

Marine Science Review – 410

Management and governance



In this review:

A. Recent articles with abstracts

O/A denotes an open access article or journal

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Stoett, P. **Framing bioinvasion: Biodiversity, climate change, security, trade, and global governance.** *Global Governance* 16(1): 103-120, 2010.

Notes: This article introduces the complexities of framing the policy debate over invasive alien species or, more generally, bioinvasion. It suggests that there are six principal framing conceptualizations that have emerged or are gaining steam and credence: biodiversity and conservation; climate change and globalization; human security; "natural national security"; market failure; and the commons and global governance. Although the biodiversity approach dominates the international discourse at present, it presents a partial and hence distorting picture. Over time, as the problem of bioinvasion compounds, the inadequacy of the biodiversity frame will become generally apparent and so the others will gain in currency. Ultimately, bioinvasion must be viewed as a policy challenge for global environmental governance and justice. The author concludes by raising the limited possibility of developing an International Convention on Alien Invasive Species.

Lopez-Hoffman, L., Varady, R.G., Flessa, K.W., and Balvanera, P. **Ecosystem services across borders: a framework for transboundary conservation policy.** *Frontiers in Ecology and Environment* 8(2): 84-91, 2010.

Notes: International political borders rarely coincide with natural ecological boundaries. Because neighboring countries often share ecosystems and species, they also share ecosystem services. For example, the United States and Mexico share the provisioning service of groundwater provided by the All-American Canal in California; the regulating service of agave crop pollination by long-nosed bats; and the aesthetic value of the North American monarch butterfly, a cultural service. We use the Millennium Ecosystem Assessment (MA) to elucidate how drivers in one country can affect ecosystem services and human well-being in other countries. We suggest that the concept of ecosystem services, as articulated by the MA, could be used as an organizing principle for transboundary conservation, because it meets many of the criteria for successful transboundary policy. It would frame conservation in terms of mutual interests between countries, consider a diversity of stakeholders, and provide a means for linking multiple services and assessing tradeoffs between uses of services.

Ferraro, G. and Pavliha, M. **The European and international legal framework on monitoring and response to oil pollution from ships.** *Journal of Environmental Monitoring* 12(3): 574-580, 2010.

Notes: Oil spills cause damage to the marine environment. Such oil spills originate from land-based or sea-based sources. Sea-based sources are discharges coming from ships or offshore platforms. The origin of the pollution can be accidental or deliberate (defined also as operational). The European and international legislation in the field of monitoring and response to marine oil pollution is mainly based on the International Convention for the Prevention of Pollution from Ships, 1973, as amended by the Protocol of 1978 thereto (MARPOL 73/78) and the 1982 United Nations Convention on the Law of the Sea

(UNCLOS). To complete the international framework, and with specific reference for European Countries, also the recent European legislation is presented. Special attention is given to the prosecution of polluting vessels. The main legal problem is the coordination and integration of the two principles on jurisdiction which co-exist: the nationality of the ship and the geographical position of the ship.

Kempf, A. **Ecosystem approach to fisheries in the European context – history and future challenges.** *Journal of Applied Ichthyology* 26(s1): 102-109, 2010.

Notes: The ecosystem approach to fisheries (EAF) is currently a highly topical issue which, in the context of fisheries management, has been controversially discussed during the last decade. The aim of the current analysis was to reveal the historical development of the EAF and put it into perspective of its potential benefits and pitfalls. Current fisheries management approaches of the European Commission and the International Council for the Exploration of the Sea (ICES) to implement an EAF are critically analysed. Shortcomings preventing a successful implementation of an EAF could be thereby identified on all levels, reaching from missing basic knowledge to an insufficient amount of data and questionable management concepts. Ideas how to overcome these shortcomings are discussed and some alternatives to currently planned measures to achieve a sustainable exploitation of fish stocks inside an EAF are suggested. It could be demonstrated that the Maximum Sustainable Yield (MSY) concept in its current form is not suitable to reach the various objectives of an EAF. It is discussed how this concept can be changed to meet the various objectives.

Jordan, S.J., Hayes, S.E., Yoskowitz, D., Smith, L.M., Summers, J.K., Russell, M., and Benson, W.H. **Accounting for natural resources and environmental sustainability: Linking ecosystem services to human well-being.** *Environmental Science and Technology* 44(5): 1530-1536, 2010. **O/A**

Notes: One of society's greatest challenges is to sustain natural resources while promoting economic growth and quality of life. In the face of this challenge, society must measure the effectiveness of programs established to safeguard the environment. The impetus for demonstrating positive results from government-sponsored research and regulation in the United States comes from Congress (General Accountability Office; GAO) and the Executive Branch (Office of Management and Budget; OMB). The message is: regulatory and research programs must demonstrate outcomes that justify their costs. Although the concept is simple, it is a complex problem to demonstrate that environmental research, policies, and regulations cause measurable changes in environmental quality. Even where changes in environmental quality can be tracked reliably, the connections between government actions and environmental outcomes seldom are direct or straightforward. In this article, we describe emerging efforts (with emphasis on the role of the U.S. Environmental Protection Agency; EPA) to frame and measure environmental outcomes in terms of ecosystem services and values – societally and ecologically meaningful metrics for gauging how well we manage environmental resources. As examples of accounting for outcomes and values, we present a novel, low-cost method for determining relative values of multiple ecosystem services, and describe emerging research on indicators of human well-being.

Scott, J.M., Goble, D.D., Haines, A.M., Wiens, J.A., and Neel, M.C. **Conservation-reliant species and the future of conservation.** *Conservation Letters* 3(2): 91-97, 2010. **O/A**

Notes: Species threatened with extinction are the focus of mounting conservation concerns throughout the world. Thirty-seven years after passage of the U.S. Endangered Species Act in 1973, we conclude that the Act's underlying assumption — that once the recovery goals for a species are met it will no longer require continuing management — is false. Even when management actions succeed in achieving biological recovery goals, maintenance of viable populations of many species will require continuing, species-specific intervention. Such species are "conservation reliant." To assess the scope of this problem, we reviewed all recovery plans for species listed as endangered or threatened under the Act. Our analysis indicates that 84% of the species listed under the Act are conservation reliant. These species will require continuing, long-term management investments. If these listed species are representative of the larger number of species thought to be imperiled in the United

States and elsewhere, the challenge facing conservation managers will be logistically, economically, and politically overwhelming. Conservation policies will need to be adapted to include ways of prioritizing actions, implementing innovative management approaches, and involving a broader spectrum of society.

Kaplan, D.M., Planes, S., Fauvelot, C., Brochier, T., Lett, C., Bodin, N., Le Loc'h, F., Tremblay, Y., and Georges, J.-Y. **New tools for the spatial management of living marine resources.** *Current Opinion in Environmental Sustainability* 2(1-2): 88-93, 2010. **O/A**

Notes: Until recently, our ability to implement and assess spatial marine management approaches has been limited by a lack of information regarding processes that bind marine ecosystems, including habitat locations, larval and adult movement, trophic interactions, and fisher behavior. However, recent advances in habitat-mapping technologies, genetics, marine microchemistry, animal tracking and numerical modeling have greatly enhanced our knowledge of these processes. Although these advances have yet to be fully integrated into management decisions, they have the potential to revolutionize spatial marine management. Nevertheless, this revolution will require advances in our ability to share and integrate data into models of marine ecosystems.

Ritchie, H. and Ellis, G. **'A system that works for the sea'? Exploring stakeholder engagement in Marine Spatial Planning.** *Journal of Environmental Planning and Management* 53(6): 701-723, 2010.

Notes: This paper aims to contribute to the current debate on Marine Spatial Planning (MSP) by exploring the issue of stakeholder engagement. MSP is an emergent policy field that is subject to an increasing body of research, yet the role, scope and nature of participatory engagement within the process remains a neglected topic. This paper briefly reviews the nature of the 'marine problem', to which MSP is seen to be the response and describes the emergence of MSP policy in the UK with specific emphasis on participatory aspects. Drawing on the experience of terrestrial planning it discusses the potential benefits of stakeholder engagement in MSP and highlights some of the key issues that need to be taken into account when shaping stakeholder input into the process. It then goes on to describe the findings from a series of interviews with key stakeholders in the Irish Sea Region, which suggest that we need to develop a more critical and deeper understanding of how various interests frame the 'marine problem', and how they see their role in shaping the form of the MSP process. This highlights the importance of encouraging stakeholder involvement in MSP, the need to develop a shared vision of a 'sea interest'. Priorities are then set for research to support this important policy agenda.

Andrzejewicz, E., Otremba, Z., and Kaminska, K. **Ongoing technical activities and conservation measures in maritime spatial planning within Polish Marine Areas.** *Polish Journal of Environmental Studies* 19(3): 553-563, 2010.

Notes: This paper presents an overview of ongoing and planned technical developments and their impact in Polish Marine Areas versus nature conservation measures. Relevant information has been collected through the national contacts, through the screening of available environmental impact assessments (ETA), and from the authors' own experiences. We indicate growing environmental pressures from the new technical installations while some environmental effects are not well understood. We also point out that there is not sufficient knowledge about environmental effects of new large-scale installations (particularly regarding wind power parks, pipelines, and some coastal structures). We recognize potential conflicts with existing traditional activities (such as shipping and fishing) with planned new developments (such as wind farms and some coastal structures) and with the established protection measures (such as HELCOM BSPA and NATURA 2000 areas). Finally, we offer suggestions that should be useful in maritime spatial planning.

Samhouri, J.F., Levin, P.S., and Ainsworth, C.H. **Identifying thresholds for ecosystem-based management.** *PLoS ONE* 5(1): art. e8907, 2010. **O/A**

Notes: *Background* One of the greatest obstacles to moving ecosystem-based management (EBM) from concept to practice is the lack of a systematic approach to defining ecosystem-level decision criteria, or reference points that trigger management

action. *Methodology/Principal Findings* To assist resource managers and policymakers in developing EBM decision criteria, we introduce a quantitative, transferable method for identifying utility thresholds. A utility threshold is the level of human-induced pressure (e.g., pollution) at which small changes produce substantial improvements toward the EBM goal of protecting an ecosystem's structural (e.g., diversity) and functional (e.g., resilience) attributes. The analytical approach is based on the detection of nonlinearities in relationships between ecosystem attributes and pressures. We illustrate the method with a hypothetical case study of (1) fishing and (2) nearshore habitat pressure using an empirically-validated marine ecosystem model for British Columbia, Canada, and derive numerical threshold values in terms of the density of two empirically-tractable indicator groups, sablefish and jellyfish. We also describe how to incorporate uncertainty into the estimation of utility thresholds and highlight their value in the context of understanding EBM trade-offs. *Conclusions/Significance* For any policy scenario, an understanding of utility thresholds provides insight into the amount and type of management intervention required to make significant progress toward improved ecosystem structure and function. The approach outlined in this paper can be applied in the context of single or multiple human-induced pressures, to any marine, freshwater, or terrestrial ecosystem, and should facilitate more effective management.

LeDee, O.E., Nelson, K.C., and Cuthbert, F.J. **The challenge of threatened and endangered species management in coastal areas.** *Coastal Management* 38(4): 337-353, 2010.

Notes: A substantial proportion of U.S. federally listed species inhabit a small fraction of the nation's land mass, the coastal zone. Historically, management in this region has been conflict-ridden among diverse parties interested in natural resource extraction, land use, and conservation. This tension persists today, albeit in a more contemporary form: public access demand versus ecosystem conservation. The focus of this study is the influence of this tension on local-level management of federally threatened and endangered species. We surveyed managers of 43 locations of ecological importance for a threatened shorebird, the Piping Plover (*Charadrius melodus*). Reflecting the federal mandate to accommodate both public access and ecosystem conservation, we detected a shift in mission from sole-purpose initiatives (e.g., public access or ecosystem conservation) to a multiple-use mission (i.e., resource-based recreation). Public access and ecosystem conservation were the primary management goals at surveyed sites, 97 and 93%, respectively. Accessible public recreation is common at most locations; however, active management for listed species is rare. Ultimately, local land managers are accountable for managing coastal sites for dual use, thus the tension; however, coastal management activities have yet to resolve the conflict between concurrent management of public access and ecological requirements of listed species.

Webler, T. and Lord, F. **Planning for the human dimensions of oil spills and spill response.** *Environmental Management* 45(4): 723-738, 2010. **O/A**

Notes: Oil spill contingency planners need an improved approach to understanding and planning for the human dimensions of oil spills. Drawing on existing literature in social impact assessment, natural hazards, human ecology, adaptive management, global change and sustainability, we develop an integrative approach to understanding and portraying the human dimensions impacts of stressors associated with oil spill events. Our approach is based on three fundamental conclusions that are drawn from this literature review. First, it is productive to acknowledge that, while stressors can produce human impacts directly, they mainly affect intermediary processes and changes to these processes produce human impacts. Second, causal chain modeling taken from hazard management literature provides a means to document how oil spill stressors change processes and produce human impacts. Third, concepts from the global change literature on vulnerability enrich causal models in ways that make more obvious how management interventions lessen hazards and mitigate associated harm. Using examples from recent spill events, we illustrate how these conclusions can be used to diagrammatically portray the human dimensions of oil spills.

Shimura, J., Coates, D., and Mulongoy, J.K. **The role of international organisations in controlling invasive species and preserving biodiversity.** *Revue scientifique et technique de l'Office international des Epizooties* 29(2): 405-410, 2010. **O/A**

Notes: Invasive alien species spread through the environment and threaten native biodiversity, assisted by the absence of natural enemies. Alien species may also carry pathogens, which can be transmitted to native species. About half of the known

endangered species are under threat from invasive alien species. The Conference of the Parties to the Convention on Biological Diversity in 2008 invited relevant international organisations to work together to fill the gap in the international regulatory framework on invasive alien species. The Convention also reaffirmed the need for capacity and expertise to deal with invasive alien species in many countries, especially in developing countries. In this paper, the authors review the findings of this project.

Kullenberg, G. **Human empowerment: Opportunities from ocean governance.** *Ocean and Coastal Management* 53(8): 405-420, 2010.

Notes: Stimulus to reach the millennium goals of poverty abatement and empowerment, including education and employment, for the large part of the population in the coastal zone can be found in the resources and services of oceans and coasts; the required financial means, given political will and right priorities, can be provided through implementation of the related international conventions, in particular UNCLOS with the EEZ, the Common Heritage of Mankind and other provisions, Agenda 21 of UNCED and the WSSD 2002 Ocean Targets; the motivation is the necessity to address over-exploitation, depletion and destruction of resources, habitats and coastal ecosystem services, global changes, as well as economic transformations and social conditions of poverty, employment and inequity. Achieving adequate management and protection of natural assets as ecosystems and their services, habitats, biodiversity requires that the socio-economic and human security needs of the coastal populations are met. One way to reach the goal is to enable them, representing about 50% of the global population and increasing, to fight poverty and cope with uncertainties and changing conditions of employment, environment and sustainability through proper governance of the coastal and ocean assets. This includes provision of education and knowledge as regards these assets and their proper uses. They include energy, water, food, transportation and trade, communication, coastal developments, tourism, recreation and ecosystem services, as well as the need to properly manage them. The present economic system cannot fully harmonize with the required governance, partly since the ecosystem resources and services are not internalised in the market-oriented system. This calls for a revised education and training system, more comprehensive than the present, taking into account the social, cultural and environmental requirements, and stressing the sustainable development paradigm. In order to achieve ocean governance and comprehensive human security an understanding of the system is needed. This is substantiated through the Decade of Education for Sustainable Development as well as the Millennium Ecosystem Assessment. The aim here is to discuss some of the issues in context of implementation of related ocean conventions and commitments, which include achieving ocean governance, and to elucidate opportunities given by oceans and coasts, also in generating employment and providing for basic human needs.

Jeffers, J. **Climate change and the Arctic: Adapting to changes in fisheries stocks and governance regimes.** *Ecology Law Quarterly* 37(3): 917-976, 2010. **O/A**

Notes: This Note analyzes climate change impacts on Arctic fisheries and governance structures, and examines the role of science, policy, and law in minimizing future repercussions of such impacts. The Arctic is currently undergoing unprecedented shifts in marine species, and climatic conditions in the region are changing at a rate nearly twice as fast as those at lower latitudes. In addition, long-term climatic changes present entirely new challenges. These ecological and socioeconomic alterations will have a significant effect on fisheries governance structures and interactions between Arctic countries and could potentially destabilize existing management regimes. Positive changes to fishery stock compositions and distributions may also lead to conflicts between Arctic nations due to overlapping jurisdictional claims, unregulated fishing, and a lack of multiregional agreements. The current Arctic regulatory and governance framework is not sufficient in scope and flexibility to adequately address future fishery changes brought on by climate change. This Note suggests that the region needs a new, dynamic management regime in order to successfully negotiate the uncertainties inherent in climate change predictions and anticipate the effects such climatic changes will have on fisheries stocks. I propose four primary components of such a regime: (1) increased overlap of nation-state actors and scientists, (2) institutional nesting, (3) division and management of resources (both in terms of jurisdictional concerns, as well as conservation and utilization principles), and (4) non-political measures. I integrate these components into specific governance options for the future, including the creation of an Arctic regional treaty, an overhaul of the Arctic Council, and the formation of an Arctic-wide Regional Fisheries Management Organization. This

Note concludes that although a regional treaty or agreement is currently unrealistic, overhauling the Arctic Council and establishing a new Arctic Ocean Regional Fisheries Management Organization may be feasible options to create an effective governance regime.

Trathan, P.N. and Agnew, D. **Climate change and the Antarctic marine ecosystem: an essay on management implications.** *Antarctic Science* 22(4): 387-398, 2010.

Notes: In this paper we review evidence for, and anticipated consequences of, climate change in Antarctic marine communities, examining the potential impacts on invertebrates and vertebrates alike and exploring plausible outcomes for species, with examples principally from the Antarctic literature. We suggest that industries with the greatest potential to aggravate climate change impacts on marine communities are marine capture fisheries. In the Southern Ocean, harvesting is governed under the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR). CCAMLR espouses an ecological management framework and so has the capacity to mitigate harvesting impacts such that they do not worsen impacts from climate change. We discuss some of the implications of climate change and advocate that CCAMLR address certain key issues if it is to fulfil its international obligations. It will be essential for CCAMLR to determine relative risks (uncertainties), impacts and timescales, of various processes consequent on climate change. Such risk assessments should be feasible with current knowledge and should provide a focus for future work. We believe it will be important to prioritize issues that reduce impacts and uncertainties by the greatest degree, and propose that future plans should involve shared responsibility (e.g. with SCAR etc.) for each of the risks described.

Sanchirico, J.N., Eagle, J., Palumbi, S., and Thompson, B.H. **Comprehensive planning, dominant-use zones, and user rights: a new era in ocean governance.** *Bulletin of Marine Science* 86(2): 273-285, 2010. **O/A**

Notes: Ocean-zoning arguments often center on the biology of ocean species, the geography of fishing-use patterns, and the need for preventing use conflicts. Here we expand this discussion to the social and legal aspects of ocean zoning, focusing on comprehensive planning, segregation of activities into use-priority areas, and the allocation of user rights within each zone. The inclusion of all of these features within an ocean-zoning regime can be a catalyst for a variety of ancillary benefits, including opportunities for user groups to form informal or formal long-lived institutions and a reassessment of the focus and scope of the regulatory institutions involved in ocean management. Along with the ability of users to negotiate and trade within and between zones, both features will lead to improved conflict resolution, efficiency of use, and ecosystem stability critical components for the production of ecosystem services and maintenance of biological and human economic benefits.

Kenchington, R. **Strategic roles of marine protected areas in ecosystem scale conservation.** *Bulletin of Marine Science* 86(2): 303-313, 2010.

Notes: Responses by management to an increasing range of human uses and impacts on marine ecosystems are a recent phenomenon. They are developing alongside traditional sectoral management of fisheries, shipping, and coastal land uses. Many regimes have been developed for approaching the tasks of integrating management of coastal and marine ecosystems. The role of marine protected areas and conservation agencies in such regimes is often a matter of contention. The application of International Union for the Conservation of Nature (IUCN) protected-area categories to marine ecosystems can cover the broadest range of management regimes, from strict nature reserves with no fishing or collecting to multiple, verifiably environmentally sustainable, levels of use and impact. Here, I address the roles that protected areas and other management categories can play in relation to the multiple scales and strategic objectives for management of marine ecosystems. I draw on experiences of planning, management, and community response to the Great Barrier Reef Marine Park to discuss the opportunities and challenges of using protected-area categories and other strategies in management for conservation and reasonable multiple use at the ecosystem scale.

Beger, M., Grantham, H.S., Pressey, R.L., Wilson, K.A., Peterson, E.L., Dorfman, D., Mumby, P.J., Lourival, R., Brumbaugh, D.R., and Possingham, H.P. **Conservation planning for connectivity across marine, freshwater, and terrestrial realms.** *Biological Conservation* 143(3): 565-575, 2010.

Notes: Conservation plans are usually developed for regions that encompass only one environmental realm (terrestrial, freshwater or marine) because of logistical, institutional and political constraints. This is inadequate because these realms often interact through processes that form, utilize and maintain interfaces or connections, which are essential for the persistence of some species and ecosystem functions. We present a conceptual framework for systematic conservation prioritization that explicitly accounts for the connectivity between the terrestrial, marine, and freshwater realms. We propose a classification of this connectivity that encompasses: (1) narrow interfaces, such as riparian strips; (2) broad interfaces, such as estuaries; (3) constrained connections, such as corridors of native vegetation used by amphibians to move between natal ponds and adult habitat; and (4) diffuse connections, such as the movements of animals between breeding and feeding habitats. We use this taxonomy of inter-realm connectivity to describe existing and new spatial conservation prioritization techniques that aim to promote the persistence of processes that operate between realms.

Lester, S.E., McLeod, K.L., Tallis, H., Ruckelshaus, M., Halpern, B.S., Levin, P.S., Chavez, F.P., Pomeroy, C., McCay, B.J., Costello, C., Gaines, S.D., Mace, A.J., Barth, J.A., Fluharty, D.L., and Parrish, J.K. **Science in support of ecosystem-based management for the US West Coast and beyond.** *Biological Conservation* 143(3): 576-587, 2010.

Notes: Declining ocean health, increasing human demands on marine ecosystems, and a history of management focused on individual activities, species or sectors has led to calls for more comprehensive, integrated management that considers entire coupled social-ecological systems. This transition to ecosystem-based management (EBM) for the oceans will certainly face a number of hurdles, and many practitioners struggle with how to move forward with EBM. In this paper, we assess whether the necessary science exists to support EBM. Specifically, we evaluate the state of the social and natural sciences for three research areas that are critical to EBM: (1) ecosystem services, (2) cumulative impacts, and (3) ecosystem variability and change. For each of the three research areas, we describe its importance to EBM and assess existing and emerging information and application of this knowledge, focusing on the US West Coast. We conclude that available science is not the bottleneck for moving forward with comprehensive EBM for this region, although we highlight important remaining knowledge gaps, particularly within the social sciences. Given imperfect and uncertain knowledge, EBM calls for an adaptive management approach, starting with readily available information, and continuously adapting as new information emerges. This synthesis can serve as a basis for comparison for other regions; it provides guidance for organizing information in support of EBM and outlines many novel and broadly applicable scientific approaches.

Koivurova, T. **Limits and possibilities of the Arctic Council in a rapidly changing scene of Arctic governance.** *Polar Record* 46(237): 146-156, 2010.

Notes: In a very short time, discussions on Arctic governance have moved from being a topic of scholarly attention and NGO advocacy onto the agendas of states and of the European Union (EU). Increasingly, the various alternatives propounded by a diverse set of actors over what Arctic governance should look like appear as pre-negotiation tactics, a type of testing period before a regime change. The article examines whether the still predominant inter governmental forum, the Arctic Council, is facing a threat of being supplanted by other forms of governance. It will study how resistant the Arctic Council, and its predecessor the 1991 Arctic Environmental Protection Strategy, are to change in order to understand whether the council could renew itself to meet future challenges. It will also examine the various proposals for Arctic governance set out by states, the EU and the region's indigenous peoples. All this will permit conclusions to be drawn on where the Arctic Council stands amid all these proposals and whether, and in what way, it should change to support more sustainable governance in the Arctic.

Hemmings, A.D. and Stephens, T. **The extended continental shelves of sub-Antarctic Islands: implications for Antarctic governance.** *Polar Record* 46(239): 312-327, 2010.

Notes: This article considers the legal and policy issues surrounding the establishment of continental shelves beyond 200 nautical miles (nm) from sub-Antarctic islands. Under the 1982 United Nations Convention on the Law of the Sea (UNCLOS) a coastal state may establish a continental shelf that extends seawards beyond 200 nm where the continental shelf continues, normally to a total distance of no more than 350 nm. To establish such an extended continental shelf (ECS) a coastal state must file a submission of delineation data with the Commission on the Limits of the Continental Shelf (CLCS), a technical body established by UNCLOS. The rights of coastal states present particular difficulties in the Antarctic Treaty area (ATA), due to the general non-recognition of the seven territorial claims and the provisions of article IV of the Antarctic Treaty. Accordingly, Antarctic claimant states are generally adopting a restrained approach to the issue of ECS as appertaining to claimed territories in Antarctica in their submissions to the CLCS. These states appear to recognise that they cannot secure the normal prerogatives of a coastal state from territorial sea baselines within the ATA, at least for the duration of the present Antarctic Treaty system (ATS). A different approach is being taken with respect of sub-Antarctic islands lying north of the ATA. Sovereignty over sub-Antarctic territory north of the ATA is, with the exception of South Georgia and the South Sandwich Islands, not contested. Accordingly, rights in relation to any continental shelf attaching to sub-Antarctic islands may be realised, apparently without challenging the Antarctic *modus vivendi*. However, the ECS of several sub-Antarctic islands penetrate the ATA. In 2008, the CLCS largely endorsed the 2004 Australian submission that included data on ECS from Australia's sub-Antarctic islands of Macquarie Island and the Heard and McDonald group. The ECS from both groups penetrates south of 60°S into the ATA, in the case of Heard and McDonald covering a huge area. Although the wider dispute regarding sovereignty between the United Kingdom and Argentina adds complexity to the case, the South Sandwich Islands are sufficiently close to the ATA that their continental shelf also penetrates the area. In the event that the CLCS were ever able to make a recommendation on a submission of data relating to the South Sandwich Islands (something that could only occur with the consent of Argentina and the United Kingdom) the result would be a situation similar to that pertaining to the Australian sub-Antarctic islands. The consequence of these developments is that rights to seabed areas within the ATA have been assigned to individual states. On the face of it, this appears to be in conflict with the norm of collective responsibility that was established by the Antarctic Treaty 50 years ago precisely to constrain sovereignty issues in the region. What is suggested by this practice is a difference in the attitude of Antarctic Treaty Consultative Parties (ATCPs) to rights generated from territory *within* the ATA and rights generated from *external* territory. Nonetheless, there may be significant implications flowing from the latter for resource issues within the ATA. Minerals exploitation on sub-Antarctic extended continental shelf within the ATA is precluded in the near-term because of cost, the formal prohibition under article 7 of the 1991 Protocol on Environmental Protection to the Antarctic Treaty, and the fact that all sub-Antarctic coastal states are ATCPs. However the situation in regard to other resource activities is less clear. Bioprospecting could proceed subject to coastal state approval pursuant to the provisions of UNCLOS relating to marine scientific research, and there is no mandatory regulation under the ATS. The possibility that a coastal state may seek to realise rights on the ECS in relation to genetic resources may complicate collective ATS approaches and pose wider geopolitical challenges. In the longer term, the fact that some Antarctic states are presently seeking to secure rights that are essentially about ensuring their preclusive access to resources may have significant implications for strategic interests in the greater Antarctic region.

Parker, R.D. and Madjd-Sadjadi, Z. **Emerging legal concerns in the Arctic: sovereignty, navigation and land claim disputes.** *Polar Record* 46(239): 336-348, 2010.

Notes: With global warming, the clearance of the Northwest Passage and the rising demands for new energy resources, the sovereignty of Canadian and other national land claims in the Arctic north is coming into question by those wishing to control access to this region. The present paper examines issues involving emerging landmasses, maritime rights, strategic control and navigation, perhaps the most important variable, and the consequences in terms of commercial economies and geopolitical impacts. We consider many variables such as the 1982 Falkland Islands war as a demonstrative example that may have translatable impact in future years. Our purpose in this paper is to raise awareness of impending geopolitical activities that are inevitable during the 21st century as the Arctic pack ice retreats.

Matisoff, D.C. **Are international environmental agreements enforceable? Implications for institutional design.** *International Environmental Agreements* 10(3): 165-186, 2010.

Notes: Over the past several decades, European international environmental institutions have evolved, heeding institutionalist calls for stronger institutions backed by sanctioning and dispute settlement mechanisms. This apparent increase in institutional strength has led to a corresponding increase of the behavioral effectiveness, or active compliance management of institutions as observed in the incidence of arbitral tribunal decisions. However, upon closer examination, it is apparent that this behavioral effectiveness has not been exclusively due to provisions for arbitral tribunal decisions within international environmental agreements. Rather, the incidence and enforcement of these arbitral tribunal decisions is linked to the institutional design of the enforcement mechanisms. Most international environmental agreements rely on parties to raise disputes and enforce commitments, causing individual countries to bear the cost of enforcement. In addition, bringing a dispute to an arbitral tribunal requires the accordance of the parties to the dispute. In contrast, the European Court of Justice allows for enforcement to originate from a strong central authority and for the cases of arbitration to be filed unilaterally. International environmental agreements that have been joined by the European Community and have a provision for an arbitral tribunal have stronger enforcement mechanisms, are more likely to result in enforcement action, and are more effective in generating behavioral change.

Gareau, B.J. **A critical review of the successful CFC phase-out versus the delayed methyl bromide phase-out in the Montreal Protocol.** *International Environmental Agreements* 10(3): 209-231, 2010.

Notes: The Montreal Protocol is often described as an international environmental agreement *par excellence*. After all, it successfully led to the phase-out of almost 95% of all chlorofluorocarbon (CFC) use. A critical review of the Protocol's history, however, suggests that its successes are deeply entrenched in the economic opportunities that were made available to phase out CFCs. The Montreal Protocol, in other words, was a "bestcase scenario" for CFC producers. This may be problematic for policymakers, ecological modernization practitioners, and other scholars who look to the Montreal Protocol for guidance in phasing out other global environmentally harmful substances and practices that are not as "economically efficient." The shift to delay the phasing out of methyl bromide (MeBr) in the Protocol, an ozone-depleting substance used to this day primarily in strawberry and tomato production, demonstrates how even this most successful of international environmental agreements can become subject to significant setbacks when economic gains and scientific evidence are not obvious to the global powers. Furthermore, changes in what constitutes a viable exemption to the phase-out of CFCs versus MeBr marks a shift away from concern for the general functioning/welfare of society, and toward concern for the market performance of specific individuals. This shift runs parallel to a lack in economic incentives to phase out MeBr in the United States. The article demonstrates how civil society representation in ozone politics is largely dominated by industry interests, especially when scientific uncertainty is high.

Biermann, F., Betsill, M.M., Gupta, J., Kanie, N., Lebel, L., Liverman, D., Schroeder, H., Siebenhüner, B., and Zondervan, R. **Earth system governance: a research framework.** *International Environmental Agreements* 10(4): 277-298, 2010.

Notes: The Earth System Science Partnership, which unites all major global change research programmes, declared in 2001 an urgent need to develop "strategies for Earth System management". Yet what such strategies might be, how they could be developed, and how effective, efficient and equitable such strategies would be, remains unspecified. It is apparent that the institutions, organizations and mechanisms by which humans currently govern their relationship with the natural environment and global biochemical systems are not only insufficient -- they are also poorly understood. This article presents the science programme of the Earth System Governance Project, a new 10-year global research effort endorsed by the International Human Dimensions Programme on Global Environmental Change (IHDP). It outlines the concept of earth system governance as a challenge for the social sciences, and it elaborates on the interlinked analytical problems and research questions of earth system governance as an object of study. These analytical problems concern the overall architecture of earth system governance, agency beyond the state and of the state, the adaptiveness of governance mechanisms and processes as well as their accountability and legitimacy, and modes of allocation and access in earth system governance. The article also outlines four crosscutting research themes that are crucial for the study of each analytical problem as well as for the integrated understanding of earth system governance: the role of power, knowledge, norms and scale.

Curtin, R. and Prellezo, R. **Understanding marine ecosystem based management: A literature review.** *Marine Policy* 34(5): 821-830, 2010.

Notes: Ecosystem based management takes into account the interconnectedness and interdependent nature of ecosystem components and emphasizes the importance of ecosystem structures and functions which provide a range of services. The concept has now been adopted by many international agreements and national governments and is in the process of being implemented. This paper seeks to review the literature and to analyze the understanding of the subject. The term is defined and its implementation in fisheries and for all marine uses is analyzed. It has been concluded that to understand marine ecosystem based management one must consider ecosystems as complex adaptive systems which can show changes at higher levels from actions and processes occurring at lower levels. Recognizing that humans are part of these complex adaptive systems is vital in that their actions along with other processes can lead to transformations in ecosystem functioning. This recognition is also important to show how society can sustainably exploit these resources and that the inclusion of all stakeholders in the management process is necessary to legitimize the process. The uses of the precautionary principle along with adaptive management are seen to be useful tools in implementing these insights into the management of natural resources. Finally, the need for reducing consumption of fish is considered.

Mahon, R., Fanning, L., McConney, P., and Pollnac, R. **Governance characteristics of large marine ecosystems.** *Marine Policy* 34(5): 919-927, 2010.

Notes: The Large Marine Ecosystem (LME) concept is widely established as a large-scale approach to coastal and marine management. LME-oriented activities have focused mainly on natural sciences. Socioeconomic and governance aspects have only recently been receiving increased attention. The 64 LMEs that have been defined appeared to exhibit considerable diversity in characteristics that would be expected to affect governability. This paper explores two questions: (1) Do the LMEs vary widely enough in geopolitical complexity that different approaches to governance may be required for different LMEs? (2) Are there groups of LMEs within which one might take similar approaches to governance? The analysis demonstrates that there is considerable heterogeneity among LMEs with regard to characteristics that would be expected to affect governability. It concludes that a diversity of governance approaches will be required to cope with this heterogeneity. It also appears that LMEs can be grouped according to these characteristics. This suggests that different approaches could be considered for clusters rather than for individual LMEs and that there can be sharing of experience and learning within clusters. The types of relationships between features of LMEs and the 'best' approaches to marine governance are discussed in the context of emerging governance ideas.

Foley, M.M. *et al.* **Guiding ecological principles for marine spatial planning.** *Marine Policy* 34(5): 955-966, 2010.

Notes: The declining health of marine ecosystems around the world is evidence that current piecemeal governance is inadequate to successfully support healthy coastal and ocean ecosystems and sustain human uses of the ocean. One proposed solution to this problem is ecosystem-based marine spatial planning (MSP), which is a process that informs the spatial distribution of activities in the ocean so that existing and emerging uses can be maintained, use conflicts reduced, and ecosystem health and services protected and sustained for future generations. Because a key goal of ecosystem-based MSP is to maintain the delivery of ecosystem services that humans want and need, it must be based on ecological principles that articulate the scientifically recognized attributes of healthy, functioning ecosystems. These principles should be incorporated into a decision-making framework with clearly defined targets for these ecological attributes. This paper identifies ecological principles for MSP based on a synthesis of previously suggested and/or operationalized principles, along with recommendations generated by a group of twenty ecologists and marine scientists with diverse backgrounds and perspectives on MSP. The proposed four main ecological principles to guide MSP – maintaining or restoring: native species diversity, habitat diversity and heterogeneity, key species, and connectivity – and two additional guidelines, the need to account for context and uncertainty, must be explicitly taken into account in the planning process. When applied in concert with social, economic, and governance principles, these ecological principles can inform the designation and siting of ocean uses and the management of activities in the ocean to maintain or restore healthy ecosystems, allow delivery of marine ecosystem services, and ensure sustainable economic and social benefits.

Cullis-Suzuki, S. and Pauly, D. **Failing the high seas: A global evaluation of regional fisheries management organizations.** *Marine Policy* 34(5): 1036-1042, 2010.

Notes: Regional fisheries management organizations (RFMOs) collectively manage the largest distinct area of the world, the high seas, but their effectiveness in conserving the fish stocks therein has been questioned lately, as many stocks have declined. This study quantitatively assesses the effectiveness of the world's 18 RFMOs, based on a two-tiered approach, concentrating first on their performance 'on paper' and secondly, in practice. The former was determined by assessing how well RFMOs scored against 26 criteria that together reflect current RFMO best practices. The latter assessment referenced the current state of the stocks RFMOs manage, through biomass and fishing mortality reference points and biomass trends through time. Results show low performance of RFMOs for both assessments, i.e., average scores of 57% and 49%, respectively. The latter result is emphasized by findings that reflect two-thirds of stocks fished on the high seas and under RFMO management are either depleted or overexploited. Findings also indicate that there is no connection between the two sets of scores, suggesting a disparity between organization intent and action.

Khalilian, S., Froese, R., Proelss, A., and Requate, T. **Designed for failure: A critique of the Common Fisheries Policy of the European Union.** *Marine Policy* 34(6): 1178-1182, 2010.

Notes: The Common Fisheries Policy (CFP) of the European Union has neither lived up to its aim of enhancing the sustainability of fish stocks nor that of improving the economic competitiveness of the fishing industry. This paper discusses the failure of the CFP from a biological, economical, legal and political perspective.

Tissot, B.N. *et al.* **How U.S. ocean policy and market power can reform the coral reef wildlife trade.** *Marine Policy* 34(6): 1385-1388, 2010.

Notes: As the world's largest importer of marine ornamental species for the aquaria, curio, home decor, and jewelry industries, the United States has an opportunity to leverage its considerable market power to promote more sustainable trade and reduce the effects of ornamental trade stress on coral reefs worldwide. Evidence indicates that collection of some coral reef animals for these trades has caused virtual elimination of local populations, major changes in age structure, and promotion of collection practices that destroy reef habitats. Management and enforcement of collection activities in major source countries such as Indonesia and the Philippines remain weak. Strengthening US trade laws and enforcement capabilities combined with increasing consumer and industry demand for responsible conservation can create strong incentives for improving management in source countries. This is particularly important in light of the March 2010 failure of the parties to the Convention on International Trade in Endangered Species (CITES) to take action on key groups of corals.

Østerblom, H., Gårdmark, A., Bergström, L., Müller-Karulis, B., Folke, C., Lindegren, M., Casini, M., Olsson, P., Diekmann, R., Blenckner, T., Humborg, C., and Möllmann, C. **Making the ecosystem approach operational – Can regime shifts in ecological- and governance systems facilitate the transition?** *Marine Policy* 34(6): 1290-1299, 2010.

Notes: Effectively reducing cumulative impacts on marine ecosystems requires co-evolution between science, policy and practice. Here, long-term social-ecological changes in the Baltic Sea are described, illustrating how the process of making the ecosystem approach operational in a large marine ecosystem can be stimulated. The existing multi-level governance institutions are specifically set up for dealing with individual sectors, but do not adequately support an operational application of the ecosystem approach. The review of ecosystem services in relation to regime shifts and resilience of the Baltic Sea sub-basins, and their driving forces, points to a number of challenges. There is however a movement towards a new governance regime. Bottom-up pilot initiatives can lead to a diffusion of innovation within the existing governance framework. Top-down, enabling EU legislation, can help stimulating innovations and re-organizing governance structures at drainage basin level to the Baltic Sea catchment as a whole. Experimentation and innovation at local to the regional levels is critical for a transition to ecosystem-based management. Establishing science-based learning platforms at sub-basin scales could facilitate this process.