EXPERIENCES IN IMPROVING FISH WELFARE IN ARTISANAL FISHERY

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The fair-fish association, officially founded in Switzerland in 2000, has always been interested in detecting and fostering ways of fishing with less impact on the welfare of the fishes, in order to:

- reduce harm to fishes caused by the fishing gear
- reduce the time of captivity in the gear
- render each fish unconscious the time it is taken off the water
- and kill each fish under anaesthesia

First experiences in Switzerland (2000-2003)

In 1999, after two years of investigation in cooperation with some Swiss professional artisanal fishermen working with gillnets, fair-fish issued a first guideline. Its core requirement was to give each fish a blow on its head, by thumping it on the boat's edge, as soon as it had been freed form the meshes. Usually, the supposedly dead fish was then put on ice.
When fair-fish decided to make its initially voluntary guideline the basis of a true certification scheme, the few fishermen who had cooperated so far left the project as they had experienced that in too many cases not being able to follow the rule, be it due to a big number of fishes caught or to stormy weather. Only one fisherman was ready to undergo the audit as he had the rare advantage of being helped by a second person on board. Three years later however he went into retirement.

Improvements in Senegal (2004-2009)

At that very time fair-fish was contacted by colleagues who carried out projects in fishing villages in the Saloum estuary, a remote region in southern Senegal. Could we open them a fair access to the European market? We took the chance as, different from their colleagues in Europe, artisanal fishermen in developing countries usually work in groups on a boat, and we knew it would be easy to get one or two additional persons on board who could concentrate on stunning and killing each fish.

To prepare the project, we critically reviewed our guideline with a veterinarian specialised in slaughter. We wanted to reduce the time of captivity, which in gillnets of Swiss fishermen could easily mount to one night in summer and two day in winter. And we wanted to make sure that each fish was really stunned and killed, which was not really sure with the method we had been accepting so far.

As a result, we tightened the measures:

- Stunning and killing must be carried out as two distinct actions. Only when stunning is proven to be effective, the fish may be killed.
- To ease this additional work for the fishermen, we developed a specific tool for stunning and killing.
- We observed the practices of Senegalese artisanal fishermen to understand the period of captivity given by the fishing methods.

fair-fish directives[1] for fish welfare in artisanal fisheries

Based on experience in cooperation with artisanal fishermen in Senegal, in the Saloum estuary as well as along the Atlantic coast, these are the directives developed:

- **Period of captivity:** Each fish must be stunned and killed within a maximum time of 30 minutes after being caught.
- **Percussive stunning:** Each fish must be stunned with a blow from the *fair-fish club* immediately after being taken out of the water. No other stunning method is permitted. Any fish caught by a hook must be stunned before being released from the hook.
- **Killing:** Each fish must be killed while stunned by gill cutting in order to sever the main artery.

The fair-fish club

The tool for stunning and killing had been designed by a Swiss student who had been an amateur angler since his youth. Once tested in Switzerland and the in Senegal, the club was produced in stainless steel by a Senegalese Catholic school during their manual training lessons. The club answers to two demands:

Left: The fair-fish club, aluminium prototype.

Left, bottom: The first lot produced in Senegal.

Top centre: Blow on the fish's head.

Top right: Cutting the gills.

[1] http://fair-fish.net/guidelines/

- Ease stunning and killing with an all-in-one instrument avoiding crips changes. One end of the club provides a heavy top for stunning, a curbed blade is integrated in the other end for killing.
- Enable a posterior controls, at the reception point and in the factory, on the correct performance of stunning and killing: The screw thread of the stunning top leaves a distinct mark on the fish's head, detectable by a simple thumbnail over, and traces on the fish of blood flown out (which would not be the case if the fish was bleeded after dying).

SGS-auditor in the fish factory in Dakar controlling a sample of incoming fish before processing.

The fishing methods approved by fair-fish

In the Senegal project, we observed the practice with various fishing methods and gears used by artisanal fishermen to figure out which of them could cope with the fair-fish directives.
In a first step, four methods have been accepted, based on the fact that duration of captivity can easily be limited to 30 minutes max.

Encircling gillnet (Félé-félé), casted out by one or two boats in a circle. From the boat that remains in the circle, the fishermen make noise so the fishes flee into the net which then is hauled in step by step.

Beach seine, usually casted in shallow water by one or two two boats to form a circle and the dragged to the beach. fair-fish prescribes the seine to be dragged to the boat in order not to harm the coastal habitat (Mangroves). By dragging, the seine is divided into parts, each of which is emptied separately.

Hand line, a much used technique on smaller boats at the cost. The line carries up to 10 hooks but is hauled as soon as one fish bites into one of them. Therefore the captivity duration is ver short. In addition, hand-lining is probably the least impacting method overall, with the cheapest gear.
(All photos: Studer)

Cast, in some cases used by few fishermen in Senegal.
Photo: Euku, Wikimedia Commons)

General evaluation of fishing methods by fair-fish

As a consequence of the latest reform of the European Common Fisheries Policy, the consumer must be informed about the fishing method/gear used for the catch[2]. The problem is that the mandatory information is worthless, as it embraces e.g. under the term "Hooks and lines" everything from handlines to 100 km long longlines. The voluntary information according the EU regulation is slightly more detailed, but does still not allow the consumer to make a true choice in order to support methods with least impact on fishes and environment.

In 2013, fair-fish Switzerland started a campaign to win over importers and retailers to inform their clients in more details. Some companies showed interest but in the end contented themselves with the EU regulation, unfortunately. The scheme we proposed (see at the right), based also on the pioneering study carried out by Fishcount[3], was a groundwork for the Fish Test which will be presented now by Janika Lutz.

EU mandat.	EU voluntary	Proposition fair-fish
Seines	**Beach seines**	*dragged to the boat*
		dragged to the beach
	Danish seines	
Trawls	**Beam trawl**	
	Bottom trawls	*conventional*
		Light rollers and escape windows
	Midwater and pelagic trawls	*conventional*
		Escape windows
Gillnest	**Set gillnets**	
	Driftnets	
	Encircling gillnets	*Captivity period max 30 min.*
		Captivity period over 30 min.
Surronding nets, lift nets	**Purse seine**	
Hooks and lines	**Handlines, pole lines**	*Withoit barbs*
		With barbs
	Troll lines	*Captivity max 10 min, no barbs*
		Captivity max 10 min, no barbs
		Captivity over 10 min
	Long lines	*Captivity max 60 min., no barbs*
		Captivity max 60 min., with barbs
		Capivity over 60 min.
Muschelbagger	**Dredges**	
Fallen und Reusen	**Pots and traps**	*conventional*
		with escape windows
	Harpoons	*on smaller species*
		on bigger species
	Dynamite	

Impact on fishes and environment:
light medium heavy very heavy

[2] Regulation (EU) 1379/2013 on the common organisation of the markets in fishery and aquaculture products

[3] http://fishcount.org.uk

Combining the welfare of fishes and fishermen in artisanal vs. industrial fisheries

Billo Heinzpeter Studer
former president of fair-fish international

"The better the fish, the higher the price."
You know by your personal market experience that there is some truth in this saying. Usually, wild fish is more expensive than farmed one of the same species and size—because most consumers believe that wild fish is of higher quality. Maybe, maybe not.
You may also know that wild fishes caught by short lines—hand line, pole and line—achieve a higher market price than the same species caught by nets or longlines. The reason is simple: fishes caught by short lines are less damaged and have eventually been less stressed.

The better the fish, the higher the price.
Is this ture also for fishes who exprienced improved welfare or at least suffered less?

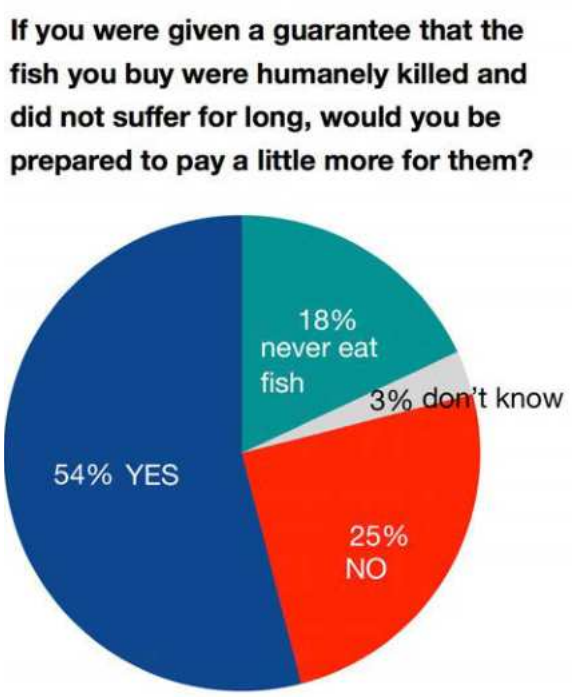
In fisheries, the welfare we can concede to fishes, or to aquatic animals in general, is
a) by preserving their habitat, and
b) by adopting protocols of humane catch and slaughter.
The second kind of action will be explored here, which does not mean that the first one would be less important—the contrary is rather true.

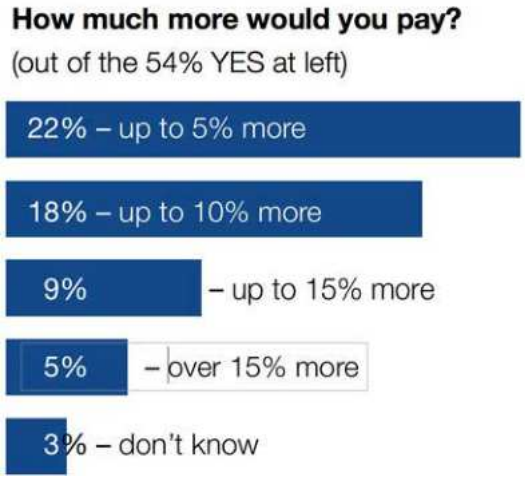
Now, what happens when fishermen take care of acting in a way to keep the suffering of the fishes as short and as low as possible? Are they rewarded by a higher price and overall fairer conditions?

The results of two experiments in the real world may indicate an answer. We will explore these experiments and discuss their potential and limits, together with the question whether the effect Is reversed as well: Do fishermen who experience fairer conditions pay more attention to the welfare of the fishes they catch? To close the thematic circle of the Summer Shoal, we will also discuss how far the findings can be adapted to fish farming.

1) Higher income for a Swiss artisanal fisherman

In the year 2000, when fair-fish Switzerland prepared for its work, we wanted to know what a) consumers knew about what happens to fishes subject to catch, b) if they bothered about their suffering, and c) if they would be ready to pay a premium for fish caught and killed in a more humane way. We investigated these quesions by a series of representative surveys, carried out by the renowned institute Link.
Asking first with an open question, people bothered first of all about freshness, taste, and quality, but hardly ever about suffering. Asking directly on this subject, however, a majority showed concern about fishes suffering. Going deeper into it, 54% percent of the persons asked said to be ready to pay more:





Basis: 125 persons interviewed on phone, selected at random in the German speaking part of Switzerland, June 2000, LINK. The small sample allows but a very rough indication of what could be expected in real life.

When fair-fish launched its then label in Switzerland, in 2000, together with the artisanal fisherman Schmid (1) at the lake of Neuchâtel, the directive was to stun and kill each fish as soon as taken out of the gill net. Schmid had been the only one ready to adopt the directives and to undergo third party audit, also due to the fact that he was helped by a second person on board, a rare advantage in European inland fisheries nowadays as the market price usually cannot cover anymore the costs of two on the boat. After having passed the audit, Schmid got recommended by fair-fish and managed to sell his catch on a local town market in Berne at 50 cents higher (3% up) than before. Unfortunately, he retired after three years having reached his 65 years, and no other fisherman wanted to take up with what they deemed to be too strict directives.

The fair-fish directives at that time, however, consisted mainly of stunning and killing each fish after being freed from the gill net by blowing its head on the border edge of the boat before storing it in ice, a method that had already been applied before, on a voluntary basis, by a minority of Swiss artisanal fishermen, and only in some cases, i.e. when the haul was


Schmid and assistant: Four hands at the net – two hands free or stunning and killing.

not big and the weather was not stormy. It has never been clear whether, by this method, the fish were duly stunned and at the same time killed. Our directives were, as a matter of fact, not so strict at all, but apparently the first ones in place with a label in fisheries.

Eight years later, in 2008, the method became a prescription by the new Swiss animal protection law, after campaigns by fair-fish and animal welfare organisations. Sadly, a year later this prescription was weakened by an internal agreement between Swiss federal authorities and artisanal fishermen's organisations: Hence, stunning and killing is not mandatory anymore in case of "too big" catch or "too rough" weather, with the result that one of these two "exceptions" is always occurring… Back to the start, then.

The fair-fish directives, originally agreed upon with some fishermen on a voluntary basis, had become mandatory only in 2000, driven by the demand of the second biggest Swiss retail chain, Coop, which had been looking for organic Swiss fish since some years in vain. When the Swiss organic organisation finally finished its directives for aquaculture, Coop dropped us instantly. But at that time, we had already developed our certification scheme and decided to market it together with our first – and only – partner, until he resigned.

Artisanal fishermen in Switzerland, early 2000:
~150 full professional
~200 semi-proessional
- of wich 5 participated on a voluntary basis
- 1 got fair-fish certified

The main problem of the professional fishermen in Switzerland consists of big catches during the summer season, especially in the holiday season when many of their clients are away. Eventually, they might be ready to adopt some rules imposed by an organisation which guarantees to market such surplus. While even the big retailers are ready to help in such cases of abundance only occasionally, how should a small label association be able to bridge such accidental gaps between supply an demand?

2) Fair trade for Senegalese artisanal fishermen

In 2004, fair-fish got introduced by a Swiss NGO and its local partner to artisanal fishermen in Senegal, in regions far away from the big fish markets, in the Saloum estuary region in the country's south and in some artisanal ports along the 700 km long coast (2). This project

found the interest of the biggest Swiss retail chain, Migros, which drove us to much more demanding directives (3).

a) Reducing fish suffering

Before starting the project, we thoroughly reviewed the process of catching, stunning and killing. We had never been happy with gill netting which causes the once entangled fish to get even more entangled while trying to escape, a useless fight that in the most extreme case can last from the set of the net at nine in the evening to its haul at six in the morning in summertime, resulting in landing many dead fish because of suffocation in the warm water, poor in oxygen; some fishermen even drop the net back in the morning after the haul, lengthening the fishes' fight to an entire day. In wintertime, when the water is cool and rich in oxygen, the fight can even last up to two days as in this season, fishermen return only every second morning to the net. It was clear that we would no longer accept such a catch method.

In addition, we wanted to get rid of the doubt whether a fish had been really rendered unconscious and subsequently killed by the simple blow on its head. We searched for a method that would stun and kill the fish in two distinct but easy to handle actions. Finally, an intern who had been fishing since his early days developed a stainless steel club, wearing at its one end a heavy crown with a screw thread to administer the blow on the fish's head, leaving an easy to control trace, whereas the other end contains a round blade for cutting the gills, i. e. to severe the fish's main artery. After tests a series of such fair-fish clubs has been produced by an artisan school class in Senegal. To train the fishermen on this method was simple, they understood quickly why and how to do it after our local team leader reminded them of the Sure in the Quran which tells them to sharpen the sword well before killing the lamb in order to reduce its pain.

The two ends of the fair-fish club, one for stunning (left) and one for killing (right)

b) Respect for the marine environment

The rest was more demanding. Whereas in Switzerland, the ecology of fisheries is already monitored by the competent authorities, and fair market conditions for the fishermen are not a crucial concern, the situation in a developing country is fully different. There was a much

cited authority in place, but it turned out that their latest assessments, of few stocks only, were obsolete as the government had not allocated any means for it since years. We therefore asked Friend of the Sea (FOS) for their advice, allowing only the catch of species approved by FOS to be offered under the fair-fish label—none of the much sought-after and thus overfished species like groupers, giltheads or barracudas.

Regarding the fishing methods, we observed various methods and practices locally in place in order to measure the duration of captivity and the feasibility of stunning and killing each fish as soon as taken out of the water. Finally, we decided to accept, for the time being, four traditional methods which manage to hold no fish captive longer than 30 minutes max:

- encircling gill net
- beach seine, solely if drawn to the boat, not to the beach (mangroves preservation)
- handline
- throw net

For other methods in place, mainly purse seine operated by big pirogues, or short longlines, we decided to postpone an eventual certification to a later project step.

Top left: A beach seine after having been divided into small compartments.

Top right: Handliners.

Left: An encircling gill net being put in a circle by one pirogue, while the second one is standing still with the other end of the net.

c) fair trade

The most demanding task, however, was to develop a fair trade scheme, a task in which we were completely alone as no fair trade scheme had ever touched fisheries (and still today, no fair trade scheme seriously does)—in shocking contrast to the fact that fish as a com-




Top left: The fish trade is in the hands of the women under fair-fish certification.
Top right: School attendance of the fishermen's kids is controlled.
Lower left: Fish boxes, ice and life jackets were brought to the fisher villages.
Lower right: Diversification: support for the building of a local medical post, creating 3 local jobs.

modity is more important for developing nations than all food and luxury food products together. Why is their still no fair fish trade? One reason might be that artisanal fisheries in developing countries cannot simply be organised in cooperatives to satisfy the ideological concepts of fair trade organisations in the north.

The success of our project consisted in

- higher and non-fluctuating prices paid to the fishermen (at least 10% higher than the annual average price paid on the local market)
- guaranteed acceptance of the pre-ordered fish weight as long as caught and killed in accordance with the label directives
- fisherwomen were paid for their traditional role of treating and commercialising the catch
- ice, boxes and a financial aid for transporting the catch to our local cold store
- health insurance for the fishermen, the fisherwomen and their kids (by their inscription, we were able to control the kids' school attendance)
- additional payment (equaling 10% of the price paid to the fishermen) to the community for economical projects outside of fishing, in order to stimulate the diversification of the local economy and by that the reduction of a) the dependence on dwindling fish and b) the pressure on fish stocks.

The fair-fish project in Senegal, 2004-2010:

- first ever certification scheme respecting fish welfare, marine environment, and fair trade
- 21 imports of ~100 kg fillets each (2006-2007)
- 7 artisanal fisher villages involved from time to time
- with ~ 150 fishermen and 40 fisherwomen

Unfortunately, despite of a feasibility study welcomed by Migros, the retailer decided to step out of the project as they were afraid of an eventual economic risk, having never carried out test sales. We then tried to cooperate with other retailers in Switzerland and in Germany, but the problem remained the same: Bridging the gap between small scale fisheries in Africa and big scale retailers in Europe—who did not want to play more than an expectant part in the project—was simply not feasible in the long run for our small association. The problem, at least in Switzerland, was not the product price, roughly 20% above a comparable conventional offer; the big problem might have been rather the narrow commercial perspective because cooperating with artisanal fishermen who operate widely dispersed along the coastline does not promise much economy of scale.

The advantage of artisanal fisheries

Speaking of the welfare of fishes and of fishermen, artisanal fisheries bring great advantages compared to their industrial opponents:

- Many artisanal fishing methods conform easier with the requirements of humane catch and slaughter. In fact, a few industrial vessels, mainly purse seiners, are equipped with

FISHERY / BENEFITS	LARGE SCALE	SMALL SCALE
Number of fishers employed	about ½ million	over 12 millions
Annual catch for human consumption	about 30 million t	same: about 30 million t
Capital cost of each job on fishing vessels	$$$$$$$$$$ 30,000 - 300,000	$ 300 - 3,000
Annual catch reduced to meals and oils	20 - 30 million t	Almost none
Annual fuel consumption	About 37 million t	About 5 million t
Catch per tonne of fuel consumed	= 1 – 2 t	= 4-8 t
Fishers employed for each $1 million invested in vessels	5 - 30	500 – 4,000
Fish and other sealife discarded at sea	8-20 million t	Very little

Graphic adapted by Jennifer Jacquet et al., 2008

conveyors and continuous electrical stunners similar to the ones in aquaculture, but this does not reduce the welfare impact of the catch. In general, industrial fisheries operate with all kinds of huge nets or extreme longlines and with no stunning in place, subjecting the fishes to long-lasting and great suffering.

- Artisanal fisheries, together with their downstream, create about 25 times the labour turnover of their industrial counterpart, which indicates that the job argument usually brought forward by the industrial lobby is ridiculous.

3) Discussion of the results

In the Swiss case—with one single exception—the perspective to obtain a better price and fairer conditions did not motivate artisanal fishermen to try for fish welfare. They did not believe that their catch would be marketable at a higher price, given the lower price of rivalling imported fish offers. They were not convinced by the outcome of our opinion polls indicating that half of Swiss consumers would accept a price premium for more humanely caught and killed fish.

In 2009, an investigation with artisanal fishermen at the Pointe de la Bretagne in France, well-known for their Sea bass, provided a similar result: Even if many of them by their practice almost fully complied with our directives developed in Senegal, they were not interested in a fair-fish certification—even free of charge—as they had a well-established chain of custody in place allowing the consumer to trace back from the tag in the fish back to the boat, and they thought that this would already cover the interest of those consumers who were ready to pay a higher price, whereas fish welfare would not be perceived as an added value.

Fish caught and killed in a less painful way may reward the fishermen if they believe the market will accept a higher price.

On the other hand, artisanal fishermen in a developing country who lack access to a well paying market are much more prone to comply with fish welfare directives, provided they are understandable and feasible. A fish welfare scheme can offer them a perspective in a situation which is almost bare of opportunities and make them potential ascenders. In contrast, artisanal fishermen in industrial countries seem to be used to their still liveable situation of objectively dwindling prospects, even when scared to become descenders.
Thus, fish caught and killed in a less painful way may reward the fishermen if they believe the market will accept a higher price.

To put the question in the reverse way: Will fishermen pay more attention to reducing the suffering of the fish when they experience an improvement of their economic situation? The Senegal experiment suggests a positive answer: During the project, the situation of the involved fishermen improved, and their motivation to pay attention to the suffering of the fish never ceased, to such an extent that after some training, the reduction of fish suffering was the least problem we had to tackle with.
This might come true also for their colleagues in industrial countries, if a market programme succeeds to prove that their economical situation improves when they deliver fish from a less painful catch.
However, we could not find any studies on the positive effect of fishermen's welfare on fish welfare and suggest further research.

Are these findings adaptable also to aquaculture?

The positive correlation between reduced fish suffering and improved quality of the fish meat has been emphasised in a review comparing various stunning methods by D. Robb and C. Kestin already in 2002). The assumption that fish welfare in general correlates positively with the product quality suggests itself.

Summary of negative impacts on welfare and quality shown by the different slaughtering methods

Method	negative impact on welfare	on quality	*loss of consciousness*
Asphyxiation	high	high	
Asphyxiation on ice	high	low	
Exsanguination *	very high	high	
Carbon dioxide narcosis	high	high	***slowly***
Evisceration *	very high	high	
Decapitation	very high	--- ***	
**Anaesthetics ** **	**very low**	**very low**	
Salt or ammonia bath	very high	high	
Anoxic water bath	high	--- ***	
Electro-immobilisation	very high	very high	
Percussive stunning	**low**	**low**	
Hydraulic shock	very low	very high	
Spiking, coring, ike jime	**low**	**low**	***rapidly***
Shooting	**low**	**low**	
Electrical stunning	**very low**	**low**	

* not stunned ** Eugenol *** insufficient evidence

Source: D H F Robb + S C Kestin (2002), Methods Used to Kill Fish: Field Observations and Literature Reviewed, Animal Welfare 2002, 11: 278

In a recent study on the aquaculture industry, FAIRR (4), a network of investors raising awareness of environmental, social, and governance risks caused by intensive livestock production identified among ten key issues fish welfare as an "emerging risk" and as "linked with the financial performance of aquaculture companies, demonstrating how companies that prioritised welfare issues experienced financial outperformance. The analyst attributes this strong performance to the mitigation of reputation risk and the fish health benefits associated with higher welfare standards."

But does this mean that an aquaculture company will achieve higher market prices by observing higher fish welfare standards? Fish welfare is still a too young concern in the market to dare a valid statement. While it is probable that the first companies offering their fish with a fish welfare certificate will gain a premium, the bulk of the companies following the pioneers will probably not. But it is safe to assume that fish farmers will have to comply with fish welfare criteria in order to defend their place on the market, whereas the ones who don't care about it will face a price decline in the long term.

In the long run, the main effect of respecting fish welfare might not be to achieve a higher price but to defend ones place on the market.

Links to background information:

(1) http://www.fair-fish.ch/de/was-wer-wo/wo/schweiz/ (in German only)
(2) http://www.fair-fish.ch/de/was-wer-wo/wo/senegal/ (in German)
English: http://www.fair-fish.ch/de/english/
(3) http://fair-fish.net/guidelines/
(3) https://www.fairr.org/article/shallow-returns-esg-issues-in-aquaculture/