Institutional discourses on Plastic Pollution in the North Pacific Gyre

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ABSTRACT

Plastic pollution is the greatest contributor to marine ecosystem degradation. With the increased proliferation of plastics in the last half-century, plastic debris presents an environmental problem without a clear solution. Historical and current management and governance models lack a concrete legal framework for preventing and reducing marine pollution. State and non-governmental institutional discourses have shaped policy processes and affected governance regimes seeking to limit the environmental effects of plastics pollution in the Pacific Ocean, yet researchers have not considered how tensions within and between these discourses may have inhibited effective governance. I compared the discourses of key U.S.-based state and non-governmental stakeholders, including the National Oceanic and Atmospheric Administration, the Environmental Protection Agency, and the Plastic Pollution Coalition, in publications and public websites, focusing on the communication of the ideas about causes of and solutions to the marine plastics pollution issue. I found that the stakeholders frame the issue in very different terms, with some delineating it in terms of "plastics debris," while others use the less specific "marine debris." Establishing a common terminology that can serve to facilitate a dialogue based on a shared understanding the nature of problem. This suggests the possibility that the incongruency of stakeholder discourses, reflecting different institutional agendas, may serve as an impediment to effective management.

KEYWORDS

Agencies, discourse analysis, marine debris, political ecology, plastic debris

INTRODUCTION

The nature of ocean circulation makes it difficult to identify specific sources of pollution in the North Pacific Central Gyre. Land-based sources of marine pollution (LBSMP) originate from many micro-point sources along the Pacific Rim, flow clockwise towards Asia, and swirl into the center of the gyre where the debris accumulates (Moore, Moore, Leecaster, & Weisberg, 2001). LBSMP is the greatest contributor to marine ecosystem degradation (Hassan, 2006, p. 34), with 49 percent of marine debris originating from urban, land-based sources (EPA, 2009; Laist, 1987). At the center of the North Pacific Central Gyre, there is an observable accumulation of debris (Moore et al., 2001), the exact amount and area coverage of which is difficult to monitor, but one study claims that it is about the size of the state of Texas (Moore, 2001). Plastics form the vast majority of marine pollution found in the Pacific Gyre. Plastics are highly resistant to natural decomposition (Pruter, 1987), but UV radiation from sunlight breaks plastic polymers into tiny pellets that marine organisms ingest (Rios, 2007). It is crucial to manage marine pollution, and specifically plastics in marine environments, as they can detrimentally affect environmental health and ecosystem services such as food production, waste cycling, and climate regulation (Palumbi, 2009). Designing and implementing a transnational system to regulate marine pollution is difficult, because of the physical properties of the ocean and the challenges of controlling LBSMP globally. Governance of marine pollution must begin through a dialogue between the affected stakeholders, in which they discuss the problem and agree upon a policy framework that they recognize as legitimate and are willing to enforce. In order to effectively manage the marine ecosystem, concerned stakeholders must engage in a coherent policy process through which diverse institutions may work toward commonly recognized goals.

With the increased proliferation of plastics in the last half-century, plastic debris has created environmental problems in terrestrial and marine ecosystems without clear solutions. Community, regional, and international efforts to address marine plastics pollution have been largely ineffective in developing cooperative means of managing these problems that involve key stakeholders (Hassan, 2006). Instead, a loose patchwork of programs, such as California's "Coastal Cleanup Day" and "Adopt-A-Beach," have

served as the primary means of addressing the issue through land-based plastics pollution control programs designed to capture the debris before it enters the sea. Some sea-based programs, such as Korea's national "Practical Integrated System of Marine Debris," have sought to address the issue by integrating prevention, removal, and treatment approaches (Jung, Sung, Chun, & Keel, 2010). Yet, there is no international policy framework to address LBSMP or marine plastics pollution, though there have been attempts to facilitate international and regional efforts in this matter (Hassen, 2006). States and NGOs have attempted to develop an effective management regime governed under international law, but have failed to produce effective solutions (Birnie & Boyle, 2002). For instance, Agenda 21 and the Global Programme of Action for the Protection of the Marine Environment from Land-based Sources advanced innovative ideas for controlling marine pollution, but they have failed to effectively control LBSMP from the source and at the sink (GPA, 1995). The 1982 United Nations Convention on the Law of the Sea (LOSC) provides a comprehensive framework for the management of maritime activity and initiated the development of regional and international organizations for marine environmental protection (Juda, 1977). However, LOSC lacks detailed provisions for international standards and does not provide a comprehensive international management system for LBSMP (Hassen, 2006) or a concrete legal framework for preventing and reducing the marine pollution (Torrens, 1994).

This failure to achieve effective governance under international law may be driven by a more fundamental failure of government agencies, NGOs, corporate interests and other stakeholders to conceive of and engage the issue in terms that allow for effective communication that could serve as the basis for negotiations over the goals and means of international marine plastics pollution governance. Yet, there is a gap in the literature concerning how governmental and non-governmental institutional discourses have shaped processes of policy development and affected LBSMP governance regimes seeking to limit the environmental effects of plastics pollution in the Pacific Ocean. Analyzing institutional discourse will addresses how communication between institutions and with the public draws on contested representations of the marine pollution issue and reflects institutionally embedded political agendas within scales of power that ultimately shape policy.

I analyzed how institutional discourses have represented marine plastic pollution in terms of the social construction of the issue and policy prescriptions designed to decrease plastics pollution in the northern Pacific. I ask how these discourses have shaped the development of effective marine plastic pollution governance? To answer this question, I focus on the interaction of U.S.-based stakeholders. My analysis may help inform decision makers in creating an effective transnational resource management system in the Pacific Gyre.

METHODS

Key stakeholders

I identified key U.S.-based state and non-governmental stakeholders, including the National Oceanic and Atmospheric Administration (NOAA), the Environmental Protection Agency (EPA), and the Plastic Pollution Coalition. NOAA maintains one of the world's largest scientific research communities concerned with climate, oceans, and ecosystem protection. It was established as part of President Nixon's 1970 reorganization the federal governments' administration of environmental activities, with the goal of promoting economic development and conservation of U.S. fisheries (NOAA, 2006). The EPA was also formed in 1970 to administer environmental protection in the U.S, and internationally, in conjunction with other governments. The Plastic Pollution Coalition is an international network of over ninety NGOs and businesses, whose core issue is the marine plastic pollution problem. The coalition includes both research and policy advocacy groups, including Algalita Marine Research Foundation, TEDx Great Pacific Garbage Patch, and 5 Gyres Project.

The roles of the federal agencies and NGOs in the LBSMP issue vary in accordance with their level of economic and political influence. NOAA and EPA operate within the executive branch, charged with administering the U.S. legal framework for marine environment protection and resource management, and both have a relatively high institutional capacity for the implementation of plastic debris management (Table 2), because they have regulatory power and funds allocated by Congress for marine

protection programs and projects. In contrast, the Plastic Pollution Coalition has no administrative authority and acquires funding from donors and member organizations (Plastic Pollution Coalition, 2010C), while the Plastic Pollution Coalition executive team consists of an environmental attorney, environmental strategist, entrepreneur, visual artist, and many environmental activists (Plastic Pollution Coalition, 2010B). Analyzing the federal and grassroots organization discourses reveals how the representation of the issue differs across institutional contexts and reflects the complex interests of the different stakeholders.

Institutional discourses and power relations

I compared stakeholder discourse in publications and public websites, focusing on the language and forms of communication concerning causes of and solutions to LBSMP. Discourse conveys "subjectivity, knowledge and power, and '…discursive practices situate actors (including individuals and organizations) in matrices of power, which privilege some interests and marginalize others' (Pettenger, 2007)." Power relations, political economy, and the social construct of the Pacific Ocean shape institutional discourses and how institutions approach management of marine debris in the Pacific Ocean. The scale and power of the institutions underscore their influence on policy processes associated with LBSMP. And their ability to shape policy debates through discursive strategies is inevitably grounded in power relations. I searched for U.S. policies that were relevant to marine resource management and determined the levels of institutional governance the stakeholders have. The vested powers give the federal agencies legitimized managerial power, along with the power to facilitate corporate, governmental, and non-governmental organizations.

RESULTS AND DISCUSSION

I found that the stakeholders frame the LBMSP issue in very different terms. Both NOAA and EPA use the term "marine debris" to describe LBMP, while the Plastic Pollution Coalition deems "marine debris" too ambiguous and argues for the use of the

term "plastics pollution" instead. The terminology and representation of the plastic pollution issue used by the governmental and non-governmental agencies illustrate their differences in political agendas and indicate the scales of action (individual versus collective action) their solution offers. The federal agencies websites lack a course of action for a better LBMP management system; however, the Plastic Pollution Coalition described how the organization influenced politics and communities directly on their websites.

NOAA

Representation of issue

NOAA acknowledges the severity of present and potential future biological and ecological impacts from LBSMP in the North Pacific Gyre (NOAA, 2010A), but they use inconsistent terminology to describe the problem. NOAA acknowledges that it is difficult to clean up and manage the debris already in the ocean (NOAA, 2010A) due to properties of the ocean water and circulation that complicate the distribution of pollutants.

The presence of LBSMP in the North Pacific Gyre was termed the “great Pacific garbage patch” following the media attention surrounding Captain Charles Moore’s publication (Moore et al., 2001). NOAA denounces the use of the term “garbage patch,” noting that it gives the impression and imagery that the pollutants accumulate into a visible mass or “island of trash” (NOAA, 2010A). However, I found that NOAA uses terminology to describe LBSMP inconsistently. Before Moore’s publication, the pollution phenomena in the Pacific Gyre and other gyres were unnamed, but as the phenomenon came to the attention of scientists, states and the public, it became necessary to coin a term to describe the LBSMP situation in the Gyre. Information on the NOAA “Marine Debris” website states that the term “garbage patch” is not the best way to describe the areas where marine debris concentrate. Yet the frequently asked questions listed on the site all include the term “garbage patch,” framing the issue by asking questions such as: “What are the ‘garbage patches’?” “Where are the ‘garbage patches’?” “Are the ‘garbage patches’ the only areas where marine debris concentrates?” “How big

are the 'garbage patches'?" "Is debris cleanup feasible in the "garbage patches" and other areas of our oceans (NOAA, 2010A)?"

NOAA establishes their opinion on the terminology of "garbage patch" in the answer to the first question: the media uses the term and NOAA does not approve of the labeling. NOAA's condemnation and actual use of the term "garbage patch" are contradictory actions. Even though the NOAA Marine Debris Program website deems the term a misnomer, I found that NOAA's efforts to appeal to popular understanding so readers can easily relate to the LBSMP issue, drive them to use the terminology that they expressly disavow. This would appear to be grounded in NOAA's focus on the LBSMP management solution at individual and community scales. The imagery of "islands of trash" appeals to the individual's urgency of action, and the specificity of possible projects (i.e. beach clean-up, fishing gear disposal programs) convinces communities that they can be part of the solution.

Solutions identified

NOAA contends that an ocean cleanup plan is infeasible (NOAA, 2010A). Instead, NOAA supports addressing the issue on land. "Ecofinley," NOAA's Marine Debris Project mascot calls for action with the slogan "Keep the sea free of debris," appeals to the individual's potential to contribute to the solution (NOAA, 2010B). NOAA suggests that individuals address the issue by practicing the 3 R's, "Reduce, reuse, and recycle," and participating in coastal cleanups (NOAA, 2011B). Yet I was unable to find a single NOAA publication calling for action on a larger scale or offering policy prescriptions at the municipal, regional, state or federal level. One possible explanation is that NOAA is an institution that influences decision-makers by providing them with information and research, but does not directly iterate environmental policy prescriptions. Due to the limited research on the disposal and clean up of marine debris in the open sea, NOAA is also raising awareness and calling for community action (NOAA, 2010B). For instance, NOAA distributes funds to community-based marine debris removal projects, marine debris prevention and outreach partnership, and addressing old, abandoned, or derelict fishing gear programs (NOAA, 2011A). The focus on individual efforts implies

that the scope of power NOAA has is influencing global information for collective action in larger scales, and is the present solution NOAA can implement.

EPA

Representating the issue

EPA publications sparingly cover the plastic debris issue in the Pacific Ocean. I conducted a search for EPA publications using the keyword "marine debris" in the title, and I received four results: a paper discussing the framework for marine debris management in the Gulf of Mexico, a classroom curriculum for the marine debris topic, and two fact sheets. There were no recent EPA publications within the past ten years on "plastic debris," suggesting that marine pollution is not an immediate or urgent issue on EPA's agenda.

The terminology used by the EPA to describe the plastic pollution phenomenon in the Pacific Ocean reflects the agency's need to communicate in generic and broad terms. Because the EPA is a federal agency charged with regulating industries, and working with governmental organizations, communities, and research groups, it must appeal to the causes of all groups. "Marine debris" is an all-encompassing term that not only refers to plastic debris, but also other solid wastes, storm water discharge, and vessel wastes. The agency does not focus explicitly on the "plastic debris" issue, but describes plastics as a resource that can be better managed, stating that:

> Plastics are a pervasive environmental problem, but they are a material that can be managed and a resource that can be conserved. Reducing the plastic component of marine debris depends upon better management of this resource…These small resin spheres can be lost and carried into the aquatic environment at various stages throughout their creation, transport, and use (EPA, 2011D).

The EPA webpage on plastic pollution acknowledges the economic and lifestyle convenience of plastic use, but does not discuss the biological and environmental effects of plastics in the world's oceans. The lack of details and insufficient amount of publications reflect on the federal agency's goal of balancing economic, environmental,

and human health interests (EPA, 2011D).

Solutions identified

Both NOAA and EPA focus on the larger picture of marine debris, with relatively less emphasis on plastic pollution. They do not offer specific goals to control sources of plastic debris or guidelines through which they plan to better manage the plastic debris at sea or on land. In EPA's "Prevention, Control, and Reduction: Plastic," the agency offers ambiguous solutions to the marine debris problem, stating that:

> Reducing marine debris, however, depends on improving our control of plastics. Through proper management by individuals and organizations, we can reduce the amount of plastics entering our oceans and conserve this valuable material (EPA 2011).

EPA does not define how the agency plans on "improving [their] control," nor does it define what is "proper management." But the agency does offer solutions based on research, education, public awareness campaigns, and lifestyle changes (EPA, 2011C).

NOAA and EPA state their goals in marine resource management, but do not clearly define their plans to fulfill them (EPA, 2010B & NOAA, 2011C). EPA broadly states that waste reduction is the key to manage the marine debris on land:

> Reducing or eliminating waste at the source can decrease the amount of marine debris accidentally or deliberately entering the ocean. Even if better management cannot occur at the source, appropriate handling and disposal of waste can prevent it from becoming marine debris. Pollution prevention and improved waste management can occur through regulatory controls and best management practices (2010B).

However, the organization does not offer a solid agenda for institutions across levels of governance to address LBSMP. The EPA does not indicate any "best management practices" or how it should cooperate with industries to reduce wastes from packaging, despite EPA regulatory power over industries and municipalities that are sources of plastic debris in the marine ecosystems. Although the EPA has a larger scope of

economic and political influences than NOAA and Plastic Pollution Coalition, I was not able to find any publications on their website regarding funded research on PBSMP or any information about the status of marine debris research. NOAA relies on education and public awareness as a source of information flow (e.g. beach clean-up projects and "Reduce, Reuse, and Recycle"), because it is a science-based agency that provides oceanic and atmospheric information and services for public knowledge, research, and decision-making. Both agencies appeal to the community and individual levels for managerial practices for plastic use. However, the political and economic power of the EPA encompasses all levels of governance, in terms of political and economic resources (Fig. 2), so its discourse is broader in terms of policies and goals. Hence, the terms used to describe LBSMP and the policy prescriptions offered by federal agencies like EPA differ from those of NGOs like Plastic Pollution Coalition due to their contrasting political agendas.

Plastic Pollution Coalition

Representation of issue

The Plastic Pollution Coalition argues that federal agencies do not define the plastic debris problem clearly enough. The federal institutions are focusing on the management of "marine debris" to avoid the plastic pollution issue. However, "marine debris" is an ambiguous term that relates to the collective lifestyle of polluting the coastal shores, and it also blurs the plastic debris with other solid wastes. Consequently, the discourse creates an overtone of individual responsibility to the plastic pollution problem. Framing LBSMP as a plastics problem directly implicates the plastic industry and plastic use. Highlighting these connections in the language used to describe LBSMP and in policy would expose government agencies to the political and economic power of the plastics industry.

Plastic Pollution Coalition, which is representative of NGOs related to plastic debris, and 5 Gyres and Algalita Marine Research Foundation, which represent the perspective of research institutions, specifically label their core issue as "plastic

pollution" and "plastic debris," which contrasts the ambiguity of the federal agency discourse (Plastic Pollution Coalition, 2010A; 5 Gyres; Algalita Marine Research Foundation, 2011). I noticed how the stark contrast between the specific and ambiguous labeling of the problem reflects how the scale and power of the institutions frame their language and discourse. The federal agencies have the political and economic power to indirectly and directly establish environmental regulations and standards. But, they do not publicly prescribe or mandate solutions based on the regulation of plastics production or disposal that would directly affect the plastics industry or associated industries. This may reflect the fact that governance institutions often neutralize their discourse and "self-presentation," stripping it of links to power and interests (Djelic & Sahlin-Anderson, 2006). Institutions in higher levels of governance, EPA and NOAA, often use ambiguous wording for the courses of action in the management of "plastics." The NGOs and research institutions have less of the political and economic strength to manage the plastic debris directly, so they contribute to the ongoing flow of scientific information between the industry, other NGOs and research organizations, and the government.

Solutions identified

The Plastic Pollution Coalition focuses on collective action, calling on federal, industrial, and research organizations to build and spread awareness that inspires action and legislation (Plastic Pollution Coalition, 2010C). The coalition provides ideas for policy-makers and challenges political leaders to adopt and implement policies to curb the use of plastics by creating economic incentives (TEDxGreatPacificGarbagePatch, 2010). Due to the difference in their institutional scale and power, NGOs focus on grassroots efforts to raise awareness in the global community, while NOAA seeks to build on existing relationships with international organizations in the exchanging of ideas and implementation of projects (Plastic Pollution Coalition, 2010C; NOAA, 2010D). Instead of only offering individual scale of actions, the Plastic Pollution Coalition also incorporates solutions through policy-making and larger associations.

STUDY LIMITATIONS AND FUTURE DIRECTIONS

This study provides a partial analysis of institutional discourses on the topic of LBSMP, and is limited by the number of agencies and publications studied. Future studies can entail a broader political ecology framework and include issues associated with power relations. It would also be interesting to incorporate plastic industry and media influences to the "plastic debris" discourses in the analysis. Because language can deter effective dialogue between governance institutions, it is important to understand how the discourses develop, disseminate, and change.

CONCLUSIONS

The current U.S. federal governance model for addressing LBSMP has action and research components, but lacks the horizontal and vertical linkage between organizations across scales of power that must underpin effective governance. The different discourses examined here suggest different scales of actions, so it is necessary to align their representation of the issue and solutions in these discourses in order to create the pre-requisite to effective communication and collaboration between organizations operating at vastly different scales (of power). If each institution identifies the environmental issue in different terms, “plastic debris” or “marine debris,” it will remain very difficult to engage in constructive dialogue between institutions, because all of concerned stakeholders do not agree on very terms of that dialogue. This difference in terminology reflects institutions’ diverse agendas and constituencies. The ambiguity of the terms “marine debris” obscures the actual problem in the North Pacific Gyre. Overcoming this “discourse barrier” would be an important first step toward effective international management of marine plastic pollution.

Boundaries between national and international waters in the Pacific Ocean may be legally defined, but the constant motion of marine water complicates jurisdiction and the responsibilities of organizations and countries. Due to the physical properties of the ocean, an effective LBSMP management system needs to address questions of institutional "scale." The scale of LBSMP control and institutions engaged in policy

processes affect the development and implementation of governance models. The LBSMP problem in the North Pacific Gyre requires the cooperation of all stakeholders, and this can only be achieved through a shared understanding of the essential nature of the problem as one of plastics pollution.

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APPENDIX

Name of institution	Solutions	Key impediments	Scale of influence
NOAA	Research and external debris removal projects	Management at sea is infeasible	International, national, and regional research, community-based projects
EPA	Management on individual and organization scales	Serious environmental problem but can be solved	International laws and regulations, monitoring and research

Table 1. Summary of institutions of interest to marine debris management[1]

Law	Aim	Power relations
BEACH Act (Clean Water Act)	To reduce disease to users in recreational waters.	EPA is responsible for National Pollutant Discharge Elimination System permits
Coastal Zone Enhancement Grants (Coastal Zone Management Act)	To fund management programs that will reduce marine debris	Governor appoints a regional agency for the responsibility
Ocean Dumping (Marine Protection, Research, and Sanctuaries Act)	To manage and control waste in waterways; find information about the effect of plastic material in the marine environment	EPA provisions in Title 33. NOAA sanctuaries in Title 16.

Table 2: Summary of relevant U.S. law to marine debris management[2]

[1] EPA. 2010A, 2010B.
[2] EPA. 2011B, 2010A. NOAA, 2007.