

Charting New Waters: Markets for Marine Megafauna

Introduction

As the past few centuries have unraveled, species extinctions progressively escalated to 1,000 times background rates, and land conversion to human use, particularly in the last 50 years, became the leading cause of plummeting biodiversity levels (Groombridge and Jenkins, 2002). These grim trends correspond with concentrated bouts of human population growth that galvanize resource extraction and put stress on natural systems that are an essential foundation to global livelihoods and welfare. Many wildlife species that are integral to supporting ecosystem dynamics are common pool resources (CPRs). CPRs are commonly targeted by users with the aim of extracting short-term benefits, and this widespread issue has endangered the sustainability of economically-important species. Collective action measures around CPRs hinge upon convergence of local land users, hunters, local government and the international community, all of whom have different interests in the resource, its welfare, and repercussions of consumption (Dietz, 2003). Gridlock may occur when the species is deemed both a resource and a nuisance by different parties (Horan, 2004; Bulte et al., 2008). Moreover, CPRs that are migratory species, traversing territories and possibly crossing multiple jurisdictions, are particularly problematic (Allen, 2010; Cervený, 2013).

Policy attempts to capture and perpetuate the value of nature's beneficial goods and processes, including those provided by wildlife, have merged on economic solutions, such as payments for ecosystem services, ecotourism, recreational hobbies (i.e. observing wildlife in their native habitat), hunting licenses, and proposals to legalize the trade in prized animal products (Kinzig et al., 2011; Ceballos-Lascurain, 1996; Baldus et al., 2008; CITES Decision-making; Conrad, 2012). Markets have proven to be an effective agent for conferring real value to natural infrastructure, though the validity of the monetary figure is unsettled. They also signal to users an approximate level of abundance or scarcity of a resource and give some indication of its importance (Sandler, 2004). Hence, rights-based solutions stand to be instrumental as more natural resources face the risk of overexploitation and/ or under-provision of proper control mechanisms that support soft infrastructure (i.e. rules) (Hilborn et al., 2005). Economic solutions may be able to ensure the long term utility of natural resources to ecosystem function and human development as long as they uphold ethical relevance, stay true to the tenants of collective action, and obey rigorous economic principles. Granted, market solutions are not a panacea, but there are settings and species for which they are an appropriate strategy, and this warrants investigation.

In "wildlife markets", secure and tradable rights to a resource are allocated among users, and together with an effective mechanism to monitor the use of the rights, can lead to sustainable outcomes (Fujita et al., 2013; Fischer, 2010; Biggs et al. 2013; Kinzig et al., 2011; Pinkerton, 1989). One type of wildlife market, "catch shares", has been applied to the management of fisheries worldwide. With the threat of collapse looming over large mismanaged fisheries, catch shares have helped overexploited fish populations recover biologically and economically (Wilder, 1995; Costello, 2012; Minter, 2009; Tientenberg, 2006; Arnason, 2012; Grafton, 2006; Costello, 2008). Instituting catch shares where quotas are already in place for large marine species, such as sharks and sea turtles, could be an improvement to the efficiency and accountability of marine regulation and other at-risk wildlife populations (Essington, 2012).

Marine resources in particular are a critical asset to commercial and subsistence interests worldwide for nutrition and income; yet, they are inadequately managed relative to their demand and importance. The problem of overexploitation arises from constraints inherent to marine resources and aspects of marine megafauna biology (e.g. low reproductive rates, long-ranging migrations, unique histories and relationships with humans that evoke strong preferences) (Hirata, 2004; Roman et al., 2013). Most notably, there is no authorized jurisdiction of the open ocean, stakeholders are very heterogeneous, and there is limited available knowledge on marine wildlife. In addition, this collection of species is susceptible to a variety of accidental yet deleterious human impacts (bycatch, vessel strikes, etc.) (Notarbartolo-di-sciara, 2013). Because of these factors, solutions to successfully govern marine species, to which whales are no exception, have generally evaded policy makers. Any robust institutional arrangement for marine megafauna must acknowledge the limitations of governing marine resources and compliment the highly variable attributes of the global community.

In attempt to progress beyond the current stalemate of international whale management, Costello et al. (2012) expounded on a conservation market for cetaceans in which stakeholders could buy and sell the rights to preserve or harvest whales. What would be the result of broadening the economic paradigm of wildlife markets employed solely in fisheries to a policy that incorporates protectionist interests? Using whales as an illustrative example, this analysis explores the potential for markets to be a socially acceptable, economically efficient, and biologically sustainable solution for certain wildlife plagued by a commons dilemma, and in doing so, will identify the key considerations for rights-based management of threatened species. A socio-ecological lens is used *vis à vis* the Institutional Analysis and Development (IAD) and robustness frameworks to develop a comprehensive understanding of the associated value tradeoffs.

A Brief History of Whale Management

The International Whaling Commission (IWC) has remained the primary platform for whaling discourse throughout its gradual transitions from a utilitarian scheme to one of sustainable practice to a preservationist, animal welfare model. It was established in 1946 as strictly a fishing enterprise with the primary responsibility to set catch quotas but lacked systemically reinforced ecologically or ethical obligations (Gambell, 1993). The intention was for stewardship practices set by the Commission to guide and complement whaling activity at the national level while also safeguarding stocks and defending against indirect threats to whales. The autonomy with which the IWC entrusted member nations failed to wholly integrate into domestic policies and led to overfishing, despite admonition (MMC, 1973; Caron, 1995). In light of depleting stocks, the Scientific Committee, appointed in 1961, adopted rigorous science-based stipulations (Gambell, 1993). This standard was satisfactory until the 1970s environmental movement, which prompted moral inquiry into the industry and practice of culling wildlife and, simultaneously, instigated political tensions between whaling and non-whaling nations (Scheiber, 1998; Caron, 1995).

Incremental revisions to the Commission's laws have paralleled the expanding scientific knowledge of cetaceans and leading ethical stances through time. A full-fledged moratorium took effect in 1986 as a temporary fix until the setting of catch limits was resolved. The moratorium partly stemmed from the shortage of biological data and hesitation over the acceptability of whaling. Buttressing the moratorium, today there exist marine protected areas on

the high seas and nationally defined marine sanctuaries (iwc.int/home). For example, the United States mandates no take of cetaceans by order of the National Oceanic and Atmospheric Administration's (NOAA) 1972 Marine Mammal Protection Act (NMFS, 2012). Whale populations have recovered since the moratorium took effect in 1986, though leverage of the IWC is teetering (SH 2007; Roman et al., 2013).

While all commercial whaling is banned and few stakeholders still have a vested interest in preserving the age-old activity, whaling persists in three exceptional cases: among aboriginal subsistence communities for which there are stipulations to confirm this status, whaling with a scientific permit, and whaling under the objection clause. All exclusions are liable to a quota (iwc.int/home). Because the US is the *de facto* leader of the IWC, its inclination towards whale preservation colors the landscape. The US and its cohort of allies of the Western world control policies that are ultimately enacted. Animal rights activists agree with the notion that whales are superior entities worthy of moral respect. On the other hand, whales are heavily sought after among select groups worldwide for their economic and cultural value. Some subsistence communities (recognized by the IWC in Denmark, Russia, St. Vincent and the Grenadines, and the USA) regard whales with reverence but continue the tradition of killing them for nutrition and to sustain ceremonious hunts that are cultural centerpieces (Reeves, 2002). Unrest remains over the moratorium mostly because of commercial industries in Iceland and Norway. Not without controversy, it also continues in Japan where whaling is by scientific permit. Recent studies have confirmed that the country contributes no substantive data or scientific insight to the field (Mangel, 2013). Reportedly, most whale meat they collect goes unsold because Japanese consumer interest in the protein has sunk dramatically since the 1960s (IFAW, 2013).

Other salient threats to whales include bycatch, vessel strikes, pollution, climate change, plastic ingestion, disease, prey depletion, entanglement, and acoustic disturbances (Notarbartolo-di-sciara, 2013), all of which are exaggerated by growing human populations, especially in coastal regions. Also, species stationed at the top of the food chain accumulate high contaminant loads, and the resource is always in a state of constant uncertainty because accurate population data is limited (Roman et al., 2013). Narrowing in on one of the problems, excessive bycatch illustrates the lack of enforcement troubling marine management. Since 30-40 years ago when targeted hunting was more prolific, the table has now turned towards non-targeted yet deliberate catches. Hunting overall has not relented because secondary catches are still consumed, targeted or not. The total capture rate, despite the method or intention, remains high and is motivated by ill-enforced consequences (Robards, 2011). An important consideration for marine megafauna management is whether markets have the scope to confront the slew of exogenous shocks whales suffer. These concerns are punctuated by heightening demand in growing economies, like China, where increases in income correspond to increased consumption of luxury food items, like fish and a variety of exotic products (Gale and Huang, 2007).

If the reinstatement of whaling is judged favorably by popular vote, the IWC has prepared a scientifically robust plan called the Revised Management Procedure, but the majority currently approves of the moratorium (iwc.int/rmp). As demonstrated by the historical feedbacks between attitudes towards wildlife, scientific knowledge, economic drivers, and policy for whaling, it is important to understand what value systems bear on a debate that has become dominated by everything but economic reasoning. Revisiting the policy through an analytical lens is entirely

necessary with the hope of boosting institutions, like the IWC, out of fixed pathways in order to sustain wildlife populations.

A Creative Option Beyond the Moratorium

The proposal for a “whale market” arose from the impetus to dissolve mounting social pressure around international whaling. Paradoxically, species that are most taxing to manage often pique human sentiment and the desire to protect them. Large-bodied, long-lived species are particularly susceptible to exploitation (Schipper et al., 2008). For example, rare African trophy animals are highly valuable in markets, but their inherent vulnerability is compounded by multiple anthropogenic stressors (Johnson et al., 2010). This vulnerability to exploitation is magnified for marine megafauna because of the cumulative effect of multiple threats and a relative paucity of biological information (Schipper et al., 2008; Ressurreicao et al., 2011). From an economic standpoint, being labeled ‘endangered’ is a dominant influence on willingness-to-pay (WTP) for the protection of a species (Tisdell et al., 2007). Ethical attitudes toward the moral status of animals or species may lead individuals to assign a relatively high WTP and to favor a complete moratorium on harvest for megafauna. At the same time, management founded in the recovery of imperiled species has a relatively low return on investment and currently garners inadequate conservation funds (Clark, 1973^{A,B}), making extinction the most economically efficient option in the short term (Clark, 1973; Martin-Lopez et al., 2008; Martin-Lopez et al., 2009). In the Western world, there is evident bias towards the protection of charismatic species, yet there is also popular support for broader objectives of biodiversity conservation (Ressurreicao et al., 2011). A wildlife market offers an approach to achieve conservation goals given limited financial resources (Costello et al., 2012; Minter and Gerber, 2013).

Stakeholders whom would ideally become shareholders in a wildlife market, and thus, owners of whale quotas, espouse a mixture of environmental attitudes towards whales that manifest in diverse preferences for types of whale management. Generally, there are distinct camps of actors, those who seek to preserve animal populations and those that would elect to harvest them. Within each of these designations is a spectrum of viewpoints regarding the use of animals, spanning from animal welfare advocates and conservation scientists to subsistence and commercial harvesters. Stakeholders also include recreational shareholders, local advocates, and larger scale conservation groups. Adamant resolve for mammal preservation is more striking than typically ambivalent or unfavorable perceptions bestowed upon other taxa, like reptiles and invertebrates (Kellert, 1982). Universal compliance, however, is rare when dealing with shared resources, and markets currently do not exist for resources that raise deep ethical quandaries, like charismatic wildlife (Minter, 2000). In fact, the moral of markets for such species has implications that are subject to scrutiny.

Preservationists pulled by ethical arguments suggest that a market for wildlife fails to account for hidden costs and benefits and simply buys into the incomplete notion that wildlife lead to economic ends (Sandler, 2004). Can we put an accurate price on an animal that properly reflects its ecological and ethical significance? Doing so would appease a fraction of stakeholders oriented towards the monetary facets of natural resources, but it is possible that commodification of a non-market good erodes our moral commitment to non-human species? In response, one could question whether it matters that a market misses the full spectrum of values for whales as long as it works for conservation and does not undermine the capacity for those other values to

be realized (Minteer & Gerber, 2013). Other issues of wildlife markets voiced in opposition to a whale market are economically related, which Gerber et al. address in turn (*in press*^B). Conservation market critics assert that some resource users object to markets and would not participate while others may free ride on the contribution of like-minded stakeholders and also opt out of a market, leading to sub-optimal outcomes. If conservation organizations overtake the market, whale shares would essentially become buyouts for whalers (Gerber et al., *in press*^{A, B}).

Beyond constraints imposed by attributes of the community and functionality of the rules, the biophysical context of the resource strongly influences acceptability and participation of stakeholders in a market for wildlife. Whale management is marked by a host of challenges because of cetacean biology and behavior. Firstly, whales inhabit the open ocean, making them common-pool resources that are non-excludable and subtractive. Like other large marine species, whales are highly migratory, which dampens the capacity for institutions to effectively uphold proper incentive structures when enforcing compliance to the rules. They are an integral link in marine trophic systems (Roman and McCarthy, 2010), for extirpation of a few individual whales has large implications for the population; the magnitude of killing a few is greater for species with long life spans and births of a few offspring interspersed over time, intimating that the loss of a few whales contributes to higher order effects at the community or ecosystem level (Lewison et al., 2004).

Assessment of a Market for Whales

Policies operate on short time scales and can be adjusted to prime stakeholders for bigger, imminent social transformations. For whales, attitudinal shifts that penetrate policy amendments are largely propelled by environmental ethics and biological triggers. Ethical approaches take a slower but more enduring route to change behavior by infiltrating value systems at the core of natural resource management. Until social changes occur, an improved whaling regime can rectify divisive political views not by developing a single, uniform policy but by adopting a mixed-management system. Commercial whaling is enmeshed in broader social, economic, and ecological issues and processes, and must be dealt with sensitively. Even so, conscious objectors to the moratorium are in the minority, so a market for whales is a curious imposition on a regime holding fast to all-out whale preservation. Most concerning is that starting a market would displace moral calculations with economic ones, and in doing so, could stimulate a market that is already dissipating (Sandel, 2005; IFAW, 2013; Gerber et al., *In Press*^B).

The capacity of institutions at any scale to monitor and sanction activity that occurs on the open ocean is low and the expense of providing that public infrastructure is lofty. Some prohibitory management features of a market, therefore, are shared by all policy attempts to govern the commons no matter the strategy or species, while other policy nonstarters are unique to whales because of their special status. Nonetheless, there are existing, more capable governing bodies than the IWC, such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). I recommend that the IWC consider collaboration with international organizations.

Since entering into force in 1973, “CITES is one of the world's most powerful tools for biodiversity conservation...” (Vincent et al., 2013). Their meetings also have wide participation from observer delegates like NGOs and IGOs (Vincent et al 2013). Not only does CITES have

enforcement clout, it prolifically collects data on species and could provide information where there is currently uncertainty in marine species. Moreover, 178 countries are members of CITES (89 countries are IWC members (Reeves, 2002)), so the legality and competence to track stakeholder exchanges and cope with the inevitable difficulties associated with the wildlife trade would not be undermined. In 2013, CITES met to consider subsuming traded marine fish within its jurisdiction, which further validates the prospective role of CITES in marine megafauna management (Vincent et al., 2013). That same year, CITES moved five sea sharks and rays onto a growing list of other sharks and sea turtles under the Appendix II listing. Trade is now permissible but highly regulated in these species, a landmark decision given that many shark fisheries are exacerbated by demand in Asian markets (Inskipp and Gillett, 2005; CITES History; Liu et al., 2013).

The improbability of a market for whales does not dismiss the potential for markets of other marine megafauna. Though sharks and rays have different characteristics than whales (as a product of disparate evolutionary lineages), they are similar in that they are severely threatened by human activity and are equally cumbersome to monitor and sanction. At the same time, stakeholders are more receptive to the trade of sharks, sea turtles, and rays. Because these species inhabit existing fishery zones (and are at risk because of intensive human activity there), they are more amenable to enforceable rights-based management. NOAA seeks to expand catch share programs and are currently considered for them for other marine megafauna (e.g., Atlantic sharks, Baja sea turtles (Senko et al., 2013; NMFS, 2011)), which highlights the emerging importance of wildlife markets in marine settings. Current NOAA policy specifies a TAC, among other regulations, for shark fisheries in the US (NOAA Fisheries Fact Sheet), and similar laws apply to other coastal countries. Caps on total fishery bycatch also control the removal of sea turtles (e.g. the Hawaiian long-line fishery (NOAA Fisheries Division)), but individual bycatch limits would impose costs for exceeding the allotted share (Senko et al., 2013). Such promising policies endorse the potential for rights-based strategies to manage marine megafauna.

Conclusion

Mired by controversy, the IWC has much progress to make by way of improved policy decisions that replace the currently tenuous moratorium on commercial whaling. Though IWC meetings are inclusive, involving the broad stakeholder participation, it is fully aware of its insufficiencies and regularly convenes to address them (The RMP, 2013). Considering the costs and benefits of rights-based management on the high seas, a market for whales does not appear advisable. A market is not robust because the IWC is weak as a policing force and the biophysical context is a poignant vulnerability, as it impairs critical monitoring and sanctioning. Reports of recovering whales stocks over recent decades are encouraging, and if demand for whale meat is both isolated and declining naturally, the impetus for a rights-based strategy to conservation is too weak for further action. In addition, a market for whales raises a host of ethical and socio-economic questions that are not worth stoking for the gains a whale market may reap. Rather, no-take zones coupled with quota-based systems where whaling persists, is worth continuing, seeing as it echoes the majority of both preservationist and harvest-minded stakeholders. Wildlife markets should be explored more in-depth for alternative marine megafauna because of the ominous list of stressors from which they suffer and the opportunity to ally with existing fisheries with catch share programs. More apt international partners, like CITES, should be prompted for collaboration in order to improve rates of abundance to the rules.

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