

Bren 2011-2012 Group Project: Sustainability Trajectories to reform the coral reef wildlife trade

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Proposed Project - Problem Statement

The trade of live coral reef wildlife supports a multi-million dollar aquarium industry but also threatens the health of vulnerable coral reef species and ecosystems due to a lack of regulation¹. To supply this trade, fishermen often overexploit fish populations and rely on fishing practices, such as using cyanide, that harm coral reef organisms and habitats. In addition, 90% of fishes collected from reefs die before reaching their final destination—aquarium tanks—further perpetuating overharvesting to meet demand². Despite the negative impacts of this trade on reefs worldwide, the United States accounts for the vast majority (over 60%) of the aquarium fish market. The U.S. lacks import regulations or standards for aquarium fish, which typically originate from developing countries, such as Indonesia and the Philippines, where these export products provide local communities with a major source of income³. If managed properly, marine aquariums have the potential to be an environmentally-friendly, educational, and profitable hobby while the sustainable harvest and/or cultivation of reef fish to supply this industry could provide communities with a long-term source of income.

Background Information

Previous attempts to reform the aquarium trade predominantly focused on education and training for new methods of collection (e.g. nets instead of cyanide); however, these efforts have been ongoing for over a decade, cost millions of dollars, and yet have had little effect reducing negative impacts on reefs or reforming trade practices.⁴ These efforts have been largely unsuccessful due to the constant demand for fishes—whether sustainable or not—and the low prices per fish that suppliers and traders pay to fishermen. Low prices require fishermen to collect more fishes to make a profit and favor the use of inexpensive but environmentally damaging collection practices like cyanide fishing. In addition, these efforts failed to address the staggeringly high mortality rates that occur during and immediately following transport, which also encourage higher harvesting rates.⁵ For example, a survey of retailers showed that 60% and 35% of fishes died within 3 days of their arrival to stores to the U.S. East and West coasts, respectively⁶. High post-harvest mortality due to poor transportation and husbandry practices highlight some of the trade's inefficiencies, while also presenting important opportunities for improving industry sustainability. Previous work (Amos & Claussen 2009) identified the supply-chain as an overlooked but critical component of the industry in need of reform, with implications for supply to U.S. markets.⁷

Other mechanisms, such as a voluntary sustainability certification by the Marine Aquarium Council, have been developed to provide incentives for sustainable practices by leveraging market power.⁸ Despite such efforts, large-scale efforts to buy and sell sustainable fishes have not been adopted -- perhaps due to a lack of financial incentives, consumer awareness, or information on sustainable yet cost-effective alternative practices. Regardless, certification standards are loosely defined and quantitative assessments are still needed to identify market demand, best practices, and the consequences of improving practices for prices.

More sustainable practices are possible and can be coupled with emerging technologies to reform the trade into a more ecologically and socially responsible industry. Improving the sustainability of both the supply-chain and demand-side of the aquarium fish industry will require quantitative assessments of the costs and benefits of potential reforms and alternative practices, with particular attention to effects on demand in and supply to the U.S. Few assessments address how prices, profit, and demand respond to new technologies or increased supply of certified fishes via education or mandate. This lack of assessments has delayed the adoption of better practices, perpetuated the perception that all sustainable practices are less profitable, and weakened the credibility of certification programs. **This project proposes to fill this gap by evaluating the cost effectiveness, market impacts, and ecological benefits of adopting sustainability measures, such as standards for certification or investments in existing and emerging technologies** at several levels of the supply-chain including traders, exporters, suppliers, and retail businesses.

Project Objectives

This project will shed light on sustainable trajectories for the global aquarium trade and the market-level effects of these possible industry changes by addressing the following questions via literature reviews, analysis of existing empirical datasets, costs-benefits analysis, and surveys.

I. Identify sustainable practices to inform certification efforts. What are the current Marine Aquarium Council (MAC) standards for certification? What are their limitations and how can they be improved, including through the adoption of innovative technologies that reform the supply-chain and/or husbandry of fishes during transport?

II. Determine the net costs and benefits of reforming practices and standards on imports.

- 1) What are the costs of switching to more sustainable strategies (e.g. costs of new technologies for culturing or shipping) and improving transport practices in terms of capital and effort? How will these costs be distributed?
- 2) What are the potential benefits of investing in technologies, such as aquapods for cultivating aquarium species, that enhance supply through sustainable sources or improve post-harvest survivorship of aquarium fishes?

III. Assess the response of domestic markets. Through data collection and surveys of consumers and suppliers of aquarium fish, the group will conduct a market analysis of **1)** awareness of sustainability issues; **2)** willingness to pay (a price premium per fish) for sustainable products; and **3)** forecast changes in demand and prices with changes in supply due to sustainability measures that increase survivorship (e.g. improvements in transportation and husbandry through technology and education or a reform of import requirements).

This component of the project will help determine **1)** the prices at which investing in new technologies, capital, or fish culturing techniques becomes both viable and profitable; **2)** how the demand and price per fish will change with adjustments to the supply of sustainably and unsustainably collected fish.

Approach

The group will address part I this Spring by conducting a literature review and interviews with NGOs, groups, and communities involved in the aquarium trade and existing initiatives to reform practices (through contacts at the coalition; see Stakeholders). To answer the questions in part II, data collection and analyses will begin this Spring and continue during the Summer and Fall 2011, including researching the market value of capital (e.g. technologies), conducting cost-benefit analyses, and developing bioeconomic models. The third component will be achieved using contingent valuation methods through surveys of suppliers and consumers during the Summer and Fall 2011 by 1-2 interns.

Project Significance

The aquarium trade's cumulative impacts have strong negative effects on coral reef ecosystems from direct harvesting and destructive fishing practices, which compromise a reef's resilience to other anthropogenic impacts; however, the United States represents the largest portion of the market for aquarium products and therefore can influence change in this industry through regulation on improved standards on imports, or by changing the demand (e.g. increasing the demand for sustainable products). Therefore, this project will provide much needed research to inform change for both suppliers and consumers in an industry that is currently unsustainable and damaging to reef ecosystems. Sustainable practices and new technology developed to mitigate the effects of harvesting ornamental fish can also be applied to other marine ecosystems around the world. The project also provides MESM students with experience working on both domestic policy and international conservation problems.

Olazul and emerging technologies

Olazul is a non-profit NGO that aims to develop sustainable alternative livelihoods for communities that are dependent on unsustainable and illegal fishing. To achieve their objectives, Olazul fosters partnerships with local NGOs and community leaders to test the sustainability and viability of new technologies and their potential to be integrated into local communities to meet their socioeconomic needs. Olazul is currently exploring the feasibility of a new offshore aquaculture technology known as aquapods, which show tremendous promise for sustainability. Aquapods are spheroid aquaculture containment units, which are stocked with a commercially viable species and

suspended in the water column. In partnership with Rising Tides, a coalition focused on aquaculture and ornamental species, Olazul seeks to investigate the feasibility of using this technology to produce ornamental species for the marine aquarium trade.

This project will assess the value of developing new technologies, including aquapods, that can reduce pressure on wild populations of marine aquarium fishes while providing an alternative livelihood for communities engaged in damaging collection practices. Olazul is exploring the potential for pilot projects in Indonesia (Raja Ampat, Papua and Bali) to test the potential for aquapods and other technologies (such as nets) to be used on coral reefs to either cultivate ornamental fish directly for the trade in addition to help fishermen transition away from unsustainable collection practices.

Stakeholders

-Fish traders -Communities involved in unsustainable or illegal fishing
-Marine Aquarium Council -US Consumers (Hobbyists)
-Fish transporters - Wildlife Industry
-The US coalition on the aquarium trade (partnership of WWF, EDF, Defenders of Wildlife, and the Humane Society)

Partners and Available Data

In addition to the client, Olazul, representatives from WWF, Defenders of Wildlife, EDF, and the Humane Society who are working to reform the aquarium trade have agreed to support the group through data and information sharing. If the group chooses, the lead coral reef scientist at Defenders of Wildlife and of the coalition on the aquarium trade, has agreed to be an external advisor to the project. The group's findings can be directly communicated to these partners to maximize the impact of their analyses.

Deliverables

1) Final report for Olazul and the Coalition on the aquarium trade that provides an assessment of the cost effectiveness and conservation/socioeconomic benefits of implementing "improved practices" for the aquarium trade. The report will include a market assessment of available technologies and recommendations for best practices based on the approaches reviewed for the project. This project represents an important step for Olazul, influencing their priorities for future projects related to culturing aquarium fishes.

2) 2- to 6-page education guide for participants in the trade (e.g. NGOs, communities, and businesses interested in reforming practices) about management practices identified by the project to be the most cost effective and sustainable. This deliverable can be conducted in partnership with the Bren communications office, to provide students with experience communicating science and research results to broader audiences.

Client and Client Commitment

Olazul (Contact: Beau Perry, Executive Director; Email: beau@olazul.org, Phone: 650.714.5540)

Olazul is committed to providing data and other information required for completion of this project without stipulation for a non-disclosure agreement. Olazul also commits to up to 2 student summer internships, subject to agreement on the scope of work.

Anticipated Financial Needs and Sources of Support

Please see attached letter of support from Beau Perry, Executive Director of Olazul, committing up to \$15,000 towards the project. These funds will support: 1) travel for site visits, data collection and compilation, interviews, and meetings with stakeholders, 2) 1-2 paid summer internships, and 3) minor supplies.

In addition, representatives from the coalition of aquarium trade (Dr. Dan Thornhill, lead scientist, and Cara Cooper, NOAA) have offered their support and guidance for the project and to provide direct communication with the campaign for sources of data and input.

Internship Opportunities

There will be 1-2 paid summer internships associated with this project. The interns will have the opportunity to spend some of the summer in Mexico/Indonesia working with Olazul and their partners

Literature Cited

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- ⁷ Amos, A.M. and J.D. Claussen. (2009) Certification as a Conservation Tool in the Marine Aquarium Trade: Challenges to Effectiveness. *Turnstone Consulting and Starling Resources Report*.
- ⁸ Marine Aquarium Council (MAC). (2007). Transforming MAC to transform the trade. <http://www.aquariumcouncil.org/pdf/MAC%20Final%20Packard%20OE%20Report%202007-30932.pdf>.