

## A Horizon Scan on Aquaculture 2015: Livelihoods

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### **Introduction**

Including all stakeholders in aquaculture processes is very challenging. The exclusion of indigenous people's knowledge and women has led to disadvantaged policy-making affecting their livelihoods. Their lack of involvement has resulted in uneven distribution of benefits, a disregard for local needs, detrimental effects on human health, degradation of the environment and poor food security. Establishing cooperatives for small-scale producers would provide them with access to resources, food security, employment, skills, health improvements, and recognition by institutional bodies resulting in higher small-scale efficiencies.

Aquaculture is continuously expanding at a global scale and therefore leading to both, opportunities and threats for local communities. It generally contributes to the overall welfare of people engaged in the sector, particularly in Asia, where 89% of the world's aquaculture production takes place [1-3]. Different stakeholders, from the small-scale farmer, to a retailer, up to an employee at the supermarket and finally the consumer, benefit from the livelihoods aquaculture is providing them [4-5]. The sector offers the benefits of employment, it offers food security by providing fish and other aquatic products as a major source of protein for a balanced and nutritious diet for a healthy well-being, and ultimately secures the income of individuals or whole families [6]. Aquaculture in Asia provides the poor rural farmers and their households with the opportunity of poverty alleviation and access to domestic markets [3, 7].

Small-scale farmers and microenterprises in aquaculture show a large potential to enhance

people's livelihood, if all stakeholders are included in the aquaculture sector and if their knowledge and skills are taken into account [8-10]. Another aspect of major importance is the fact that communities are highly vulnerable and little resilient to all kind of shocks, fluctuations and (natural, personal) disasters [11-13]. Aspects of vulnerability arise from social, physical, economic and environmental factors and are often paired with low abilities of resilience. The latter is broadly defined as the ability of a system or community exposed to hazards to resist, absorb, accommodate and recover from impacts effectively and efficiently [14]. High vulnerability - in the aquaculture context - is low level assets' protection, lack of public information and awareness, limits of official recognition of risks and preparedness measures, and negligence for environmental management [15].

The challenge now is to decrease or even overcome this high vulnerability and low resilience in order to be able to include all stakeholders, in both aquaculture practices and decision-making. This policy brief will look at the involvement and inclusion of women, indigenous peoples and small-scale farmers in aquaculture. These three groups provide large potential for the aquaculture sector that is currently not being fully exploited. The private aquaculture sector and involved policy-makers are encountering challenges to manage adequate inclusion of the three groups and utilization of indigenous knowledge.

### ***Involvement and inclusion of small-scale stakeholders – The challenge ahead***

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Aquaculture and its accompanying positive socioeconomic effects on livelihoods and nutrition have large potential to spill-over to the (more marginalized) groups identified; which are currently not fully enjoying all of its benefits. In order to increase the benefits distribution, foster a spill-over effect and achieve improved well-being and livelihoods, the following challenges have to be tackled [16].

**Ignored Indigenous Knowledge and Lack of Inclusion**

Ignored indigenous knowledge goes hand in hand with the lack of inclusion of small-scale farmers. If there is no inclusion of farmers, then the other actors in the aquaculture sector automatically miss out on indigenous knowledge that in cooperation could lead to higher productivity.

Scientists and policy-makers have continuously been overlooking fisher’s indigenous knowledge and its importance, which is based on oral traditions and their experience of generations of fishing at sea [17-18]. Local small-scale aquaculture producers are aware of the seasonality of activities and the finiteness of resources based on their comprehensive year-round observations [17,19]. Nevertheless, their knowledge and traditional labor-intensive operations have been unable to keep up with the pace of globalization and economic pursuit for growth of their respective countries. Since the aquaculture sector presents the opportunity to access the global market and to enhance national economic growth and development, many developing countries prioritize the development of capital-intensive aquaculture. Governments support public regulations for low taxation, credit facilities, or coastal access in order to foster production growth and support larger aquaculture businesses. As a result, many poor coastal communities with a weak investment capacity have been marginalized or forced to leave the sector [20-21]. With the withdrawal of small-scale producers from the aquaculture sector, their indigenous and traditional knowledge as well as skills of ecological (marine) resource management are lost. Consequently, developing countries have been

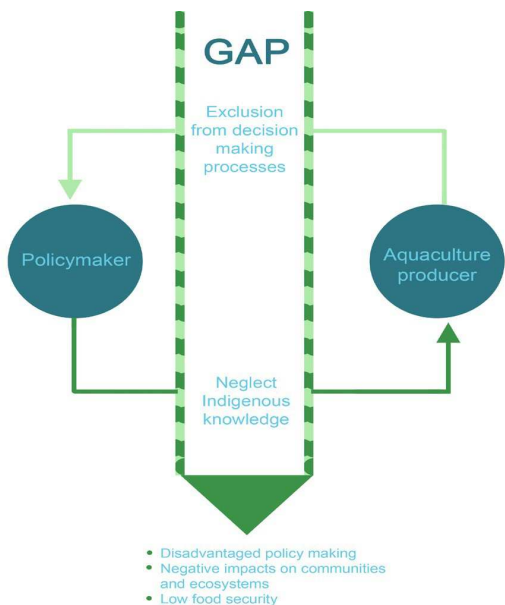


Figure 1 above shows the knowledge gap between the local (small-scale) farmer and the policy-maker.

The gap is caused by lack of communication or miscommunication by both sides. Consequently, indigenous knowledge of the farmer, as well as the involvement of the policy maker, are being weakened due to lack of and/or miscommunication and therefore, it tends to arrive at the respective other end.

	% of women in aquaculture production	% of aquaculture workers by region	% women in total
Total est.	70%	18 500 000	13 088 500
Asia	72%	18 000 000	12 960 000
Americas	25%	250 000	62 500
Africa	20%	230 000	46 000
Europe	20%	100 000	20 000

performing unsuccessful marine resource management due to lack of understanding by resource users, and the ecological settings in which they operate [22]. Apart from devastating environmental degradation that is caused by this ignorance, it additionally enhances the knowledge gap between aquaculture industry and policy-makers that is regularly underscored as the accumulated wisdom of fisher folk and often ignored even though it is a source of time-tested unrecorded knowledge [18, 23].

**Women’s Exclusion**

Increasingly important actors in aquaculture processes are women [24, 25].

Their participation in aquaculture and fisheries is essential, although the widespread problem of gender inequality often diminishes or ignores their roles. Often, much of women’s work is informal, unpaid and unreported, which is common in both developing and developed countries. Women constitute a high proportion of workers in subsistence aquaculture, artisanal and industrial processing, in fresh fish trading and retailing, environmental organizations and administrative positions [3, 10]. In the table 1 below, it can be seen that approximately 70% of the aquaculture industry consists of women. On the other hand, there are very few women in industrial fishing and in leadership positions [3].

Table 2 shows that in certain countries such as Denmark and Norway, women are able to hold directors positions. However, there is still evidence that in certain countries, mostly developing countries, women’s participation is constrained by strong cultural tabloid, societal conventions and even discriminatory laws. Women are barred from seafood harvest related jobs, such as going on-board fishing vessels. Moreover, they may be denied ownership rights, and thus be discouraged from fish farming business, without allowance to access finances and insurance services. These barriers limit their capacity to improve their knowledge and skills. Lack of inclusion of women’s role and work in seafood industry leads policy-makers to develop policies that discriminate

women, which ultimately prevents them from accessing public resources [3].

Signs of future deterioration of women’s roles include the on-going changes in globalization and its desire for cheap inputs including labor, widespread decline in marine resources, deterioration of coastal habitats and climate change which generates severe consequences on the economically vulnerable women population [3]. Women’s exclusion in the seafood industry leads policy-makers to develop policies that discriminate women, which ultimately prevents them from accessing public resources and

*Table 2: Percentage of women holding director’s position in the seafood industry in 2014*

Denmark	27%
Norway	21%
China	13%
Iceland	7%
Thailand	5%
France	5%
Japan	2%
Chile	2%

Retrieved and adjusted from [3]

actively participating in the decision-making process [3]. Ignoring fishing activities by women leads to underestimating the pressure on family livelihoods and income distributions, the marine ecosystem, and distorting scientific advice based on biased knowledge.

**The Role of Aquaculture Cooperatives**

Small-scale producers in developing countries are often not economically efficient because of the relatively high input costs outweigh the profits. Moreover, they are unable to take advantage of economies and often lack the financial resources such as credits and loans to make their farms profitable [26]. As the aquaculture industry continues to grow and change, its leaders must respond to new demands, they must create new opportunities, and they must work together towards their shared goals [27]. Establishing cooperative farms will allow farmers to share capital and reduce input costs thereby increasing production and

income. A “cooperative” is the unification of farms belonging to many smallholder farmers.

There are different types of cooperatives (see Annex II). The Wisconsin Aquaculture Association is an example of a cooperative association. Farmers producing a common product formed a cooperative to ensure widespread education about production techniques, market developments, legislative activities, and other issues that affect their industry. In addition, they promote their products and conduct market research to encourage the industry’s expansion [27-29].

On the contrary, The Noank Cooperative in Connecticut is an example of small-scale marketing cooperative that sells and distributes clams and oysters for its members. The cooperative sells to servers in order to coordinate supply among many producers to meet larger buyers’ demands for quantities and service, provide the economies of scale to break into new markets and establish high quality standards for all members to follow [30]. Depending on the service and purpose of the cooperative, it can have different benefits (see Annex II)

Lastly, there are numerous NGO’s, one of them is WorldFish, that establish cooperatives with small-scale producers in developing countries. In 2007, WorldFish started a project with aquaculture farmers with its purpose to supporting its members in technical and financial aspects to ensure sustainable and responsible shrimp farming. The project was successful in increasing both productivity and profitability of small farmers. The new more sustainable business approach fostered investments by providing technical knowledge transfer and capacity building. The approach combines business- and management skills and therewith contributes to improving community incomes, gender equality, and wealth creation for the region.

Through diversification and innovative, sustainable, renewable and climate adaptive engineered structures they try to protect local communities and its environment by providing employment, food security, partnerships with multiple stakeholders, technology platforms, and most importantly employee owned franchises [31]. This bottom-up approach effectively contributes to the empowerment of small-scale farmers, who are in charge of the management all accompanying responsibilities, while sharing their resources helps to meet the growing demand for aquaculture products.

### ***Future Prospects***

The aquaculture sector has large potential to contribute to the improvement of people’s livelihoods all over the globe. In order to positively exhaust this potential to the fullest, policy-makers would want to focus their attention on:

- Widespread inclusion of all stakeholders, in particular women, which leads to more advantageous and improved policy-making and mutual relations
- Constant inclusion and involvement of indigenous knowledge and encouragement of knowledge- and information sharing.
- Promotion of more active participation and empowerment of women in the aquaculture sector, leading to more gender equality and the recognition of the importance of women’s roles
- The active encouragement to establish resilient communities and cooperatives to decrease vulnerability and increase resilience of small-scale producers

In case of execution and application of these improvements, enhanced policy-making results in an even distribution of benefits, widespread access to resources, increased food security, higher employment and improved working and health conditions, augmented food production and economic performance –which in turn assists the overall improvement of people’s livelihood.

## References

- [1] Bostock, J., McAndrew, B., Richards, R., Jauncey, K., Telfer, T., Lorenzen, K., Little, D., Ross, L., Handisyde, N., Gatward, I., Corner, R. (2010). Aquaculture: global status and trends. *Philosophical Transactions of the Royal Society*, 365, 2897-2912. doi:10.1098/rstb.2010.01702897
- [2] FAO, (2014). Small-scale fisheries: Promoting collective action and organization for long-term benefits.(2014). In *The State of world fisheries and aquaculture: Opportunities and challenges*. (pp. 99-104). Rome: Food and Agriculture Organization of the United Nations.
- [3] Monfort, M.C. (2015). *The Role of Women in the Seafood Industry*. FAO/GLOBEFISH: Rome
- [4] Binte Islam, S., & Habib, M. (2013). Supply Chain Management in Fishing Industry: A Case Study. *International Journal of Supply Chain Management*, 40,41-40,41.
- [5] Ahmed, M., & Lorica, M. (2002). Improving developing country food security through aquaculture development— lessons from Asia. *Food Policy*, (27), 125–141-125–141.
- [6] Tveteras, S. and R., Tveteras. (2010). The Global Competition for Wild Fish Resources between Livestock and Aquaculture. *Journal of Agricultural Economics*. 61(2), 381-397.
- [7] WorldFish. (2012). Annual Report 2011/2012. Retrieved November 12, 2015 from [http://pubs.iclarm.net/resource\\_centre/WF\\_3269.pdf](http://pubs.iclarm.net/resource_centre/WF_3269.pdf)
- [8] Edwards, P. (2015). Aquaculture environment interactions: Past, present and likely future trends. *Aquaculture*, 447, 2-14
- [9] Interview Holmyard, N., 17 November 2015, Skype Call, Interviewees: Schalenkamp, D., Schmitz, L., Hil van den, K.
- [10] Meenakumari, D. (2014 eds) Report - 5th Global Symposium on Gender in Aquaculture and Fisheries (GAF5), India, 12-14 Nov 2014; Retrieved December 01, 2015 from <https://genderaquafish.files.wordpress.com/2014/10/02-b-meenakumari.pdf>
- [11] De Young, C., & Soto, D., & Hahri, T., and Brown, D. Building resilience for adaptation to climate change in the fisheries and aquaculture sector. Retrieved from [www.fao.org/3/a-i3084e/i3084e08.pdf](http://www.fao.org/3/a-i3084e/i3084e08.pdf)
- [12] Interview Alexander, K. 19 November 2015, Skype call, interviewee: Winkelhuijzen, R., Temmink, R., Stoffelen, T
- [13] Interview Kruijssen, F. 30 November 2015, Skype call, interviewee: Winkelhuijzen, R., Temmink, R
- [14] UNDISR. (2009). Terminology. Retrieved December 10, 2015, from <http://www.unisdr.org/we/inform/terminology>
- [15] UNDP. (2012). Annual Report 2011/2012. The Sustainable Future We Want. Retrieved December 17, 2015 from <http://www.undp.org/content/undp/en/home/librarypage/corporate/annual-report-2011-2012--thesustainablefuture-we-want.html>
- [16] Boto, I., Phillips, S., D'andrea, M., (2013). Fish-farming: the new driver of the blue economy. Retrieved December 17, 2015 from <https://brusselsbriefings.files.wordpress.com/2013/07/cta-reader-322.pdf>
- [17] McGoodwin, J. R. (2001). Understanding the cultures of fishing communities: A key to fisheries management and food security. Rome: FAO.
- [18] Royal, C. (2006, November 23rd - 24th). Creativity and matauranga Maori: Toward tools for innovation. Paper presented at the meeting of the Managing and developing Maori business and traditional knowledge, Rotorua.
- [19] Ruddle, K. (2008). Introduction to the collected works of R.E. Johannes, publications on marine traditional knowledge and management. SPC Traditional Marine Resource Management and Knowledge Information Bulletin, 23, 13-24
- [20] Environmental Justice Foundation. (2003). Smash and Crab. Retrieved December 05, 2015 from [http://ejfoundation.org/sites/default/files/public/smash\\_and\\_grab.pdf](http://ejfoundation.org/sites/default/files/public/smash_and_grab.pdf)
- [21] Toufique, K. A., & Gregory, R. (2008). Common waters and private lands: Distributional impacts of floodplain aquaculture in Bangladesh. *Food Policy*, 33(6), 587–594.
- [22] Krause, G., Brugere, C., Diedrich, A., Ebeling, M. W., Ferse, S.C.A., Mikkelsen, E., Perez agundez José, a., Stead, S.M., Stybel, N., Troell, M. (2015). A revolution without people? Closing the people-policy gap in aquaculture development. *Aquaculture*, 447, 44-55
- [23] Manole, B. (2014). Hybrid Forums: Constructing Better Regulatory Policy. *UW Bothell Policy Journal*. 55-65 Retrieved December 10, 2015 from <https://uwbpolicyjournal.files.wordpress.com/2014/06/hybridforums.pdf>

[24] Weerantunge, N. and Snyder, K. (2015). Gleaner, fisher, trader, processor: understanding gendered employment in the fisheries and aquaculture sector. Gender Pathways out of Poverty Rural Employment. Malaysia: WorldFishCenter.

[25] OECD (2015), Aquaculture production (indicator). doi: 10.1787/d00923d8-en (Accessed on 17 December, 2015)

[26] Small-Farm Cooperatives. (2014). Retrieved December 16, 2015, from <http://12.000.scripts.mit.edu/mission2014/about-terrascope>

[27] Wisconsin Aquaculture (2015). Wisconsin Aquaculture Association, Inc. Retrieved December 16, 2015, from <http://www.wisconsinaquaculture.com/>

[28] Motiram, S., & Vakulabharanam, V.. (2007). Corporate and Cooperative Solutions for the Agrarian Crisis in Developing Countries. Review of Radical Political Economics, 360-467.

[29] Pomeroy, R. & Getchis T.S. (undated). Financing the aquaculture operation. Aquaculture Fact Sheet, Sea Grant Connecticut, Publication Number CTSG- 03-12. 2 pp. (available at: <http://web2.uconn.edu/seagrant/publications/aquaculture/finance.pdf>)

[30] Noank Cooperative. (2015). Retrieved December 16, 2015, from <http://noankcooperative.org/>

[31] Pacific Aquaculture Cooperatives International. (2015). Project Gallery. <http://www.pacinternational.org/gallery.html>