Sustainable Fisheries and Aquaculture

The Sustainable Fisheries and Aquaculture focus area is new as of the 2014-2017 strategic plan. Sustainable Seafood has been a focus in the past,[1] but the inclusion of aquaculture is new.[2] This focus area is organized into two goals:

1. A safe, secure and sustainable supply of seafood to meet public demand.
2. Informed consumers who understand the health benefits of seafood consumption and how to evaluate the safety and sustainability of the seafood they buy.

Strengths

Sea Grant supports sustainable fisheries and aquaculture by conducting outreach, education, and the development of curricula and other educational resources. As a trusted broker, Sea Grant fulfills a unique role in communities, coordinating activities between universities, non-governmental organizations, local communities, and government. Additionally, Sea Grant's understanding of local ecology and local market conditions allows funding to be directed to where it is most useful.

The transfer of aquaculture technologies supports the first goal by addressing the demand for a sustainable supply of seafood. There are many examples of Sea Grant's successes in this area. One example is Connecticut Sea Grant's development of a technical manual and training videos for seaweed cultivation which are now being used by people in Chile as well as other locations.[3] Another example is the development by California Sea Grant of a larger hybrid Pacific oyster that offers a higher yield. This new oyster has already been used on a commercial basis, and could mean an increase of several million dollars each year for the West Coast oyster industry.[4]

The first goal is also supported by Sea Grant's efforts to keep seafood safe. One example of this is the Hazard Analysis Critical Control Point (HACCP) training conducted at several Sea Grant offices. Additionally, Georgia Sea Grant has recently conducted training on how to prepare crabs in a safe manner (by removing the hepatopancreas). This training was conducted with high school students as well as cooperative extension agents.[5]

Sea Grant also uses its outreach capabilities to develop and spread technologies designed to improve the sustainability of wild-caught fisheries. For example, Georgia Sea Grant helped promote the adoption of Turtle Exclusion Devices in state shrimp fisheries by including fishermen in the research process.[6] The Louisiana Sea Grant has helped institutionalize sustainability in the crab fishery by holding a series of workshops with crab industry representatives that helped them better understand new regulations and encourage fishermen's participation in sustainable fishing practices.[7]

[1] National Sea Grant College Program Strategic Plan 2009-2013
[2] National Sea Grant College Program Strategic Plan 2014-2017
[3] Connecticut Sea Grant SSSS 2010-2014 Program Summary - 2015 PRP
[4] California Sea Grant SSSS Program Focus Area Report - 2015 PRP
[5] Georgia Sea Grant - SSSS Focus Area Report - 2015 PRP
[6] Marine Advisory Services Sea Grant Proposal 2014-2018 – PIER database – 2014 Impacts
[7] Louisiana Sea Grant – Crab Industry Workshops – PIER database – 2014 Impacts

Many Sea Grant offices have developed partnerships and outreach events to support the second goal of informed consumers. For example, the Texas Sea Grant started a monthly cooking program to teach consumers about the health benefits of seafood, in addition to how to safely handle and prepare different types of seafood.[8] The New Hampshire Sea Grant worked with partners to create Community Supported Fisheries, a project which involves innovative marketing and delivery techniques that benefit fishermen economically while also providing fresh, local seafood to consumers.[9]

Weaknesses

Although Sea Grant's place-based, local approach allows it to network well at a smaller scale, it can also make it more challenging to share best practices and lessons learned between local offices. Although some of the work Sea Grant does is necessarily very local and cannot be easily transferred, there is still much room for collaboration between offices.

An ongoing issue in aquaculture development is the public perception or social license relating to aquaculture in waterfront communities. Marine aquaculture in the United States faces challenges associated with it being (mostly) unproven. It is also still a small industry and, because it uses public waters, it faces strong social opposition.[10] Sea Grant is attempting to address this concern: Georgia Sea Grant has developed a demonstration clam farm to help the public become more familiar with what aquaculture might look like in their immediate area.[11] In addition, New Jersey Sea Grant is raising awareness of the importance of oyster habitat by involving K-8 students in the construction of shell bags intended to promote oyster recruitment.[12] More work needs to be done in this area to understand the complex socio-ecological relationships behind the public perception of aquaculture. The transfer of the knowledge of aquaculture to future generations will also be more effectively addressed if greater focus is placed on this type of project.

In addition, the human dimensions of aquaculture are not well understood. Aquaculture has the opportunity to provide income and employment, but also has the potential to disrupt traditional socio-ecological relationships. In Alaska, disruptions to traditional fishing livelihoods have complex ties to declining mental, physical, and social health in fishing communities.[13] Better understanding the economic, social, and environmental effects of aquaculture could lead to the easier adoption of appropriate aquaculture development in the future.

Opportunities

The work Sea Grant has been doing with communities to market sustainable fisheries has created demand for fresh, local seafood as well as the opening of new markets for aquaculture and wild-caught fisheries. However, more opportunities exist to work with local communities in order to meet public demand safely and sustainably. Emergence of new seafood markets is due in part to better public understanding of the health benefits derived from seafood and efforts by Sea Grant and partner organizations to create new markets such as Community Supported Fisheries. However, domestic

[8] Texas Sea Grant – Sea Grant Extension Program – 2014 Accomplishment
[9] New Hampshire Sea Grant – PIER database – 2014 Impacts
[10] G. Knapp, M. Rubino. 2016. The Political Economics of Marine Aquaculture in the United States. Reviews in Fisheries Science and Aquaculture 24 (3): 213-229.
[11] Georgia Sea Grant - SSSS Focus Area Report - 2015 PRP
[12] New Jersey Sea Grant Consortium: Focus Area Summary Report: SSSS - 2015 PRP
[13] Katherine Reedy-Maschner. *Aleut Identities: Tradition and Modernity in an Indigenous Fishery.* McGill-Queen's University Press. 2010.

demand for seafood has decreased since the recession of 2007 – 2009, and the perception of fish as a luxury protein likely contributed to this decline.[14] Sea Grant can continue to adopt best practices from current marketing and outreach programs and expand these to new areas and markets.

Public perception with regard to the precarious state of the world's fisheries has led to a growing demand for sustainably caught or cultured seafood in United States markets. An example of Sea Grant's work in this area is Michigan Sea Grant's publications concerning ecosystem health, locally sourced fish, and the benefits of fish consumption.[15] Additionally, the Mississippi/Alabama Sea Grant Consortium conducted a survey which found that Gulf residents would be willing to pay a premium price for branded Gulf oysters. This survey led to the Gulf Oyster Industry Council receiving external funding in order to market branded Gulf oysters.[16] There is room for Sea Grant to continue its role as a trusted broker with both fishermen and consumers in order to implement best practices for maintaining sustainable fisheries as well as marketing development.

At the same time, the United States has a high capacity to develop as well as enforce sustainable fishing practices.[17] [18] Sea Grant has the opportunity to work with government, non-governmental organizations, industry, academia, and others in order to implement best practices for sustainable fisheries. Leveraged with Sea Grant's capacity for assisting with market development, there is a lot of room for Sea Grant to continue and improve its role as a trusted broker with fishermen and consumers.

Threats

Several threats exist in this focus area: among them are climate change, our increasing seafood trade deficit, and illegal, unreported and unregulated (IUU) fishing and the difficulties associated with tracking it. There are examples of Sea Grant's work in some of these areas, but there is room for growth.

The United States seafood trade deficit has been increasing each year, and now stands at roughly 14 billion dollars. Sea Grant is well positioned to help close this deficit, both by promoting aquaculture and by supporting sustainable fisheries. One example of Sea Grant's work in this area is Ohio Sea Grant's assistance with the development of a new strain of faster-growing yellow perch. In 2010, sales of aquacultured seafood in Ohio tripled from $1.8 million to $6 million, in large part due to sales of this yellow perch.[19] Another example is California Sea Grant's assistance with the opening of a sustainable seafood market and increasing the sales of local seafood.[20]

[14] Catherine Plume. "An Estimation of Compliance of the Fisheries of the USA with Article 7 (Fisheries Management) of the UN Code of Conduct for Responsible Fishing" Available at http://wwf.panda.org/wwf_news/?217632/Seafood-consumption-trends-in-the-US-and-the-Coral-Triangle-connection.

[15] Michigan Sea Grant SSSS Focus Area Summary Report: 2015 PRP

[16] Mississippi/Alabama Sea Grant Consortium SSSS Focus Area Summary Report - 2015 PRP

[17] U.S. Fisheries Management Clears High Bar for Sustainability Based on New Assessment. January 28, 2016. Available at http://www.nmfs.noaa.gov/sfa/publications/feature_stories/2016/fisheries_assessment.html.

[18] M. Vasconcellos, D. Kalikoski, and T. Pitcher "An Estimation of Compliance of the Fisheries of the USA with Article 7 (Fisheries Management) of the UN Code of Conduct for Responsible Fishing" Available at http://www.aquariumofpacific.org/images/seafoodfuture/USA_CCRF.pdf.

[19] 2010-2013 Ohio Sea Grant College Program PRP Report: SSSS

[20] California Sea Grant SSSS Program Focus Area Report - 2015 PRP

Currently, many aquaculture businesses move to other countries due to regulatory constraints as well as lower costs in other places.[21] As a result of stakeholders' concerns, President Obama listed the improvement of permitting efficiency for shellfish farming as a priority in June 2014,[22] and the Administration's National Ocean Policy Implementation Plan includes multiple directives concerning the improvement of permitting efficiency for aquaculture.[23]

The threat of new emerging diseases in the marine environment as the result of climate change is also an ongoing concern. There are examples of Sea Grant's work in this area, and more needs to be done to address these emerging concerns. After Seaside Organism (*Haplosporidium costale*) was discovered for the first time in Rhode Island waters, Rhode Island Sea Grant sponsored research to determine its prevalence as well as to examine its potential as a threat to the shellfish aquaculture industry.[24] Other examples of Sea Grant's work in this area include the development by Texas Sea Grant researchers of new tools and strategies for the prediction of harmful algal blooms to allow for early warning[25] and Washington Sea Grant's work to understand *Heterosigma*'s life cycle.[26]

The continued problem of IUU fishing, along with other health and labor concerns regarding commercial fisheries and aquaculture, presents a potential threat to Sea Grant's efforts to promote sustainable fisheries. The inherent difficulty in tracking whether seafood is sustainably caught or grown can decrease consumer confidence in seafood products, leading to a decrease in demand. For example, calls to boycott shrimp from Thailand due to human rights abuses in Thailand's shrimp industry could have an effect on domestically produced, sustainable shrimp from the United States.[27] IUU fishing, bioaccumulation of toxins, and reports of human rights abuses in fishing industries can all cause informed, conscientious consumers to avoid seafood products.

Analysis and Conclusions

Upon review of the Sea Grant's strengths, weaknesses, opportunities, and threats in the focus area of Sustainable Fisheries and Aquaculture, it is helpful to look at where (internal) strengths and weaknesses align with (external) opportunities and threats. For example, where Sea Grant's strengths and opportunities align, it seems appropriate for Sea Grant to continue in these directions. Sea Grant's role as a trusted broker could be leveraged to continue to open up new markets, transfer aquaculture technologies, and keep seafood safe.

Where weaknesses and threats align, it may make sense for Sea Grant to steer clear of these directions. For instance, where coordination between regions in order to manage harmful algal blooms proves to

[21] G. Knapp, M. Rubino. 2016. The Political Economics of Marine Aquaculture in the United States. Reviews in Fisheries Science and Aquaculture 24 (3): 213-229.
[22] The White House. Fact sheet: Leading at home and internationally to protect our ocean and coasts. Press Release, June 17. Available from http://www.whitehouse.gov/the-press-office/2014/06/17/fact-sheet-leading-home-and-internationally-protect-our-ocean-and-coasts (2014).
[23] National Ocean Council. *National Ocean Policy Implementation Plan*. Available at http://www.whitehouse.gov/administration/eop/oceans/implementationplan (2013).
[24] PRP Narrative: SSSS: Rhode Island Sea Grant College Program - 2015
[25] Texas Sea Grant 2015 PRP Report
[26] Washington Sea Grant 2015 Performance Review: SSSS
[27] Associated Press. "Report of slave labor in shrimp harvest spurs calls for boycott in U.S. stores, restaurants." Chicago Tribune, December 15, 2015. Available at http://www.chicagotribune.com/business/ct-slave-labor-shrimp-calls-for-boycott-20151215-story.html.

be a challenge, perhaps Sea Grant should consider approaching this problem from a more local standpoint.

In the areas where strengths and threats align, Sea Grant will need to determine how best to mitigate the threats while capitalizing on its strengths. As an example, where aquaculture technology transfer can make an impact in closing the seafood trade deficit, opportunity exists for Sea Grant to make a significant impact.

Similarly, where weaknesses align with opportunities, additional work may need to be done in an effort to strengthen those weaknesses. Sea Grant could leverage the increasing demand for sustainably caught or cultured seafood in order to improve public perception of aquaculture.