

Improving the Integration of Restoration and Conservation in Marine and Coastal Ecosystems: Lessons from the *Deepwater Horizon* Disaster

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In the wake of the Deepwater Horizon disaster, much has been learned about the biological, ecological, physical, and chemical conditions of the Gulf of Mexico. In parallel, the research community has also gained insight about the social and organizational structures and processes necessary for oil spill response and subsequent marine and coastal restoration. However, even with these lessons from both the Deepwater Horizon and previous spills, including 1989's Exxon Valdez and the Ixtoc 1 in 1979, our understanding of how to avoid future crises has not advanced at the same pace as offshore oil and gas development. We argue that this progress deficit indicates a continued devaluing of marine and coastal resources. We believe that we must, instead, advance a proactive conservation ethic based on the precautionary principle and an appropriately placed burden of proof—strategies that will help reduce our reliance on costly restoration and protect marine and coastal ecosystems.

Keywords: Conservation, restoration, precautionary principle, burden of proof, Gulf of Mexico, Deepwater Horizon, Exxon Valdez

There is still much to learn about marine and coastal conservation from the April 2010 *Deepwater Horizon* (DWH) disaster. Following the oil drilling platform's failure, subsequent blowout, and release of 200 million gallons of oil over 87 days, the National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling conducted an 8-month review that produced recommendations on disaster response, tighter regulations, and the US oil and gas drilling program on the Outer Continental Shelf (OCS; National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling 2011a). The OCS drilling program is managed jointly by the Department of the Interior's Bureau of Safety and Environmental Enforcement and Bureau of Ocean Energy Management. Both are relatively new agencies, created from the former Minerals Management Service (MMS). Their management is governed by federal laws and regulations, including required mandates under the National Environmental Policy Act (NEPA), the Oil Pollution Act, and the Outer Continental Shelf Lands Act. Following its review, the national commission concluded

that the federal and industry safety measures were over-matched by the technical complexity of the DWH disaster. In addition, the commission found that "the breakdown of the environmental review process for OCS activities was systemic and that the [Department of the Interior's] approach to the application of NEPA requirements in the offshore oil and gas context needs significant revision." (National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling 2011b: 18).

The commission noted that MMS made several critical strategic errors, such as failing to train personnel with the appropriate technical skills to conduct oversight reviews, providing insufficient guidance prior to approving operations, cutting corners on required NEPA reviews, rationalizing the exclusion of deep water drilling from other regulatory requirements, undertaking environmental reviews at inappropriately large geographic scales, and using the categorical exclusion in bad faith (CEQ 2010, Alexander 2011, National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling 2011a, 2011b, 2011c). These

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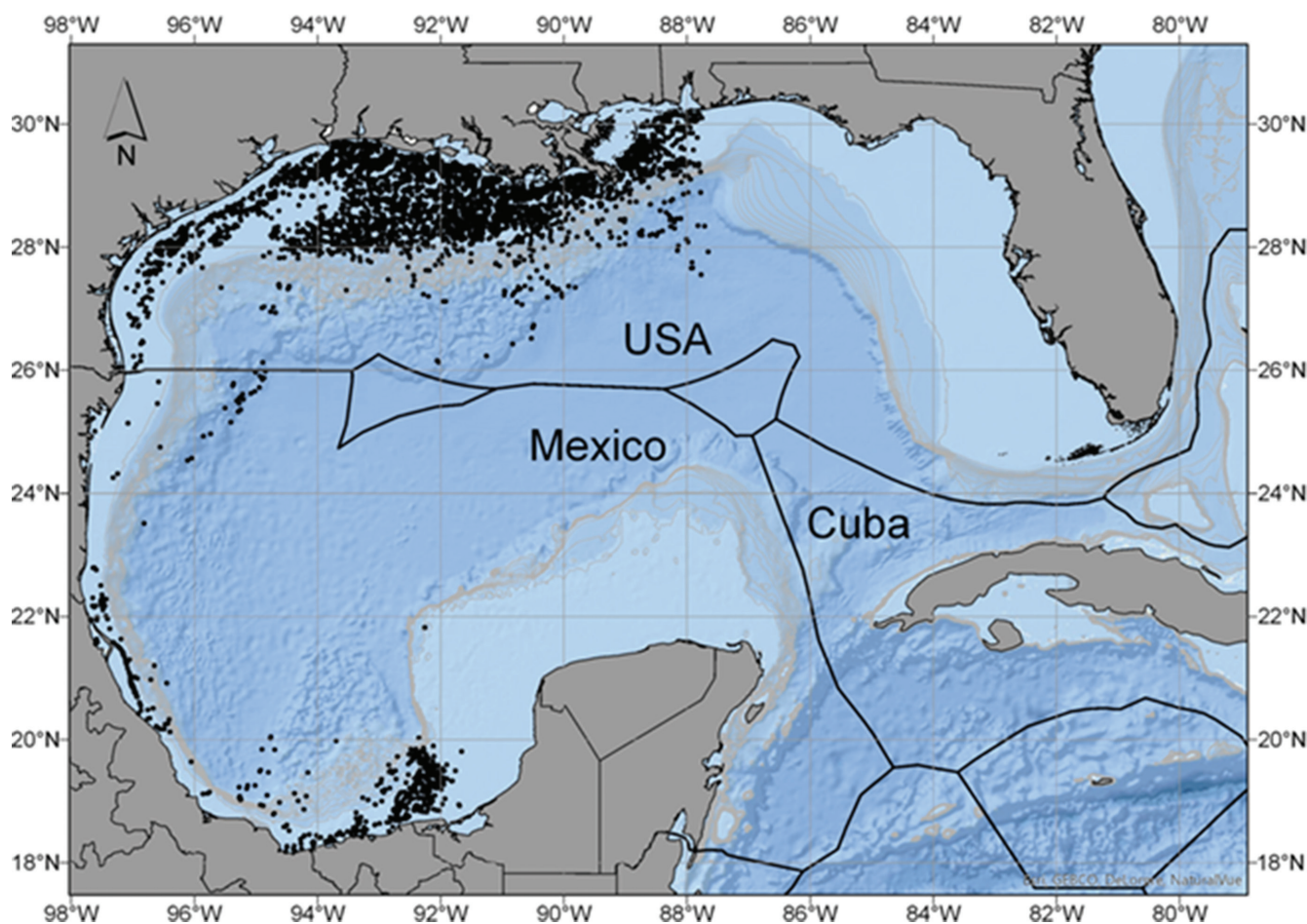


Figure 1. Locations of oil platforms in US and Mexican waters, from BSEE GoM OCS Region and Centro Nacional de Informacion de Hidrocarburos. Image: Courtesy of Gerardo Toro-Farmer and Erin Pulster, University of South Florida.

errors and associated risks are compounded by the density of oil and gas development in the Gulf (figure 1), the agency's lack of precaution in its operations, and a misplaced regulatory burden of proof in oil and gas development in which MMS—not industry—was required to demonstrate the risks of development (Zellmer et al. 2011).

All of these errors occurred despite the fact that decades had passed in which to learn lessons about oil spill prevention and response. Both the 1979 *Ixtoc 1* blowout in the southern Gulf of Mexico and the 1989 *Exxon Valdez* (EV) disaster in the northern Gulf of Alaska were record spills. The *Ixtoc 1* spill occurred during the drilling of an exploratory well in 50 meters of water, causing the release of approximately 30,000 barrels a day for 10 months, totaling 126 million gallons (Jernelöv and Lindén 1981). This was the North American record until the DWH blowout (measured in millions of gallons of uncontrolled oil released into the marine environment). The EV was a single-hulled tanker carrying 53.1 million gallons when it ran aground, spilling almost 11 million gallons, which, at the time, was the worst US oil spill on record.

Deepwater Horizon revealed the stalled development of technological, organizational, and regulatory preparedness for large spills since the *Ixtoc 1* and EV. For example, the technological tools available to address an unconstrained blowout like DWH remained relatively unchanged since the *Ixtoc 1* in 1979, but because of the unprecedented depth of the DWH, none of the existing tools (e.g., cut-off devices, caps, relief wells, top hats, etc.) worked. The eventual technological fix, a capping stack, existed only conceptually prior to the DWH and was designed and implemented in response to the disaster (Fountain 2013). When energy development technology outpaces crisis response technology, risk—and the economic and environmental burden of subsequent catastrophes—is unfairly shifted from the energy industry to ecosystems and innocent people (Kneib 2010).

At the time of DWH, the oil and gas industry was already heavily invested in ultradeep exploration (Murawski et al. 2019). Obvious lessons from the EV and *Ixtoc 1* should have been applied to regulatory processes in the Gulf, including the best available scientific understanding of spill prevention and response, and preparation for the types of information

needed to address a crisis (Plater 2010, Peterson et al. 2012). Specific lessons learned and documented after the EV concerning the social, organizational, economic, and community resilience dimensions of spill preparation and response were also either ignored or forgotten in the Gulf (Ritchie and Gill 2010, Plater 2011, Haycox 2012).

Given this, we asked the following questions: Why was so little progress made to improve the appropriate regulatory and organizational structures after the Ixtoc 1 and EV? Why were industry and regulatory authorities caught off guard when the DWH occurred? Where is social and economic sustainability and ecological conservation in the mix of regulatory approaches to oil-spill prevention and response? The uncertain answers to these questions should cause those of us working in marine and coastal science and conservation a profound degree of contemplation and concern. Specifically, why do our institutions fail to learn from experience in order to protect our marine and coastal environments? And are deficiencies likely to be remedied before the next catastrophic spill occurs?

Crises such as the DWH disaster provide opportunities for reflection and analysis from which we can learn and apply the lessons of conservation. After the EV, US president George H. W. Bush signed the Oil Pollution Act of 1990 (OPA90). However, OPA90 predates the development of ultradeep oil exploration and its associated risks by over a decade. And although regulators have reviewed and approved ultradeep oil development, no new laws have been passed that specifically regulate this risky area of exploration and production. More broadly, in the aftermath of the DWH, the United States has made little progress in embracing either the ecological or ethical standards by which conservation is applied to public policy in the realm of oil and gas development. Worse, in the affected habitats, ecological and human well-being is, regulatorily, a secondary concern to the economic drivers of oil and gas development (Costanza et al. 2010, Jacques and Lobo 2018). This US regulatory approach favoring oil and gas development ensures continued dependence on crisis response and ecological restoration when disasters occur, with damaging effects. A dependence on response and restoration devalues all services (other than oil and gas development) that marine and coastal ecosystems provide. Institutionalizing postcrisis restoration as a preferred conservation strategy justifies inaction on proactive conservation measures and impedes the kind of regulatory progress that has been achieved for decades in other conservation arenas. This has locked in a cycle of crisis and response that is both ecologically and economically unsustainable.

This institutionalized dependence on crisis response will increase the likelihood of further catastrophic crises followed by inadequate responses, continuing a cycle of oil and gas development that is clearly detrimental to long-term societal well-being (Freudenburg and Gramling 2011, Tainter and Patzek 2012). In this Forum, we suggest strategies for transforming the approach to marine and coastal

conservation in the face of ongoing oil and gas development. Specifically, we propose a broad, integrative pathway to conservation that considers the DWH and previous disasters as justification for regulating oil and gas development with a precautionary shift in the burden of proof to industry. Our proposal is conceptual, procedural, and ideological: Influencing the relevant research, regulatory, and legislative processes will require shifts in values that increase support for the well-being of marine and coastal ecosystems and the people that rely on them.

We write from our collective experience as marine scientists active in both natural and social scientific research, our many years of deep involvement in marine conservation policymaking at the federal level, and our recent and ongoing involvement in post-DWH research through the Gulf of Mexico Research Initiative (GoMRI). Following the DWH spill, BP committed \$500 million dollars to develop an independent research program (GoMRI) focused on the impacts of oil spills on ecosystems of the Gulf and affected coastal states. The program's overall intent is to improve the fundamental understanding of these spills and their associated stresses on the environment. GoMRI includes experts in the fields of science, public health, research administration, and outreach. From this program, the Center for the Integrated Modeling and Analysis of the Gulf Ecosystem (C-IMAGE) was created and continually funded for almost 10 years, investigating the various temporal and spatial scales of an oil spill and its associated impacts. C-IMAGE includes mechanical engineers, fluid dynamicists, modelers, sedimentologists, petro- and geochemists, toxicologists, biologists and others, from 18 institutions in five countries, working together to study the transport mechanisms, fate, and impacts of deep oil spills. We (the authors of this Forum) are among the few C-IMAGE researchers working on either conservation or social scientific approaches to post-DWH research.

As well, we write as current or former residents of the Gulf Coast, with deep personal experience in the social and ecological systems of the Gulf of Mexico. We have long participated in and observed the circumstances we address in the present article. It is our goal to demonstrate the value of an integrative conservation ethic and encourage specific strategies that enhance marine and coastal conservation in the Gulf and elsewhere. We hope to provide thoughtful perspectives in the ongoing discussion of conservation challenges in the Gulf and in marine and coastal systems worldwide by illustrating the diverse, interdisciplinary benefits of proactive, well-conceived conservation. We start with a brief exploration of the problems at hand, analyze their causes, and recommend strategies for future action.

The marginalization of the marine environment

It has been 70 years since Aldo Leopold published his now-famous essay, "The land ethic," the final chapter in his collection *A Sand County Almanac* (Leopold 1949). Leopold called for an integrative social-ecological ethic of conservation

and restoration to counter the then-rampant development and degradation of terrestrial ecosystems. Leopold made fundamental contributions to the establishment of three fields that are of central importance to oil spill response, especially in the wake of the Ixtoc 1, EV, and DWH: modern conservation science, ecological restoration, and environmental ethics concerning human interactions with species and ecosystems. These three fields, when integrated, provide the necessary foundation for institutional response to crises such as catastrophic oil spills.

The evolution of these three fields demonstrates the inconsistent attention given to marine and coastal systems outside a relatively limited community of researchers and conservationists. Marine and coastal conservation science is long established, with strong recognition at the federal and international levels among government agencies, nongovernmental organizations and, increasingly, industry. Much like ecological conservation, of which it is a part, marine and coastal conservation is an applied, interdisciplinary science that integrates knowledge and methods from many relevant disciplines into an adaptive problem-oriented framework that is designed to respond to substantial threats to ecological integrity (Norse 1993, Norse and Crowder 2005, Ray and McCormick-Ray 2013).

Calls for a marine and coastal conservation ethic to influence policy have been appearing for decades, with prominent advocates in the research, regulatory, and conservation communities (Siry 1984, Costanza et al. 1998, Dallmeyer 2003, Granek et al. 2005, Rau et al. 2012). This ocean ethic literature is well founded in both science and moral reasoning (Kellert 2003, Norton 2003, Shilin et al. 2003, Wolf 2003) and was spurred by foundational work in the 1940s, 1950s, and 1960s by Rachel Carson (1941, 1951, 1955), Victor Scheffer (1969), and others. Despite this impressive heritage, there has been little mitigating effect on consumptive human use of marine and coastal resources other than the passage of the Marine Mammal Protection Act of 1972 (MMPA) and Magnuson–Stevens Fishery Conservation and Management Act of 1976. These statutes have not led to a broader approach to marine and coastal conservation, and calls for a new paradigm are becoming increasingly urgent (e.g., Lubchenco and Gaines 2019). We argue, as others have before us, that the accelerating degradation of marine and coastal ecosystems has not been met with a corresponding shift in values or the regulatory strategies necessary to mitigate current levels of resource exploitation. The reliance on crisis management as the primary response in offshore oil and gas development is a case study in the evolution of this deeply problematic dynamic and an indicator of the commoditization of the marine and coastal environment. Indeed, the limited set of utilitarian values typically associated with marine and coastal systems masks a reality well understood in the scientific community but seldom reflected in broader societal attitudes: that protection of marine and coastal ecosystems not only supports but is necessary for broad, long-term societal (including economic)

development and well-being (Worm et al. 2006, Abelson et al. 2016).

The growth and institutionalization of postcrisis restoration

Despite the impediments we described above, advocates of marine and coastal protection have made strides in advancing conservation. This has principally occurred as ecological restoration has been elevated to a crisis response best practice in marine and coastal systems. This heightened awareness and attention has occurred despite the uncertainty of long-term effectiveness of restoration strategies (Martinez et al. 2012) or a clear definition of restoration. Understanding of restoration varies from narrow ecosystem science to broadly interdisciplinary approaches that integrate social concerns. For example, restoration efforts following the DWH were initially focused on ecological and biogeochemical processes. Only later did restoration efforts address specific economic opportunities for affected coastal communities and other stakeholders (*Deepwater Horizon* Natural Resources Damage Assessment Trustees 2016).

In a previous Forum article, Abelson and colleagues (2016) provided perhaps the best accounting to date of broadly integrative marine and coastal restoration. In this foundational work, they introduced the interdisciplinary nature of restoration in marine and coastal systems and elucidated the need for an integration of ecological with social (i.e., moral, economic, community resilience, and many other) variables that must occur for restoration to succeed. Their work foreshadowed our goals in this Forum when they stated, “Ecological restoration cannot provide a substitute for the conservation of ecosystems, but where ecosystems are already heavily degraded, it may be a necessary and even a more effective management strategy” (Abelson et al. 2016). In this Forum, we build on Abelson and colleagues’ (2016) work by integrating it with our understanding of conservation and proposing that restoration be recognized as a critical component of conservation, but one of last resort. We hope to demonstrate the need for conservation actions to occur prior to crises such as the DWH in order to reduce the need for postcrisis restoration.

Conservation and restoration have long been used effectively in terrestrial environments. Although the shift toward proactive marine conservation and restoration paradigms has been slow, its recognition is growing, including in our own research community, GoMRI and C-IMAGE. Since 2012, C-IMAGE and other researchers have met annually at the Gulf of Mexico Oil Spill and Ecosystem Science (GoMOSES) conference to discuss their findings, plans, and the larger implications of their work. Recently, these conferences have revealed a significant evolution in postspill perspectives. The vast majority of funding associated with early GoMRI studies focused on collecting data to support basic and applied research in the natural and physical sciences. However, since 2017, ecological restoration has become a prominent theme at GoMOSES, and sessions have

explicitly addressed the restoration applications of ongoing and future Gulf research, including those in the social realm. The impetus for this shift was the DWH financial settlement from BP and the resulting funding for restoration activities. Regardless of the impetus, this was a significant shift for the Gulf research community, reflecting important strides in the use of natural and social scientific data to support policies and regulations that benefit people, ecosystems, and wild living resources.

The restoration movement that has recently developed in the Gulf of Mexico represents an evolution in thought and practice for these researchers. However, the word *conservation* is rarely used by the GoMRI community in the conference literature, formal and informal discussions, or publications, illustrating the conceptual, procedural, and ideological challenges for Gulf conservation. Although there is an absence of specific focus on conservation, GoMOSES conferences in 2017, 2018, and 2019 highlighted an encouraging paradigm shift. In addition to presentations focused on the advancement of knowledge about oil in the environment, sessions also highlighted the role of social transparency and engagement as interdisciplinary processes and introduced researchers to new stakeholder groups. This mirrors the recommendation of Abelson and colleagues (2016) and many others before them that the scientific community needs to work conscientiously to involve diverse stakeholders in implementing restoration strategies and to consider how research results can support both ecological restoration and community resilience. Although these strategies are well-worn territory for terrestrial conservation professionals, it represents an emerging opportunity for Gulf researchers to connect their work to conceptual and practical concerns that are being addressed by the broader marine and coastal conservation community (Lewison et al. 2015, Blaustein 2016, Mason et al. 2017).

As participants in GoMRI, we appreciate the growing recognition by our community of the value of restoration. The evolution of improved technology and field methods has allowed restoration to become one of the most fundamentally effective tools available to marine and coastal conservation professionals. We do not begrudge its advocates their investment in restoration, nor do we question its effectiveness as a conservation strategy that produces desirable outcomes that serve a broad spectrum of values. However, we are concerned that although restoration itself is not problematic, its success, combined with the limited societal values about ocean life, has led to an overreliance on this approach. This overreliance, in turn, acts as a conceptual and procedural trap that focuses conservation and action on postcrisis efforts at the expense of other approaches. Restoration is a fundamentally reactive approach to conservation. Therefore, the prominence of postcrisis restoration is desirable to industries and prodevelopment regulators. In an example of being easier to ask forgiveness than get permission, it allows them to exploit marine and coastal resources without having to devote time or adequate funds ahead of

profit. The tension between conservation and offshore oil and gas development is a definitive example of this dynamic in action and has led to a status quo approach to marine and coastal conservation that is dangerously out of sync with both ecological and societal needs.

The dangers of overreliance on restoration

As a conservation strategy, restoration locks in an exorbitantly costly cycle of crisis–response that is both ecologically and economically unsustainable. The great benefit of protecting resources from crisis versus restoring them postcrisis has long been understood, even within the oil spill response community. Nash (2011), like Abelson and colleagues (2016), used the theory and literature of ecosystem services to illustrate the challenges of post-DWH restoration, concluding that “avoiding future spills always beats trying to calculate the losses afterward, and that industrial societies have to rerig the incentives that fail to prevent appalling carelessness” (Nash 2011: 259). This rerigging is the regulatory change that we believe is justified by the costs associated with restoration. In considering the role of restoration and conservation in the dynamics of oil spill response, we look briefly at the costs of restoration in the DWH case.

Estimating the value of the full array of ecosystem services affected by any oil spill is a monumental task. Even where values might be easily identifiable (e.g., concerning the economic value of a specific fishery) diverse methods of economic valuation may need to be reconciled. In the case of the DWH, the task of accounting for affected services is aided by the enormously useful Gulf of Mexico Ecosystem Services Valuation Database maintained by Texas A&M University (Plantier-Santos et al. 2012) and the US National Research Council’s (NRC) study of the ecosystem services affected by the DWH (NRC 2013). The NRC report is the most extensive analysis of US marine and coastal ecosystem services to date.

Costanza and colleagues (2010) provide two illustrative monetary examples of the DWH’s effect on ecosystem services. The first was the near-complete closure of Louisiana’s commercial fisheries immediately following the DWH, at an estimated annual loss of \$2.5 billion. The second was the composite value of all the services provided by the Mississippi River Delta. Assuming “that the Mississippi River Delta will be the most affected region and that there will be a 10 to 50 percent reduction in the ecosystem services provided by the delta, this amounts to a loss of \$1.2–\$23.5 billion per year into the indefinite future until ecological recovery” (Costanza et al. 2010: 18–19).

Another means of estimating costs of postcrisis response is legal settlements. Settlements are unpredictable because of the processes that produce them, including judge and jury trials and corporate apoloia. The DWH legal settlements totaled about \$21 billion, and although the actual costs of post-DWH restoration will not be known for years, BP estimates that cleanup costs will total \$61.1 billion, including economic losses and settlement funds allocated for restoration (NOAA 2019). These costs are contested, of course, and

at least one economic analysis more than doubles that total to \$145 billion (Lee et al. 2018). These all may be conservative estimates, given that the annual sales of affected Gulf Coast businesses have been estimated at nearly \$2 trillion (Dun and Bradstreet 2010).

As context for these figures, we note that OPA90 provides for government funding of oil spill response. On OPA90's passage, Congress funded the Oil Spill Liability Trust Fund, the purpose of which is to pay for cleanup in the absence of sufficient support from the liable party. Compensation includes "damages to natural resources, loss of subsistence use of natural resources, damages to real or personal property, loss of profits or earning capacity, loss of government revenues, and increased cost of public services. However, payments are limited by the available balance. For any single discharge incident, the Fund is authorized to pay no more than \$1 billion, of which no more than \$500 million may be paid for natural resource damages (OPA 9001(c); 26 U.S.C. § 9509)" (USCG 2017: 2).

Given that \$1 billion would not cover even 1/60th of the costs of the DWH damages, it is clear that the federal government is not well positioned to support necessary restoration efforts. Reliance on corporate responsibility is subject to the vagaries of the legal system, illustrated by both Exxon's decades-long court battle to avoid paying for the EV cleanup and BP's agreement to fund restoration at a level nowhere near what will likely be needed. Nevertheless, these are the procedures we have institutionalized: We rely on postcrisis restoration, the success of which requires financial resources beyond those available (even if every legal challenge is decided favorably). This institutionalized postcrisis restoration must be supported by decades of cooperation among countless stakeholders, including elected officials who will come and go with each election cycle. And given our understanding of marine ecosystems, all of this will fail to produce any certainty that restoration will lead to a desirable future with a steady state of ecological integrity (Nash 2011).

We find ourselves in this predicament because, societally, our dependence on oil and natural gas has compelled us to bestow on its development an at-all-costs status that profoundly overmatches our efforts to protect any other values we derive from marine and coastal ecosystems. This imbalance is untenable and is what leads us to our belief, shared by Lubchenco and Gaines (2019) and others before us, that we need a new narrative, an ocean ethic. Just as Leopold's land ethic was the inspiration for generations of conservation legislation and regulation that has helped us to protect our terrestrial ecosystems, we believe an ocean ethic will provide us with similar inspiration. This will allow us to match the scope of responsibility placed on us by the species and ecosystems of our oceans and coastal zones.

Innovating conservation in marine and coastal systems

We believe that to address the degradation of marine and coastal ecosystems, paradigmatic change must occur that

begins with a shift in regulatory approaches to favor conservation. The first step in that paradigm change is to move restoration to its proper place in the conservation toolbox—as a strategy of last resort—and to better integrate restoration with a proactive approach to conservation.

The simplest and best alternative for safeguarding human and ecological resources in the Gulf and other marine and coastal systems is to shift the burden of proof to the industries proposing natural resource exploitation strategies, making those industries responsible (with independent oversight) for acknowledging, modeling, and documenting the impacts of their proposed actions (Norse 1993, Costanza et al. 1999 and Hofman 2009, 2010, Gabison 2012, Martinez et al. 2012). Although it is not new, this idea grows in urgency as the pressures and demands on our marine and coastal systems increase. This change will require a political solution, one that would be fueled by an ocean ethic and that we believe is an essential long-term goal for statutory and regulatory revision. This would be the necessary foundation for a new paradigm for ocean and coastal management.

Precautionary regulatory structures to introduce a conservation-first approach can be developed and implemented at the federal and state levels but will require advocacy by the people closest to the resources in need of protection: residents, state and federal lawmakers, industry representatives, conservation organizations, researchers, and many others. As members of the Gulf research community, we specifically call on our colleagues in GoMRI and elsewhere to engage in the policy processes of conservation, advocating for the protection of the resources on which our research relies.

A successful US precedent for this precautionary approach to marine conservation is the MMPA, which uses ecological criteria to assess the conservation of marine mammals and their habitats in US waters (Hofman 2009, Reynolds et al. 2009, Roman et al. 2013). Under the MMPA, proposals for resource development affecting marine mammals or their habitats must undergo independent scientific review, prior to permitting, and outside of the responsible regulatory agencies and must meet ecological standards that require knowledge of food webs, species' life histories and population trends, and other baseline data. Additional precedents include NEPA, the Clean Air Act of 1970, the Clean Water Act of 1972, and the Endangered Species Act of 1973. None of these is a perfect instrument, but each provides strategic models of broadly successful conservation legislation with applications for marine and coastal ecosystems. These laws' implementation histories demonstrate that balances can be achieved between industry, high standards of ecological integrity, and community well-being, with a burden of proof that favors a precautionary approach to conservation. Given this legislative history, a broad conservation mandate for marine and coastal systems is profoundly overdue.

Next steps

Many strategies are available to aid the necessary paradigm shift we seek; however, none are easily undertaken

or adequately resourced. Establishing a baseline scientific understanding of marine and coastal systems is a necessary first step. Historically, the Gulf has suffered from inadequate funding for system-wide baseline studies. Assessing the damage of any traumatic event can only occur in the framework and knowledge of preimpact conditions. In the Gulf, GoMRI has provided much-needed funding, and the C-IMAGE consortium has collected data throughout the Gulf, as well as from Mexico and Cuba. This is important because these ongoing studies can assess the overall ecological health of the Gulf, identify regions most at risk or susceptible to future oil spills, and can pinpoint areas of significant vulnerability. This type of approach should be adopted proactively for all marine and coastal systems, not implemented only when prompted by disaster.

Almost 10 years of GoMRI-funded research offers insights into the impacts of oil spills on marine mammals, sea turtles, fish, microbes, corals, benthic environments, and a host of other marine organisms and habitats. But although catastrophic events like the DWH are extensively documented, this has not led to more effective conservation. To broaden the scope to include a larger conservation context, GoMRI is currently funding research that looks at the impacts of large catastrophic spills on marine ecosystems and the well-being of human stakeholders. Embracing this dual approach as a core value is a necessary step for the marine and coastal research community. Ultimately, we believe that this approach will lead to the acceptance of conservation, broadly envisioned, by many diverse stakeholders in the Gulf and other marine and coastal communities.

The shift toward conservation in marine and coastal resource development is a vital part of ongoing national and international efforts to elevate the importance of conservation policy to the point where stakeholders will demand federal and state action. Our experience of the DWH suggests a way forward, with lessons that are broadly applicable. Our current statutory and regulatory processes have afforded disproportionate benefits to specific interest groups, placing our natural ecosystems and coastal communities at risk. We seek to change these processes so that they protect and benefit all stakeholders. Every progressive statute in the environmental arena has had a groundswell of support by diverse stakeholders, and this case is no different. With the necessary support, we can influence passage of conservation policy for the sustained benefit of marine and coastal ecosystems and their residents, human and nonhuman alike.

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