in an era of finite resources. *Proc Natl Acad Sci* 2009;106:15103–10.
- [16] WWF. *World Wildlife Fund. Pangasius aquaculture dialogue standards*; 2010.
- [17] PAD. *Pangasius aquaculture dialogue standards. Pangasius aquaculture dialogue*, [online] <<http://www.ascworldwide.org/index.cfm?act=tekst.item&iid=5&iids=67&lng=1>>; 2010.

- [18] CAM. The common aquaculture methodology: *Pangasianodon hypophthalmus/Pangasius bocourti*. WWF, North Sea Foundation, Marine Conservation Society, CAM Aquaculture. Final Version 1.0; July 20, 2010.
- [19] Urch M. For pangasius the squeeze is on. Seafood Source2011, [online] <<http://www.seafoodsource.com/newsarticledetail.aspx?id=9958>>; 2011 [accessed 14/08/11].
- [20] Urch M. WWFs hatchet job on pangasius. Seafood Source2011, [online] <<http://www.seafoodsource.com/newsarticledetail.aspx?id=9579>> [accessed 14/08/11].
- [21] Belton B, Little DC, Grady K. Is responsible aquaculture sustainable aquaculture? WWF and the eco-certification of tilapia Soc Nat Resour 2009;22: 840–55.
- [22] Parkes G, Young JA, Walmsley SF, Abel R, Harman J, Horvat P, et al. Behind the signs—a global review of fish sustainability information schemes. Rev Fish Sci 2010;18:344–56.
- [23] Tilman D, Cassman KG, Matson PA, Naylor R, Polasky S. Agricultural sustainability and intensive production practices. Nature 2002;418:671–7.
- [24] Tacon AC, Meitan N. Global overview on the use of fish meal and fish oil in industrially compounded aquafeeds: trends and future prospect. Aquaculture 2008;285:146–58.
- [25] Glencross B, Hien TTT, Phuong NT, Cam Tu TL. A factorial approach to defining the energy and protein requirements of tra catfish, *Pangasianodon hypophthalmus*. Aquacult Nutr 2011;17:e396–405.
- [26] Abdul Kader M, Bulbul M, Yokoyama S, Ishikawa M, Koshio S, Sakhawat Hossain M, et al. Evaluation of meat and bone meal as replacement for protein concentrate in the practical diet for Sutchi Catfish, *Pangasius hypophthalmus* (Sauvage 1878), reared under pond condition. J World Aquacult Soc 2011;42:287–96.
- [27] Bosma R, Anh P, Potting J. Life cycle assessment of intensive striped catfish farming in the Mekong Delta for screening hotspots as input to environmental policy and research agenda. Int J Life Cycle Assess 2011;6(9):903–15.
- [28] Thuy NT, Lindberg JE, Ogle B. Effects of replacing fish meal with catfish (*Pangasius hypophthalmus*) processing waste water on the performance of growing pigs. Trop Anim Health Prod 2011;43:425–30.
- [29] Thuy NT. Evaluation of catfish by-products as protein sources for pigs in the Mekong Delta of Viet Nam. Uppsala: University of Uppsala; 2010.
- [30] Jamilah B, Tan KW, Umi Hartina MR, Azizah A. Gelatins from three cultured freshwater fish skins obtained by liming process. Food Hydrocolloids 2011;25:1256–60.
- [31] Anh PT, Kroeze C, Bush SR, Mol APJ. Water pollution by pangasius production in the Mekong Delta, Vietnam: causes and options for control. Aquacult Res 2010;42:108–28.
- [32] De Silva S, Ingram B, Nguyen P, Bui T, Gooley G, Turchini G. Estimation of nitrogen and phosphorus in effluent from the striped catfish farming sector in the Mekong Delta, Vietnam. AMBIO: J Hum Environ 2010;39:504–14.
- [33] Bosma RH, Hanh CTT, Potting J. Environmental impact assessment of the pangasius sector in the Mekong Delta. Hanoi and Wageningen: Ministry of Agriculture, Nature and Food Quality, The Netherlands and Ministry of Agriculture and Rural Development, Vietnam; 2009.
- [34] Cenci RM, Martin J-M. Concentration and fate of trace metals in Mekong River Delta. Sci Total Environ 2004;332:167–82.
- [35] van Leeuwen SPJ, van Velzen MJM, Swart CP, van der Veen I, Traag WA, de Boer J. Halogenated contaminants in farmed salmon, trout, tilapia, pangasius, and shrimp. Environ Sci Technol 2009;43:4009–15.
- [36] Orban E, Nevigato T, Lena GD, Masci M, Casini I, Gambelli L, et al. New trends in the seafood market. Sutchi catfish (*Pangasius hypophthalmus*) filets from Vietnam: nutritional quality and safety aspects. Food Chem 2008;110: 383–9.
- [37] MAF Biosecurity New Zealand. Import risk analysis: Frozen, skinless and boneless fillet meat of pangasius spp. fish from Vietnam for human consumption. Wellington: MAF Biosecurity New Zealand; 2008.
- [38] Phan LT, Nguyen PT, Murray FJ, Little DC. Sustainable aquaculture development: key issues of target farmed species for export in the Mekong Delta, Vietnam. Situation appraisal EU-FP-7 funded SEAT Project Report. Stirling: University of Stirling; 2011. p. 31.
- [39] Belton B, Little DC, Sinh LX. The Social relations of catfish production in Vietnam. Geoforum 2011;42(5):567–77.
- [40] Bush SR, Belton B. Out of the factory and into the fish pond: can certification transform Vietnamese Pangasius? In: Spaargaren G, Loeber A, Oosterveer P, editors. Food in a sustainable world: transitions in the consumption, retail and production of food London: Routledge; 2011. p. 257–90.
- [41] Mansfield B. From catfish to organic fish: making distinctions about nature as cultural economic practice. Geoforum 2003;34:329–42.
- [42] Bush SR, Khiem NT, Sinh LX. Governing pangasius for sustainable rural livelihoods and environmental performance: a review. Aquacult Econ Manag 2009;13:271–93.
- [43] NFI. Top 10 Consumed Seafoods National Fisheries Institute; 2010.
- [44] Marsden T, Lee R, Flynn A, Thankappan S. The new regulation and governance of food: beyond the food crisis? London: Routledge; 2010.
- [45] Marsden TK. Theorising food quality: some issues in understanding its competitive production and regulation. In: Harvey M, McMeekin A, Warde A, editors. Qualities of food. Manchester University Press; 2004. p. 129–55.
- [46] Bush SR. Governing 'spaces of interaction' for sustainable fisheries. Tijdschr Econ Soc Geogr 2010;101:305–19.
- [47] Dey MM, Garcia YT, Praduman K, Piumsombun S, Haque MS, Li L, et al. Demand for fish in Asia: a cross-country analysis*. Australian J Agric Resour Econ 2008;52:321–38.
- [48] Tveteras R. Shifting seafood markets. When will China become a net importer? In: Paper given at the GOAL meeting, Kuala Lumpur; 17–20 October, 2010.
- [49] Kharas H. The emerging middle class in developing countries. Working Paper no. 285. Paris: OECD Development Centre; 2010.
- [50] Yun H, Chen D, Lu L, Brown G, Kaelin A, Wei L, et al. Effects of domestic market trends on Chinese trade of aquaculture species. In: Presentation given at GOAL 2010, Kuala Lumpur, Malaysia; October 17–20, 2010.
- [51] Broughton EI, Walker DG. Policies and practices for aquaculture food safety in China. Food Policy 2010;35:471–8.