Marine Capture Fisheries—A Call to Action in Response to Limits, Unintended Consequences, and Ethics

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Millions of coastal communities depend upon the sea for their livelihoods and/or a significant portion of their protein intake. Yet there has been relatively little response globally from Christians involved in development, research or aid. In this context, we examine three critical questions regarding marine capture fisheries: (1) Are there limits to exploitation? (2) Are there unintended consequences to fishing? and (3) Is it ethical to eat fish? We seek to answer these three questions through recent examples from the fisheries literature, the authors' own research and examination of biblical texts. We conclude that marine capture fisheries in many places are at or beyond a point of crisis – we have reached or surpassed limits. The ways in which we have fished have had unintended, or intentionally ignored, consequences. And there are many ethical and theological issues that we have only begun to consider as a Christian community.

Humans and Fishing

The world's oceans cover about 71% of the planet's surface, contain over 97% of the planet's water, and are home to millions of species, many yet undescribed. Humanity has been intrinsically connected with the sea for centuries,[1] with upwards of 16% of the world's animal protein currently coming from fish.[2] When referring to "fisheries," we are specifically referring to the human-ecological system, involving both people and aquatic animals or ecosystems, in which people capture marine organisms primarily for food. Recent research suggests that only by recognizing and working within a framework which incorporates humans into ecosystems (often called socio-ecological systems) can we sustainably harvest the abundance of the ocean.[3]

Currently, human reliance on fish varies regionally, with some nations relying primarily on terrestrial animal protein for food, while others rely more on marine life, such as Indonesia, where upwards of 70% of the nation's animal protein comes from fish. Overall, the world's capture fisheries harvest plateaued in the early 1990s at about 85 million metric tons, and increases in fish availability since then have been due to increasing aquaculture production. Aquaculture supplied about 64 million metric tons of fish in 2011,[4] and is estimated to now supply roughly half of the world's fish. Currently, with

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our human population at seven billion people, these overall levels of fish consumption is about 18.8 kg of fish per capita per year on average.

We have tried to examine marine capture fisheries by engaging with Boorse's article regarding recent topics in environmental science.[5] Specifically, we address the issues of limits, unintended consequences, and ethics in regard to fisheries. This is not a review article on marine capture fisheries—there are a number of textbooks that would be useful for that purpose.[6] However, the issue of marine capture fisheries has received relatively little attention by Christian writers.[7] Additionally, we have not examined in detail the ways other environmental issues, such as climate change and terrestrial pollution, interrelate with capture fisheries. Our foci here are to examine whether capture fisheries' catches have reached limits, to highlight some of the unintended consequences of fishing, and to describe some of the ethical issues in this area. Using current research, we show that there is hope for the ocean and that now is the time for the Christian community globally to actively engage with this important issue.

Are There Limits to Fishing?

Limits

In the realm of fisheries, the question of limits can be addressed on a number of scales. On a global level, most evidence supports the conclusion that current fish catch amounts are at or above the level that is sustainable in the long term.[8] In other words, globally, we are harvesting at a rate at or above the limit of what the ocean can produce. Despite this, fishing effort has continued to increase in recent years, similar to the steady increase in effort since 1950. Over the past twenty-five years, though, global fish catch has not increased despite these fishing pressure increases, again signalling that we have reached a limit.[9]

Clearly, human population globally, and especially near coasts, will have a major impact on fisheries. This effect occurs through both the interrelated factors of climate change and pollution, as well as through direct consumption of marine products. For example, several successful fisheries and livelihood development projects have, due to overpopulation, incorporated reproductive health programs into their projects.[10] Many changes are already needed to restore fisheries to their previous abundance, and even more dramatic management and societal changes will have to take place as human population increases further.

However, the story is more nuanced when we zoom in to a regional scale. In wealthier parts of the world, overfishing has taken place and continues,[11] but management changes, in some cases, have altered these trends.[12] For example, in the US, the 1996 Sustainable Fisheries Act amendment to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), the US's primary marine fisheries management legislation, more clearly defined "overfishing" and required the rebuilding of overfished stocks within specified time frames. A 2014 National Academies review committee found that overfishing has halted in twenty-three of thirty-six stocks originally subject to overfishing (i.e., fishing mortality has been reduced) and that 43% of stocks are no longer overfished (i.e., fish stock biomass has increased; ten stocks are now officially rebuilt and five are rebuilding). The committee necessarily focused only on stocks assessed quantitatively, but this included the nation's most economically important fisheries. The US stock-rebuilding approach is similar to that being used in Canada, Australia, and New Zealand. Compared to these countries, a larger proportion of European Union fisheries are overfished, though this proportion is decreasing. The sustainability of developed-world fisheries is thus a mixed and complicated landscape, but it would be incorrect to paint an entirely bleak picture and state that all of the world's fisheries are in crisis.

In much of the non-Western world, though, data are lacking, and the data that exist suggest severe overfishing is happening in many places, and particularly in smaller-scale fisheries.[13] For example, in the Wakatobi region of SE Sulawesi, Indonesia, as in many coral reef artisanal fisheries, hundreds of species of fish and invertebrates are harvested; therefore, species-specific stock assessments and comparatively well-funded management of the kind done in temperate regions are simply not feasible.[14] Data suggest that catches have declined significantly in the Wakatobi and that species have been extirpated from regions where they were once abundant.[15] Thousands of similar communities and coastlines exist around the tropical developing world, and evidence suggests similar declines in species abundance and diversity in these regions also.[16]

Another indication that we have reached a limit for fish catch in some regions has been labeled "fishing down the food web."[17] Historically, it has seemed easiest and most desirable to catch a few large fish rather than hundreds of small fish of equal total biomass. However, these kinds of large predatory fish (e.g., tuna) are less abundant in terms of overall biomass and individual abundance than smaller fish that feed lower on the food web (e.g., herring). Using these species as examples, it is sustainable to catch a few tuna each year, and nations (e.g., Japan) have done so for centuries. However, when more and more tuna or other high-trophic-level species are caught, they rather quickly become overfished, and fishers have no choice but to either charge exorbitant prices for the few large individuals they catch—as is currently happening for tuna—or switch to catching more abundant lower-trophic-level species. This trend of switching from piscivorous (fish-eating) high-trophic-level species to lower-trophic-level species has been observed in the Northern Hemisphere particularly, over at least the past sixty years, and is evidence of overfishing and switching to less desirable species from a consumer's perspective.[18]

Species extinction is a final obvious threshold commonly discussed for terrestrial and avian species. Though estimates vary, evidence now suggests that humans have indeed caused the extinction of numerous marine organisms, though there is typically a fifty-year time lag between a species' last sighting and its designation as extinct.[19] In reality, it is likely impossible for humanity to know how many marine species we have caused to go extinct. However, the vulnerability of specific marine species to human-driven extinction varies for a number of reasons. We now know, for instance, that longer-lived, later-maturing species are much more susceptible to human-driven extinction than other species.[20]

Managing Fisheries within Our Limits

The Christian relief and development community has done laudable work in the realm of agricultural relief and development, but we may need to think more deeply about how we can best serve those who rely, to varying degrees, on nonagricultural food sources such as fish. To our knowledge, few Christian agencies have attempted to serve coastal communities through trying to contribute to management and restoration of marine capture fisheries. Activities will need to include partnering with management agencies, local scientists, and community leaders; utilizing the best science to focus on reducing the number, size, and type of fish caught; and changing the use of damaging fishing gear.

When we think about managing a resource, government regulation often comes to mind. However, broader than simple government control, marine fisheries governance should be seen as a complex mix of government, market, and cultural institutions as well as individuals who guide fishing activity in most regions. Within this framework, there are a number of useful management tools that may be used to direct fishing pressure in an attempt to not reach fishing limits. We will examine individual choices in the ethics section and address other aspects here.

The general challenge that must be addressed is the fact that the ocean and animals living within it are a common property resource. In other words, no one individual owns it or them, and the benefit to one individual of taking more than his or her share is greater than the cost, which is shared among all users, thus leading to a "tragedy of the commons" if proper management is not undertaken.[21] Privatizing the resource in some way is thus one major means of managing fisheries, and it attempts to make users or those who benefit from use also pay the costs of overuse. Current examples of fisheries privatization schemes include "individual transferable quotas" and other free-market approaches.[22]

Other fisheries management techniques can generally be classified as restrictions on effort, usually in the form of gear, time, space, or some combination thereof. Gear restrictions include limits on the type of nets or boats used. Time restrictions include annual fishing "season" regulations or daily restrictions in some cases. These two are combined in some scenarios, and certain types of fishing gear can only be used during certain parts of the year, often to protect reproductively active fish or spawning aggregations. In the Bahamas, for example, Nassau grouper (*Epinephelus striatus*), one of the principle targeted finfish, is in serious decline regionally and is on the US's endangered species list. While there have been numerous protection measures implemented over the years, only recently has the Bahamian government responded to the science suggesting that closure of the fishery during annual spawning aggregation times should be implemented.[23] Throughout

the rest of its range, most previous spawning aggregations of this species have been fished to the point where they do not form any longer.[24] These aggregations have recently received significant scientific attention, and new methods and management advice are available for those species which congregate to spawn.[25]

Space restrictions have become more and more popular in recent years, mostly in the form of what are called marine protected areas (MPAs). This type of marine spatial planning limits human activity within an MPA to protect a certain species, or community of species, or spawning ground, et cetera. These MPAs are not only used as biodiversity protection tools, but can also facilitate livelihoods through tourism, for example. They are also fisheries restoration tools because fish grow larger in MPAs and, since egg production is exponentially related to fish body size, reproduction greatly increases and overflows into surrounding areas through buoyant larval transport on ocean currents.[26]

A final issue worth mentioning is that in the wealthy developed world, money can be invested in scientific assessments of fish populations and marine ecosystems, and these data fed into management plans. The same cannot be said for much of the developing world where scientific data are few or nonexistent, and money is often not available for management.[27] In a recent survey of trends in regional fisheries management successes and failures, the Indian Ocean basin scored worst in terms of compliance with United Nations fisheries management recommendations;[28] it is also a region governed primarily by developing nations. This region and other somewhat less developed areas like it (e.g., Southeast Asia) are also regions of particularly high biodiversity, leading to what some have termed a "hotspot" of fisheries management and conservation need.[29]

The Unintended Consequences to Fishing

Trophic Cascades—An Example

One of the more significant sets of findings in recent years has been a better understanding of the unintended consequences fishing has on nontargeted species. These effects are due not only to ecological interactions resulting from reductions in target populations but also to the unintended impact of fishing gear. There are both top-down and bottom-up effects which are linked through complex, multispecies interactions in trophic webs that can dramatically alter the composition of marine communities.[30]

Trophic cascades occur when the removal of targeted species in a food web causes changes in the characteristics or abundances of other species at lower trophic levels. At its most simple level, the removal of a predator releases prey abundance from predation pressure and can thus result in an increase in the abundance of that prey. One of the better-studied systems demonstrating trophic cascades in tropical marine ecology is found in Kenya. Fishing pressure is intense in coastal Kenya. Marine National Parks were created to provide refuge from fishing, and those in Kenya are some of Africa's oldest, created over forty years ago. In this ecosystem, fishermen target triggerfish (Pisces: Balistidae) which are predators of sea urchins. Urchins are grazers and control macroalgal growth. Algae compete with coral for space and, in the absence of predators, can come to dominate space on a reef. As expected and predicted, cessation from fishing resulted in recovery of targeted species including both triggerfish and herbivorous fish which feed on macroalgae, and thus sea urchin populations declined. Sea urchin population decline was sigmoidal, not linear, indicating some resistance to increased predation, but also showing an eventual succumbing to that pressure. This process was surprisingly slow—full recovery did not appear to occur until more than twenty years after fishing stopped.[31]

This case study of recovery of coral reef ecosystems where fishing has been banned through the creation of a marine protected area indicates that though there was a recovery of previously fished populations, it is unclear whether these systems recover to historic pre-fished conditions, or move toward some other stable state.[32] This new ecosystem may, in terms of trophic structure, be similar to what we might expect in a "natural" system, but the relative abundance and diversity of species at different trophic levels may be very different from that present before fishing took place.[33] Differential responses within trophic cascades between the Kenyan example and Caribbean trophic cascades[34] indicate the complexity of the situation and show that recovery in different trophic groups is at least regionally specific.[35]

The take-home message is that ecological restoration may not be as simple as removing a particular pressure on an ecosystem and allowing it to return to its "natural" state. The unintended consequences of large perturbations to systems, such as intense fishing pressure, may be that these ecosystems are altered permanently. A famous example of this is the collapse of Atlantic cod populations (*Gadus morhua*) off the northeast coast of North America and the subsequent lack of recovery despite decreases in fishing pressure.[36] At a species abundance and diversity level, removing fishing pressure does not necessarily result in a restoration to previous states. This process is long and can contain unexpected changes in species composition. Additionally, these results are region and habitat dependent.

Habitat Modification and Bycatch—Trawling as an Example

Fishing gear itself can have unintended consequences. A focus on monospecific fishing has led, for example, to significant consequences of shrimp fisheries on turtle populations. The extent and diversity of nontargeted species caught while targeting certain species (called bycatch) has become much better understood. The magnitude of bycatch in some cases is very high, for example, on average 62% of the total catch in some shrimp fisheries.[37] The extent of damage is still unknown, but recent evidence suggests rare, long-lived species such as seabirds, sharks, and marine mammals are unintentionally caught in significant numbers as nontargeted species, threatening their populations.[38]

Trawling is a fishing technique whereby a large net is pulled behind one or several boats. Bycatch is a major problem for trawling as the nets are relatively unselective and much of this unintended catch is discarded as not desirable, thus catching and killing fish unnecessarily. Large nets are held open by heavy wooden doors, and the mouth of bottom trawls is kept on the bottom by weighted chains. These bottom trawl nets are then scraped along the sea floor, removing most of what is in their path—including not-targeted, structure-forming animals such as sponges and corals. Areas of the bottom have been described as looking like a parking lot after trawlers have fished in the area for significant periods of time. Though effective at catching certain species, those species' habitat, including structure that formerly protected juveniles from predation and allowed prey populations to survive, is destroyed. Removing fish and destroying the habitat's ability to support future fish populations in this way thus amplifies the effect of fishing and contributes significantly to fisheries collapse.

Using Aid in Unintended Ways—Mosquito Net Fishing

Another example of unintended consequences relates to the use of resources for fishing which had originally been intended for other purposes. Recently, one of our churches focused their Lent appeal on raising funds to buy mosquito nets for a project in Africa. Malaria ravages many communities in that continent, and Christians have rightly sought to alleviate this menace. However, once these nets have holes in them and aid agencies replace them, the old nets are put to other uses, such as fishing. Mosquito net fishing has become a big problem in many countries as the small-mesh nets catch fish down to a very small size. These can be juvenile fish that spend the beginning of their life in nutrient-rich shoreline and mangrove habitats.

Unpublished, recent research near A Rocha Kenya's field study centre found that coastal communities were using these old mosquito nets for fishing.[39] However, it was not at the expense of malarial protection—there were plenty of new nets available such that anyone who wanted to sleep under one could. Small children practiced fishing with these old nets and, at certain times, particular fish species were targeted with them. However, there was also a group of young men, with little access to resources of their own, who used these nets as an important part of their fishing arsenal. We are not suggesting that organizations stop donating mosquito nets to prevent malaria. However, one must realize that there may be unintended consequences to aid and that, in this case, there is a need to think clearly through not only the distribution but also the collection of these nets such that our aid can be more holistically effective.

Aquaculture: Part of the Problem and Part of the Solution

Recent global data on fisheries and aquaculture suggest that fisheries and aquaculture are quickly becoming equivalent in their contribution to world marine food production.[40] Is fish farming the answer

to marine capture fisheries issues? We are now able to keep in captivity, spawn, and raise from larvae many marine fish. Yet, sometimes, the cure can be as bad as, or worse than, the illness.

While acknowledging that aquaculture is a necessary and, in many cases, efficacious supplement to marine capture fisheries, it is important to understand the limits and issues regarding its implementation. These problems include the spread of fish diseases through overcrowding, habitat destruction for farm construction, poor food conversion efficiencies when raising top-level predators, and ethical issues such as the export of luxury protein to developed countries from areas of protein deficiency.[41] Fish may also problematically escape into the wild from cages.[42]

Community-based aquaculture is an important recent innovation, especially when combined holistically with conservation programs. These aquaculture programs are run by means of local authority structures, usually with the outside technical help of an international NGO. For example, throughout the Indo-Pacific, sea cucumbers have been fished to the point of commercial extinction in most places.[43] Demand from Asian markets has driven prices up to the point where there is incentive to hunt even the last individual. Recent research has focused on farming the most popular target species to restore wild populations while also meeting demand.[44] An international NGO called Blue Ventures has developed a community-based aquaculture project in Madagascar where local communities benefit from the high prices of sea cucumbers by growing them in family- and community-owned grow-out pens in the ocean.[45] This is combined with education focused on the ecology and conservation of these habitats and on the development of protected areas, such that remaining resources are receiving lower fishing pressure and are being restored to previous levels.[46]

Restoration Ecology—Coral Reefs as an Example

It is possible to restore these habitats that have been destroyed by harmful fishing gear. Obviously, the methods and means are habitat dependent, and we will here discuss only one hopeful example based on our experience. The authors have both seen firsthand the destruction that dynamite fishing causes on coral reefs of the Coral Triangle. This is an area of high biodiversity focused in a triangular region that covers portions of Malaysia, Indonesia, Papua New Guinea, Timor Leste, Solomon Islands, and the Philippines. Fishing has become so intense in parts of this region that many fishers have resorted to using homemade dynamite bombs, which get dropped onto the reef, explode, and kill fish, causing the catch to float to the top of the sea. Underwater, though, the structure of the reef is devastated.[47]

Off the eastern tip of Sabah, Borneo, work in a marine park has focused on beginning to restore these reefs—giving them a helping hand. The coral fragments created in explosions move with tides and currents, making it difficult for corals to settle without assistance. Local governing authorities and a UK-based NGO have worked toward establishing metal frames secured to the ocean floor where small pieces of live coral can attach, grow, and eventually cover the frames, creating new coral structures.[48] Aquaculture is also being used to release overfished species, such as giant clams, into a national park that was created to protect these habitats. Additionally, education and aid projects aimed at the local sea nomadic communities (Bajau), who fish these species, round off a holistic restoration project. This is a long-term, very difficult, and expensive route to take. Protection from habitat destruction in the first place would be much more effective. However, where there has been devastation, there is also hope, and new technology and practices such as coral transplantation can assist.

Given What We Know, Is It Ethical to Eat Fish?

The timeline of scripture is forward looking. We move from creation through the Fall and redemption to the new creation. So while we do not want to focus our efforts on a re-creation of Eden, we can get hints of what was supposed to be from Genesis and also glimpses of what will be from Revelation. In Genesis 1:20–22 (NIV),

> And God said, "Let the water teem with living creatures, and let birds fly above the earth across the vault of the sky." So God created the great creatures of the sea and every living thing with which the water teems and that moves about in it, according to their kinds, and every winged bird according to its kind. And God saw that it was good. God blessed them and said, "Be fruitful and increase in number and fill the water in the seas, and let the birds increase on the earth."

Concepts from this passage that are particularly helpful as we consider marine populations include abundance, diversity, and distribution.

The waters are meant to "teem with living creatures," or, to put this in more modern terms, there is to be *abundance*. We have seen previously how, for most places on the earth, this no longer describes our marine waters. We also note the marine biodiversity here, with specific reference to the great creatures of the sea (i.e., higher trophic levels). All of this diversity was declared good. It is not enough that there is an abundance of jellyfish or lower trophic-level creatures teeming at this point, because we have not yet fished down the food chain far enough to impact their numbers. Revelation 5:9–13 is a picture of the throne of God and all creation before it worshiping. One of the words in verse 13 which stands out is the word "every."

> Then I heard every creature in heaven and on earth and under the earth and on the sea, and all that is in them, saying: "To him who sits on the throne and to the Lamb be praise and honor and glory and power, for ever and ever!"

The new creation will be a place where the entire range of diversity is meant to worship the Creator. While we cannot say with biblical authority that every marine species that ever existed will be before the throne of God, this passage does give us hints that there will be a wide range of creatures. As we move toward the new creation, that abundant marine biodiversity must be present not only in a few places globally, such as well-protected MPAs, but also as a normal description of the ocean wherever we might go. Distribution is important.

As consumers, we must consider the type of seafood we eat and in what quantities we eat it;[49] it takes additional effort to understand which types of seafood are best to eat to promote the sustainability of fisheries. Increased demand for seafood as a healthy alternative to beef, for example, needs to be tempered such that the increased demand is for sustainably wild-fished species, and that it does not contribute to some of the aquaculture problems noted above. When we know that our tastes for certain species cause local or global extinctions—so that God is not glorified by the full range of biodiversity—then, as wise stewards, we must restrain our consumptive desires. Scientific study can help us make these decisions by providing an understanding of the effects of our actions on marine biodiversity. Our Christian moral framework must then direct our application of this knowledge in subsequent consumer choices.

The links between over-exploitation of marine resources and poverty are clear. Poverty in many people's minds primarily refers to money, as evidenced by the oft-quoted measure of poverty, "living on less than one dollar a day." Yet global analyses of poverty related to natural resources reveal much more nuanced and all-encompassing definitions, including the concept that poverty is actually a web of broken relationships.[50] Thus, as we consider the ethics of eating fish and its relationship to poverty, we must consider more than whether or not our actions or inactions affect a family's ability to place a fish on a table to eat.

Recent attempts to alert consumers to fisheries issues through labeling fish products as sustainably harvested have met with mixed reviews as to their efficacy.[51] While perhaps helpful for raising awareness, and for individually allowing us to choose fish which meet the Genesis 1 and Revelation 5 criteria of abundance, diversity, and distribution, they do not address the more difficult ethical questions raised above. The situations are complex, and understanding the exact poverty issues raised by putting a particular marine animal on your plate is not practical for most consumers. Yet we must begin to ask these questions and help people understand that the problem of fisheries and marine conservation requires answers that not only affect coastal towns but also anyone, anywhere, who is looking for a box of fish fingers in the aisles of their local grocery store. What we buy has a dramatic impact on our neighbor in far-flung places on our blue planet.

As Christians, we are, after all, called to love our neighbor. As the parable of the Good Samaritan teaches us, we must be careful when asking that question of Jesus, "And who is my neighbor?" The link between poverty, conservation, and loving our neighbor was clearly demonstrated and summarized by Boorse et al.[52] In regard to this question of eating fish, the links are clear. We must love our neighbors in what we eat. A significant proportion of Europe's fishing fleet has been deployed to less-fished areas of the world, in particular West Africa, in search of seafood to meet demand.[53] Governments make arrangements to fish inside a country's boundaries, but the foreign countries usually do not contribute

to local infrastructure or economics as fish are taken directly to Europe without landing or processing in West Africa; the fishermen from other countries may compete for resources with local fishermen. This is just one example of how our choices regarding the quantity and species we consume, and our choice of where these organisms are caught, can have a profoundly loving or unloving result.

There are many ethical issues involved in fishing, ranging from the potential pain and suffering inflicted on those animals caught, to what has been called "perverse" government subsidies of fisheries.[54] Some of these ethical issues were addressed in detail in the book *Values at Sea: Ethics for the Marine Environment*.[55] Generalizing, it is interesting that many of the authors in this edited volume suggest that we focus on the sea's value to humans and move away from talk of intrinsic value. As Christians, though, we must value the sea and its inhabitants in and of themselves—because God created them and called them good. Then, alongside this intrinsic value, we, of course, must not forget the value of these resources to humans. This call to intrinsic value may seem idealistic or naïve when considered in light of human suffering. Yet by embracing Genesis 1 and God's declaration of creation as good, even prior to the existence of humans, we see that such a worldview shift could have huge implications for grounding our actions toward creation in love.

If we have as our worldview a metanarrative that places ourselves in the center with creation there to serve us, we face a huge uphill battle to not ground creation care in anthropocentric thinking. But a radically Christocentric metanarrative of scripture that places the focus on God and his work on the cross to redeem all of creation from the results of the Fall, focuses our attention rightly on God's glory and his story which includes his valuing of creation as good, independent of its value in relation to us.

The Conclusion of the Matter?

Each topic above deserves an entire book, and there are many areas we have not had time or space to address. Yet we hope that it is clear from the examples given that marine capture fisheries in many places are at or beyond a point of crisis—we have reached or surpassed limits. It is also clear that the ways in which we have fished have had unintended, or intentionally ignored, consequences and that there are many ethical and theological issues we have only begun to consider as a Christian community. Jesus spent a lot of time with fishermen, loved them, cared for them and, dare we say it, learned from them[56]—we should do likewise.

What are the implications, then, for Christian scientists, relief/development agencies, and churches? Marine capture fisheries have received little attention from the broader Christian community, and it is time for this to change. We are hopeful that the global Christian community can make an important contribution toward the restoration of the oceans and that God may be glorified as we live out a more comprehensive stewardship of the complete breadth of his creation. We do not have to reinvent the wheel—there is much we can learn from what has already been done, regardless of the source. A recent global symposium on marine protected areas summarized its output in six broad points, the last of which focused on, among other things, the spiritual value of the sea.[57] Thus, even in historically secular circles, the opportunity and time has come for local churches to work together with Christian NGOs and scientists to extend the creation care movement to the other 71% of the planet. We certainly hope that this is not the concluding word on this matter, but the beginning of a conversation and set of actions in which we are all more actively engaged in the appreciation, restoration, and conservation of the ocean.

Notes

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