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The Political Economics of United States Marine Aquaculture

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Abstract：Government leasing and regulatory policies are critically important for the development of marine aquaculture. In much of the United States, local, state or national policies constrain the development of marine aquaculture to a scale far below its economic potential. Two extreme examples are the State of Alaska's ban on all finfish farming, and the absence of an enabling regulatory framework for aquaculture in offshore federal waters. This paper suggests five broad reasons for which U.S. polices have been unfavorable towards marine aquaculture: (1) Marine aquaculture is new and small; (2) Fish and marine waters are traditionally public resources; (3) Many Americans perceive potential negative effects of marine aquaculture without offsetting positive effects; (4) NGOs have systematically and effective opposed marine aquaculture; and (5) The governance system for leasing and regulation is structurally biased against U.S. marine aquaculture. The paper suggests four broad strategies for addressing these political challenges: (1) Fix real problems; (2) Demonstrate benefits; (3) Argue effectively; and (4) Reform governance.

Key Words：Aquaculture, regulation, policies

Introduction

The United States has many potential economic advantages for marine aquaculture. These include a very long coastline, clean water, skilled labor, high levels of technology, excellent infrastructure, a stable legal and economic system, and a large and growing market for seafood. These types of advantages that have made the United States a very successful meat producer.

However, United States marine aquaculture production is small and not growing. Why? A critical reason is unfavorable government leasing and regulatory policies. Fish farmers will not invest in marine aquaculture if they can't get leases, or if regulations make aquaculture too costly, or if leasing and regulatory processes take too long, cost too much or are too uncertain and risky (Figures 1 and 2).

Given the importance of government regulatory and leasing policies, United States marine aquaculture supporters – those who believe that U.S. marine aquaculture can and should grow and that Americans would benefit from it – need to think carefully and clearly about why United States policies are unfavorable toward marine aquaculture, and what they can do to change those policies. This means that they need to think about the political economics of U.S. marine aquaculture: what influences policies, and how policies influence and are influenced by the economics of aquaculture. Marine aquaculture poses significant technical challenges, such as how to design cages, rear juveniles, and increase feed conversion efficiencies. It poses significant economic challenges, such as how to market production effectively and reduce costs. Not surprisingly, aquaculture specialists tend to be trained to address these kinds of challenges and to focus on these kinds of challenges. However, U.S. marine aquaculture supporters need to recognize

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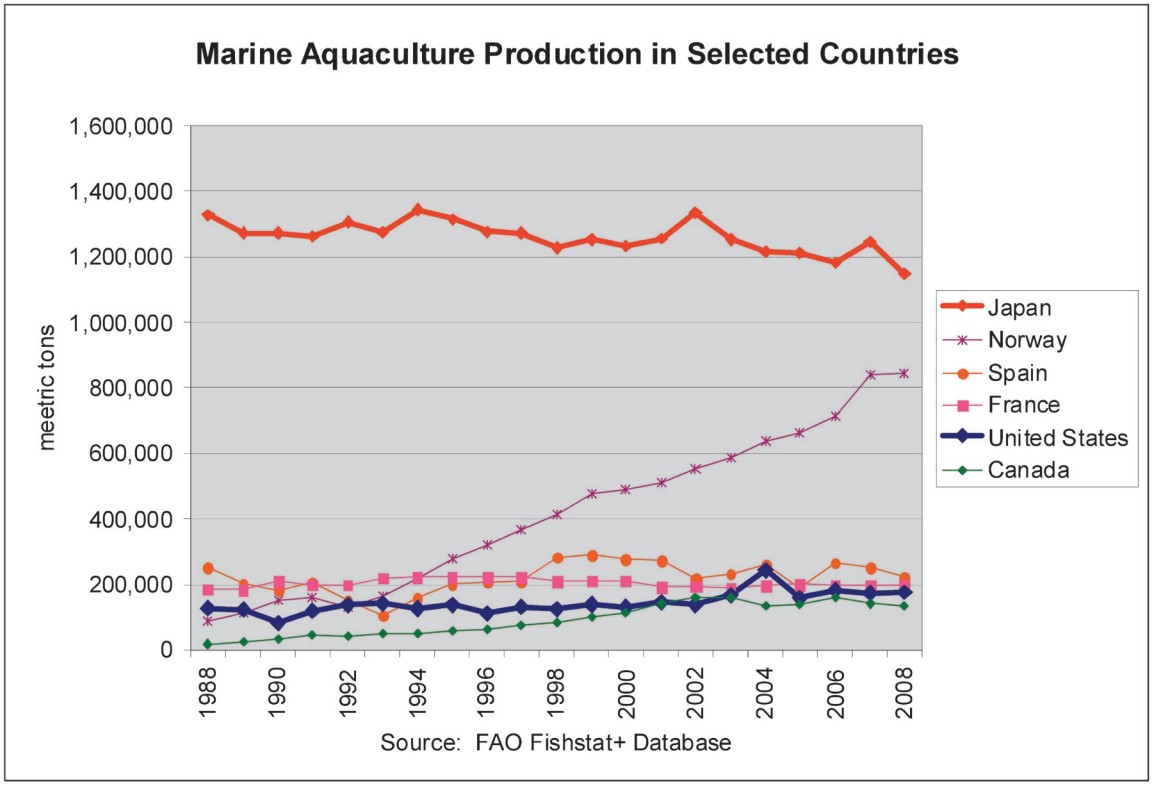

Fig. 1. United States marine aquaculture production is much lower than in Japan or Norway.

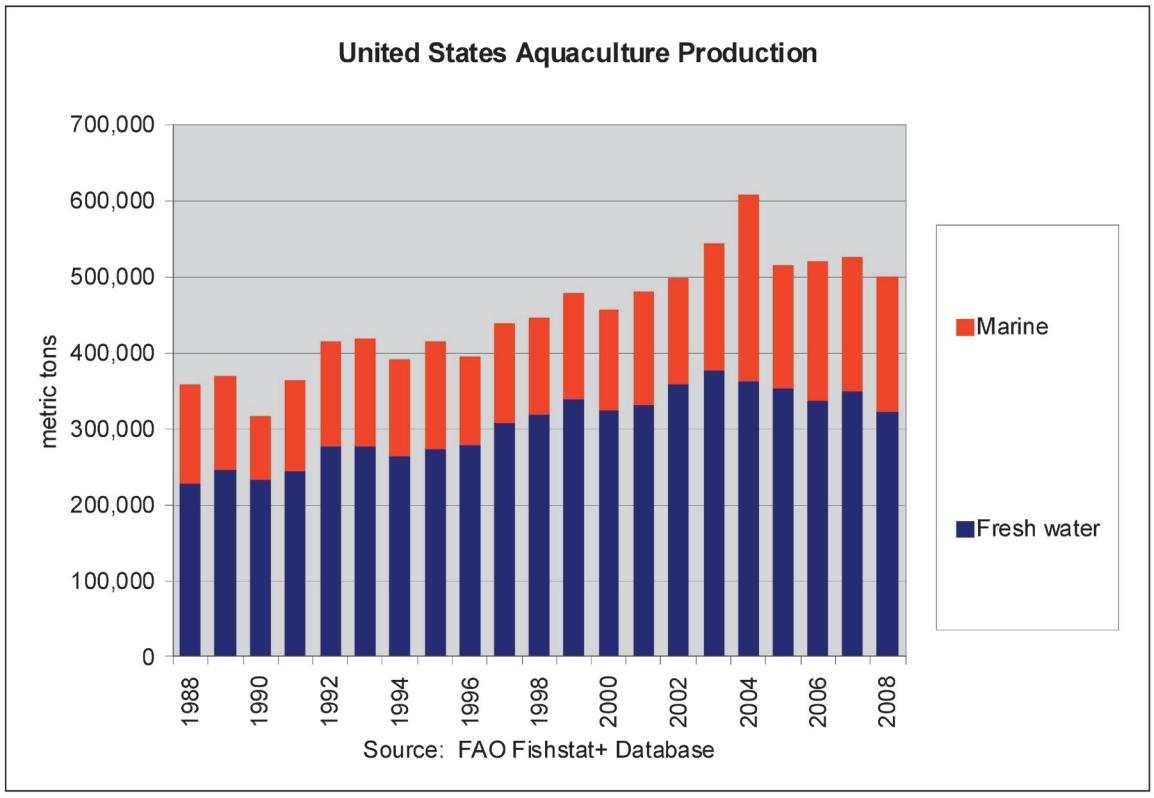

Fig. 2. Most United States aquaculture production is in freshwater.

Table 1. Selected Government Policies Affecting Marine Aquaculture

Types of policies	Selected Key Issues
Leasing policies	Is there a process by which farmers may lease sites? How predictable is the process? How long does it take? How legally secure are sites? How flexible are permitted uses of sites? Can sites be transferred? What do sites cost?
Regulatory policies	What regulations does government impose on farmers? How costly are the regulations? What is the process for developing regulations? How stable and predictable are the regulations? What are the objectives of the regulations? How efficient are the regulations: could the same objectives be achieved at lower cost?
Other policies	How is aquaculture taxed? What kinds of subsidies are available for the aquaculture industry? To what extent and how does government support research, education and marketing? What are trade policies towards farmed fish? What kinds of infrastructure (roads, ports, etc.) does government provide for aquaculture?

that the political challenges faced by U.S. marine aquaculture are as important as the technical and economic challenges. It will require concerted effort to understand and overcome these political challenges in order to achieve leasing and regulatory policies that will enable and encourage responsible development of U.S. marine aquaculture.

Government Policies Affecting Marine Aquaculture

A wide variety of government policies may affect marine aquaculture (Table 1). Conceptually, these may be divided into three broad types: leasing policies, regulatory policies, and other policies. All of these policies matter, but their effects are not symmetrical. Favorable policies such as support for research and marketing cannot offset unfavorable policies such as Alaska's ban on finfish farming or the absence of an enabling regulatory framework for offshore aquaculture. A single regulatory standard can make farming technically or economically impossible; no single favorable policy can offset this kind of barrier.

It is not just the policies that matter. It is also how stable and predictable they are, and how long it takes to get leases and regulatory approval. Risk and time are critical to business decisions. *Take the time to get it right, and keep trying to make it better*, might sound like reasonable ways to make public policies, but too much time or too many changes can kill investment that depends on those policies.

Examples of Unfavorable Leasing and Regulatory Policies for U.S. Marine Aquaculture.

U.S. marine aquaculture leasing and regulatory policies cannot be characterized in terms of any particular policy of any particular agency. They constitute a very wide range of policies of multiple agencies at federal, state and local levels, which differ widely for different types of marine aquaculture in different states and regions. However, it seems reasonable to conclude that the combined effect of these policies has been to make many kinds of marine aquaculture difficult or impossible in large parts of the United States. Here are some examples:

[1] According to the U.S. Census Bureau's Statistical Abstract of the United States 2011, Table 360, the "general coastline" of the United States is 12,383 miles, of which Alaska accounted for 6,650 miles (54%). The "tidal shoreline" of the United States is 88,633 miles, of which Alaska accounted for 33,904 miles (38%). According to the National Marine Fisheries Service's Fisheries of the United

States 2009, total U.S. capture fisheries production in 2009 was 3,568 thousand mt, of which fisheries off Alaska accounted for 1,843 thousand mt (52%).

Alaska finfish farming ban: Although Alaska accounts for more than half of United States capture fisheries production and more than half of the United States coastline, all finfish farming is banned by the State of Alaska.[1]

Absence of enabling regulatory mechanism for federal waters: There is no enabling regulatory mechanism for marine aquaculture in federal waters (generally defined as more than three miles offshore). There is no way to apply for or obtain leases to farm fish in federal waters.

Regulatory complexity, inconsistency and delays: Fish farmers face numerous complex, inconsistent, shifting, and time-consuming regulatory requirements. Consider this description by a representative of a major U.S. shellfish farming company based in Washington of challenges faced by the company in obtaining leases:

> [One challenge] facing his company and the production of shellfish in the United States is the Army Corps of Engineers' Nationwide Permit 48. Although issued in March 2007, it has yet to be implemented in the Pacific Northwest, and is resulting in inconsistent application in the other shellfish producing states. In addition, there are delays in ESA/MSA consultations and other certification requirements. One of the results of these bureaucratic inactions is that his firm is still waiting – after 15 years – to get a site license in Washington State. These delays have forced the company to purchase leases in Canada, where production has begun and 100 people are employed. Another reason for these delays is that the State of Washington's Shoreline Master Program is being updated. It includes new regulations on the growing of geoducks, a saltwater clam with which [the company] wants to expand its production (United Soybean Board-Aquaculture Industry Coalition, 2011).

In a survey of U.S. molluscan shellfish growers (who account for about two-thirds of U.S. marine aquaculture), Rioux (2011) found that growers perceived significantly higher institutional risks associated with regulation and leasing than risks associated with markets, the environment, or climate. She noted, "through discussions with growers as well as their answers to [an] open ended question, the tie that makes all state and local regulations, regardless of the state or locale, the highest risk is the rate at which they are changed. Growers find that state and local regulations are constantly changing and it is difficult to keep up with them."

According to a review in a recent study of why some aquaculture companies were leaving the United States to invest in other countries, "previous research indicates that strict regulatory environment, cost uncertainties, weak government advocacy, strong local decision-making authority, large number of coastal land owners' opposition, environmental constraints, poor marketing" (Chu, 2009, citing Lockwood, 2001b; Anderson and Bettencourt, 1993; National Research Council, 1992).

Why are United States Policies Unfavorable to Marine Aquaculture?

The starting point in addressing the political challenges to U.S. marine aquaculture has to be clear thinking about why U.S. marine aquaculture faces unfavorable leasing and regulatory policies. Here are five broad contributing factors:

1. Marine aquaculture is new and small.
2. Fish and marine waters are traditionally public resources.
3. Many Americans perceive potential negative effects of marine aquaculture without offsetting positive effects.
4. NGOs have systematically and effective opposed marine aquaculture.
5. The governance system for leasing and regulation is structurally biased against U.S. marine aquaculture.

1. Marine aquaculture is new and small: Being new and small raises economic challenges for U.S. marine aquaculture. It cannot achieve economies of scale in production, processing, transportation and marketing. It cannot learn and innovate from practical experience.

But being new and small also raises *political*

challenges for U.S. marine aquaculture. Because it is new and small, it is harder to demonstrate the benefits and easier to exaggerate the risks of marine aquaculture (Figure 3). As noted by Tiersch and Hargreaves (2002), new resource industries such as aquaculture face a different political playing field than older resource industries such as logging:

> "A core concept of the environmental movement is the precautionary principle, which basically states that it is wise to avoid unnecessary risk… This principle is biased towards slowing or stopping the development of new activities, and shifts the burden of proof from environmental advocates to practitioners such that new activities, like aquaculture, must show that they will not be a problem in the future. This is in contrast to the situation for established industries – detractors must prove that the established industry presents a problem. Of course, newer industries also lack the financial and political resources of groups such as logging, mining and petroleum extraction interests and large chemical corporations. It is easier to restrict or stop aquaculture projects, despite their much smaller environmental risk than it is to attempt to control more damaging established activities. Thus opposing aquaculture development is viewed by advocacy groups as applying an ounce of prevention now instead of the pound of cure that would be required later."

To overcome the political challenges it faces, U.S. marine aquaculture will need committed supporters at all levels of the political and policy process. It will need fish farmers and employees who tell their friends and neighbors and elected officials about the benefits of aquaculture. It will need supporters who testify at local public meetings, write letters to the editor, and be elected to local, state, and federal office. It will need organized lobbying efforts are needed to influence state and federal agencies and politicians. All of this takes committed people and money.

Because U.S. marine aquaculture is new and small, relatively few Americans have – or realize they have – a direct stake in it. That means that it has fewer committed supporters, with less money and less political influence. In much of the United States marine aquaculture is still below a political threshold scale necessary for people to understand, accept, and effectively advocate for marine aquaculture. Achieving this scale will be critical to overcoming political challenges. Marine aquaculture will become politically stronger as it grows – but it is difficult for it to grow without being politically stronger.

2. Marine fish and waters are traditionally public resources: The concept of private ownership of land is fully accepted in American law and culture. Although many Americans might think that governments should restrict certain uses of private land, few would argue that private ownership

Land farming : traditional and accepted

Sea farming : non-traditional and not accepted

Fig. 3. Two kinds of farming which both affect the environment.

is wrong in principle. Many Americans oppose land-based resource development such as mining or logging or industrial agriculture, but they don't generally base their opposition on the principle that land or resources shouldn't be privately owned.

In contrast, there is no tradition of private ownership of marine fish or waters in America. Many Americans oppose allowing private exclusive use of, or rights to marine coastlines, water or fish. In many cases this principle is firmly set in law. For example, the Alaska Constitution states that, " … in their natural state, fish, wildlife and waters are reserved to the people for common use."

The tradition that marine fish and waters are public resources imposes an extra political and regulatory hurdle for the development of aquaculture, especially for finfish farming. Before any kind of marine aquaculture can begin, new mechanisms need to be created to allow for exclusive use of marine waters.

Efforts to implement rights-based management regimes for wild fisheries, such as individual fishing quotas, face similar strong philosophical resistance from many Americans. However, as these new management regimes are implemented, public attitudes are likely to shift as the economic logic and advantages of exclusive use rights become more apparent. The same process will likely occur with marine aquaculture – but it will take time.

3. Many Americans perceive potential negative effects of marine aquaculture without offsetting positive effects: A variety of groups of Americans perceive potential negative effects of marine aquaculture. These include:

- Commercial fishermen, who fear economic competition and environmental damage to wild fish stocks.
- Coastal residents, who fear loss of access to waterfront and changes in the views they enjoy.
- Environmentalists, who worry variously that marine aquaculture will cause pollution, harm marine ecosystems, or increase pressure on global wild fish stocks harvested for production of fishmeal and fish oil used in fish feeds.

These groups play significant roles in the politics of United States marine aquaculture, across the political and regulatory process at local, state, and national levels. For example, Alaska salmon fishermen spearheaded the Alaska legislature's to 1990 ban on finfish farming, and continue to vocally oppose aquaculture development in federal waters nationwide, along with Alaska's congressional delegation (Figure 4).

Similarly, coastal residents have strongly and effectively opposed marine aquaculture in states such as Maine and Washington. Sebastian Belle, Executive Director of the Maine Aquaculture Association, described the political challenges facing aquaculture as a result of demographic shifts in coastal regions:

> "In Maine…part of the application process for the series of permits and licenses needed to operate in the marine environment is an exhaustive series of meetings with the general public and all stakeholde. Part of the constituency will not like what you do, whatever you do. [Because of] a demographic shift to a population-base of retirees from other states, as summer-home visitors to our beautiful coast became year-round residents, …coastal communities now view the ocean for 'recreational use,' and commercial fishermen and aquaculturists must make their case locally to people who have no history or link with the ocean for making a living" (Thomas, 2011).

Fig. 4. Alaska bumper sticker.

These groups' opposition is vexing and frustrating to marine aquaculture supporters who feel that the objections and fears of aquaculture opponents are exaggerated, unfounded, or simply irrational. How do you argue with people who – without any scientific basis – believe that marine aquaculture will destroy commercial fisheries? How do you argue with people who claim that fish farms that will be barely visible will destroy their coastal view? How do you argue with people who appear to be unwilling to accept any level of risk or change?

The political reality is that it is rational for groups which perceive only negative potential effects of marine aquaculture to oppose it. Why accept any risk if there is nothing to be gained?

Clearly there are many things to be gained from marine aquaculture; such as stable jobs, tax revenues, and synergies with other marine industries including commercial fishing, good food, and a reduction in import dependence. But, in many areas, aquaculture supporters have failed to make the case effectively that aquaculture has these positive potential benefits.

4. NGO's have systematically and effectively opposed U.S. marine aquaculture: Numerous U.S. Non-Governmental Organizations (NGOs) have invested significant funding and effort to advocate banning, delaying, restricting, or regulating U.S. marine aquaculture in ways that increase the risks and costs of investment. Collectively these organizations have played a major role in influencing the public, the press, politicians, and regulators in ways which have contributed to unfavorable leasing and regulatory policies towards marine aquaculture.

NGOs that have funded or engaged in significant advocacy to influence U.S. marine aquaculture policies include the Packard Foundation, the Moore Foundation, the Pew Charitable Trusts, Greenpeace, the Environmental Defense Fund, Food and Water Watch, and others, both large and small. The scale, objectives, strategies, and arguments of these groups vary widely, making it difficult to generalize about their motives, methods, and effects. All of these organizations would assert that they use rational and science-based arguments to advocate for the public interest. Marine aquaculture supporters would argue that the NGOs engaged in aquaculture advocacy range from responsible to grossly irresponsible and that they pursue strategies ranging from ethical to grossly unethical.

As noted by Tiersch and Hargreaves (2002), "Advocacy groups can provide a valuable service by acting as an impartial watchdog of environmental issues and calling attention to legitimate concerns." However, a very real and frustrating challenge for marine aquaculture supporters is that some NGOs appear willing to say anything to oppose marine aquaculture, with casual and sometimes blatant disregard for objectivity, truth, or the complex reality of what experience and science have shown about the hugely varied effects of the hugely varied kinds of activities collectively known as aquaculture. Here, for example is a statement posted on the website of the *NGO Food and Water Watch*:

> "Many fish-lovers would be horrified to learn that huge quantities of fish and shrimp are now being grown in giant nets, cages, and ponds where antibiotics, hormones and pesticides mingle with disease and waste. These industrialized aquaculture facilities are rapidly replacing natural methods of fishing that have been used to catch fresh, wild seafood for millennia."

It is difficult for people in industry, government or science to refute these kinds of arguments when they are held to much higher standards of argument and evidence.

Amplifying the efforts of NGO aquaculture advocacy are the popular and increasingly in the so-called 'scientific' press. Tiersch and Hargreaves (2002) characterized this relationship as follows:

> "Much of the criticism of aquaculture by NGOs began as opinion pieces in news media or as information provided by specific advocacy groups. Gradually this material began entering scientific literature as news items and recently has shifted into the arena of scientific review and technical articles, and special reports for commissions. In effect, NGOs have become clearinghouses for information critical of aquaculture. Various groups have adopted attacks through popular media as a method to bring about changes in popular opinion

and regulatory policy. This approach is not discouraged by the media because sensational accusations, controversy and polarized debate are considered to be newsworthy simply for their mass appeal rather than scientific validity."

A familiar and frustrating experience for marine aquaculture supporters is the appearance in respected scientific journals, such as *Science* and *Nature*, of articles of questionable scientific validity or objectivity that claim to demonstrate negative effects of marine aquaculture – such as environmental damage or health risks of aquaculture products (Naylor *et al.*, 2000; Hites *et al.*, 2004). In some cases the research was funded by NGOs with the specific stated objective of demonstrating negative effects – as opposed to objectively examining the evidence for such effects (Krause, 2010a; b; Krause, 2011a; b). These articles then receive extensive attention in the popular press – often ensured by planned publicity campaigns of the sponsoring NGOs. The other side of the story – objective scientific review and critiques of the research methodology and conclusions – is rarely heard. It is rarely heard in the review processes of the scientific journals. It is rarely heard in the pages of scientific journals, which rarely publish rebuttal articles. It is rarely heard in the popular press, which is less interested in the other side of the story because it's more confusing and nuanced and is less interesting – and because marine aquaculture supporters have no organized, planned publicity campaign to tell the other side of the story. Put simply, both scientific and press articles are easier to publish and get more attention if they indicate that aquaculture is bad than if they suggest that the studies that say aquaculture is bad are flawed.

With the public, politicians, and regulators facing a relentless barrage of negative messages from NGOs and the scientific and popular press, fish farmers face an uphill political battle (Figure 5).

Adding to the challenge is that although much of the NGO opposition is targeted at specific effects of specific types of aquaculture, enough of it is directed generally at all "fish farming" to negatively influence perceptions and polices for all marine aquaculture – all species, nationwide. Consider the greeting card sold by the Monterey Bay Aquarium (Figure 6) that argues that "farmed fish aren't the answer."

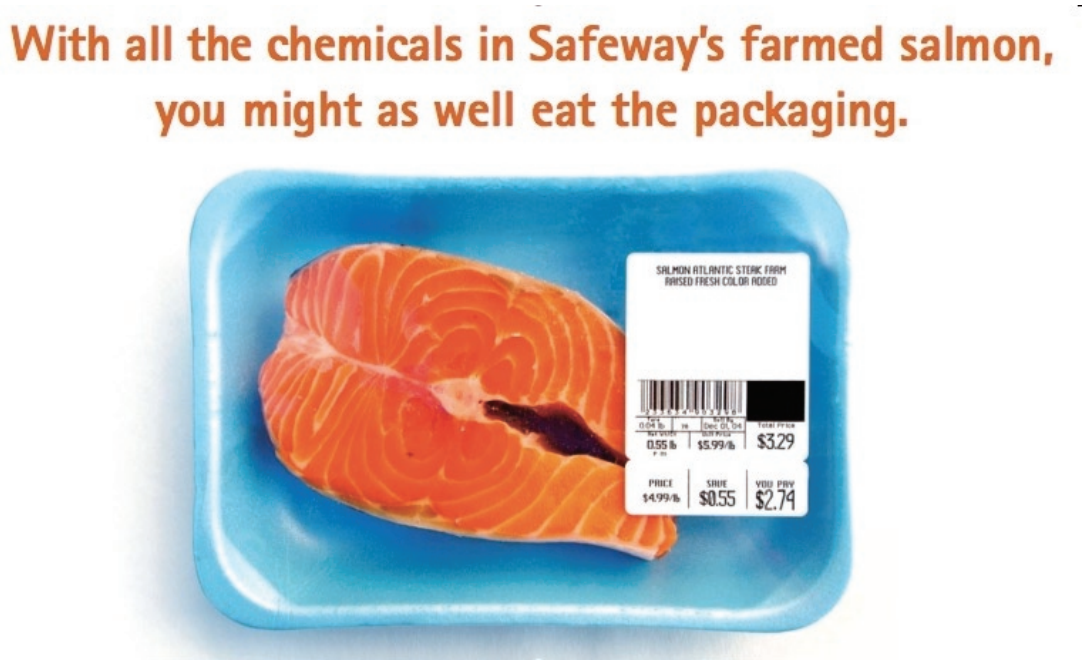

Fig. 5. NGO advertisement against farmed salmon.

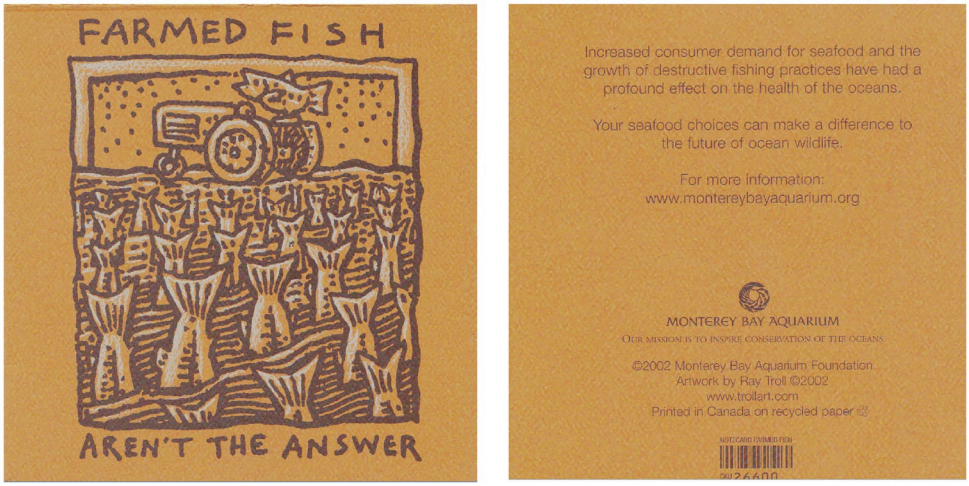

Fig. 6. A greeting card sold by the Monterey Bay Aquarium.

This kind of argument simplistically, unfairly and irresponsibly implies that all kinds of aquaculture are bad – creating perceptions that work against even the most responsible, benign and beneficial kinds of aquaculture.

5. The governance system for leasing and regulation is structurally biased against U.S. marine aquaculture: The governance system for U.S. marine aquaculture leasing and regulation consists of the process by which leasing and regulatory policies are developed by the agencies that have authority to develop policies, and how they make those policies. For purposes of discussion, we may define a hypothetical unbiased governance system as one that would develop policies based on an objective consideration of the best interests and/or preferences of society as a whole, balancing both costs and benefits. For several structural reasons, the U.S. governance system is likely to be less favorable toward aquaculture than an unbiased governance system would be.

One reason is that leasing and regulatory authority for U.S. marine aquaculture is fragmented among multiple branches of government (executive, legislative, and judicial) at multiple levels of jurisdiction (local, state, and federal agencies). Federal agencies with leasing or regulatory authority for marine aquaculture include, but are not limited to the National Marine Fisheries Service, the Army Corps of Engineers, the Environmental Protection Agency, the Fish and Wildlife Service, the Department of Agriculture, and the Food and Drug Administration. Similarly, at the state level, environmental and fisheries agencies typically have regulatory authority. Local governments may exercise additional authority, such as zoning regulations. In the legislative branch, the U.S. Congress and state legislatures enact laws affecting aquaculture, and many issues are decided by the courts at both the state and federal levels.

Several structural biases against aquaculture result from this fragmented governance system. One bias is that most agencies have a limited focus. Rather than considering the best interests and/or preferences of society as a whole, or balancing both costs and benefits of marine aquaculture, they are charged with more narrow and specific goals, such as protecting water quality or promoting economic development. Even though some agencies may be charged with considering the benefits of marine aquaculture, this does not result in an unbiased governance system. A single agency – at any level – can stop marine aquaculture even if all other agencies are willing or eager to promote it. For example, if a single agency establishes impossible water quality regulations or simply takes too long to decide what the regulations will be, it can stop or indefinitely delay aquaculture investments.

A second structural bias is that agencies may be biased internally against aquaculture. For example, fisheries management agencies may be strongly

influenced by constituents who oppose aquaculture, such as fishermen. Their staff may have little interest in or knowledge of aquaculture, or may actively oppose it. This is particularly likely to be the case because aquaculture is new and small, so regulatory jurisdiction is typically within agencies established to regulate and promote older and larger industries.

A third structural bias is that agency budgets for aquaculture leasing and regulation are limited. When budgets are limited, agencies do less. But U.S. marine aquaculture can only develop if agencies are proactive in developing enabling leasing and regulatory frameworks. Doing less will delay the development of marine aquaculture.

Aquaculture advocates often argue that leasing and regulatory policies should be driven by science and reflect an objective consideration of economic and environmental costs and benefits. However, it is uncertain whether a science-driven and objective governance process is possible for marine aquaculture. In a recent thoughtful essay about the challenges facing Canadian aquaculture, Rayner (2008) argued that it isn't:

> "Aquaculture presents special problems of policy coordination that urgently require a more collaborative, less "top-down" approach to policy-making than traditional governing arrangements are able to deliver. There has been a general loss of confidence in… authoritative coordination as the basis for public policy.. Not only are citizens less inclined to accept the decisions of their territorially-based governments about aquaculture development as definitive (the legitimacy problem), they are even less likely to be impressed by the knowledge that the decision has been informed by the advice of a group of self-accrediting experts – which is, of course, why senior public servants and ministers are not especially eager to seek out this advice in the first instance.
>
> "The reversal of political relationships has many important consequences. [One] is the phenomenon that so baffles and enrages those involved in resource industries: they can take part in all kinds of time-consuming planning exercises and comply with every legal requirement in the jurisdiction in which they are operating but still be targeted by activists who challenge the legitimacy of the original plan or regulation. The response of Canadian aquaculture to these developments can neither be "trust us, we know what we are doing," as the scientific establishment is inclined to say, nor "wait until all the facts are in," as the more radical exponents of the precautionary principle are asserting. Trust has gone and all the facts will never be in (which, of course, fits happily with the political agenda of those making the latter claim). The question of action, of what to do, and more specifically, of what we as a 'community of interest' in aquaculture can do, remains."

Political Strategies for U.S. Marine Aquaculture

What can the community of interest in U.S. marine aquaculture do? What are political strategies that can overcome the political challenges faced by U.S. marine aquaculture? This question is being raised, with increasing urgency, within the industry and among supporters in government, science, and the broader public.

Below, I briefly discuss four broad strategies:

1. Fix real problems
2. Demonstrate benefits
3. Argue effectively
4. Reform governance

Although their relative importance will vary for different types of marine aquaculture and in different regions, all four strategies will be necessary for U.S. marine aquaculture to achieve its full economic potential.

1. Fix real problems: Where there are real problems associated with marine aquaculture – such as escapes, disease or pollution – the industry needs to address them. Public opinion and policy will not support marine aquaculture where there are substantive reasons for not supporting it. Fairly or unfairly, all segments of marine aquaculture have a stake in addressing problems anywhere within the industry. As with other resource industries (including commercial fishing) problems anywhere

in the industry have the potential to affect broad perceptions of the entire industry and policies affecting the entire industry.

2. Demonstrate benefits: It will not be enough for marine aquaculture to demonstrate that it does no harm. Some groups will never be convinced, and doing no harm will not generate committed support. Gaining committed support will require making the case effectively that aquaculture offers significant potential benefits at the local, state, and national levels, including benefits for groups that have tended to oppose aquaculture, such as processing synergies and marine jobs for commercial fishermen, and tax-revenues for coastal residents.

3. Argue effectively: To overcome significant, well-funded and sometimes unscrupulous opposition, U.S. marine aquaculture supporters need to argue their case much more effectively than they have in the past. They need to communicate more effectively with the public, the press, politicians, and regulators. They need to more effectively understand and counter the arguments and tactics of anti-aquaculture advocacy groups at local, state, national, and international levels. They have been trying, but they need to try harder, and more effectively, and with more resources and coordination. How to do this is the subject of much discussion within the industry and among its supporters.

In a thoughtful article, Tiersch and Hargreaves (2002) offered a number of practical and well-reasoned suggestions for responding to criticism by advocacy groups:

- Respond from the perspective that criticisms and solutions must be based on a comprehensive and balanced view of the total problem.
- Respond to criticism with clearly presented, broad-based arguments.
- In responding to criticism, recognize that information can be used to achieve different ends.
- Refer to specific sectors rather than reinforcing the misconception of the existence of a collective aquaculture industry that is operated, regulated, and culpable as a single entity.
- Be familiar with the role of aquaculture in economic development, especially in developing countries.
- Know your critics, their methods, and their goals.
- Recognize legitimate criticism.
- Do not shift blame to other sectors of aquaculture to deflect legitimate criticism.
- Learn how the media can be used as a conduit for responses to criticism.

In a recent presentation, Sebastian Belle, Executive Director of the Maine Aquaculture Association, offered a wealth of practical advice gained from years of practical experience:

> "Over the last 20 years, we've learned that it takes basic common sense, hard work, and a lot of time to win the social license to operate. You'll never get 100% acceptance, but if you can get locals to feel that it is "their" neighborhood farm, by sharing holiday seafood, becoming a part of their lives, helping them to be familiar with operations, they can change their attitudes. It doesn't happen with outside lawyers or environmental groups who come to town for their own agenda, with no vested interest in finding solutions. We talk directly to the people who are local and close to us, and avoid gatekeepers and external stakeholders. You're only as good as your last failure, so admit your mistakes and learn from them. Get to know the community and your audience, and talk to them. The best thing is to be good at listening to people. All concerns are legitimate by definition. Listen to every one of them, respond to every one of them. Always follow through. Never mislead or be evasive. Be polite. Avoid being defensive. Form strategic partnerships. Communicate, use visual aids, show what a farm looks like to dispel fear of the unknown. Do your homework: find out what to do to make the community, the locals, comfortable with aquaculture." (Thomas, 2011).

4. Reform governance: Ultimately, the political challenges to U.S. marine aquaculture cannot be overcome by arguing more effectively. It will also require reforming governance so that leasing and

regulatory policies are based on a consideration of both costs and benefits, and accommodate the legitimate interests and concerns of farmers, environmentalists, coastal residents, and other stakeholders. Countries such as Norway have succeeded in doing this. U.S. aquaculture advocates need to learn more about how they have done so, and to give thoughtful consideration to new forms of governance based less on confrontation.

Rayner (2008) suggested that reform of aquaculture governance should include "the creation of more sophisticated aquaculture policy networks, more use of tools of self-regulation, and more open coordination and benchmarking." Despite the recognized challenges for the aquaculture industry of working with critics, Tiersch and Hargreaves (2002) offered the thoughtful observation that this approach may ultimately prove most successful:

> "Realistically, the best approach to dealing with advocacy groups is to devote effort in gaining a strong personal understanding of the relevant issues, and to be proactive in addressing problems and communicating solutions. An increased awareness of social, economic, ecological and political issues will allow those involved in aquaculture to be proactive and avoid taking a defensive, reactionary position. Indeed, it is likely that aquaculturalists and environmental advocates share values at the heart of most issues, and it is the tactics used in addressing the inappropriate actions of a minority within aquaculture and environmental advocacy that drive groups apart."

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