
Editor's note: In this series, The Skimmer is taking a look at the various ways that the pandemic is affecting marine ecosystems and their conservation and management. In April, we took an initial look at the impact of the pandemic on fisheries and aquaculture. In this issue, we cover how the pandemic is impacting coastal and marine tourism and the potential impacts of these changes on coastal and marine ecosystems. In future issues, we will examine the pandemic's impact on plastic pollution, climate change, and more. We will update previous articles as we are able, so if you see critical aspects that we are missing from this and previous articles, please let us know at skimmer@octogroup.org.

In many ways, coastal and marine tourism has become a posterchild for the COVID-19 pandemic. Some of the earliest and highest-profile cases of the mass spread of the COVID-19 virus happened aboard passenger cruise ships (here and here). Photos of crowded beaches have become synonymous with inadequate social distancing to prevent the virus's spread. And photos of empty beaches show the devastating impacts of the pandemic on local economies.

The Skimmer asked coastal and marine tourism operators and experts from around the world (Indonesia, Brazil, the Mediterranean, the United States, and more) about the diverse ways that the COVID-19 pandemic is currently affecting coastal and marine tourism, how it is likely to change coastal and marine tourism in the future, and what impacts this is likely to have on coastal and marine ecosystems. Their responses (below) give reasons for both hope and concern.

Simon Hudson: For some tourism destinations, this crisis may represent an opportunity

Editor's note: Simon Hudson is a professor in the School of Hotel, Restaurant and Tourism Management at the University of South Carolina. He has just published a book, COVID-19 & Travel: Impacts, Responses and Outcomes, documenting the impact of COVID-19 on the travel industry, including environmental impacts of the pandemic as they relate to travel.

Skimmer: What changes to coastal and marine tourism have you already seen as a result of the COVID-19 pandemic?
Hudson: Of course, the main change is a lack of tourists! The full effects of the pandemic on tourism economies around the world are still unknown, but destinations dependent on coastal and marine tourism have suffered as much as everyone else. Some countries will feel the impact harder than others – the most severe economic devastation will likely be seen in the small island nations that have staked their entire economies on overseas travelers visiting their beaches and resorts. Of the top 20 countries most dependent on travel and tourism as a source of GDP, 15 are small island nations. Many of these countries are reliant on a thriving coastal and marine tourism sector. Small and medium-sized businesses in this sector will suffer the most. In Australia, for example, of the 3,500 tourism operators on the Gold Coast, the vast majority are small to medium-size operators. They had become reliant on a growing Chinese market, so they felt the pinch early on in the pandemic.

There is also a trickle-down impact on other coastal economic sectors. In Kenya, for example, the fishing economy is strongly linked to tourism, but demand for seafood from hotels and restaurants has pretty much dried up. In addition, those engaged in the fishing sector are often involved in tourism activities such as taking tourists fishing or diving. Marine conservation is also under pressure due to a lack of tourists. In Tubbataha Reefs Natural Park in the Philippines, for example, tourism revenues make up over half of the conservation budget needed to protect the large, remote areas from illegal fisheries.

Skimmer: What long-term changes do you anticipate to coastal and marine tourism as a result of the COVID-19 pandemic?

Hudson: Most experts would agree that recovery from the COVID-19 crisis will be slow, in large part due to the impact that the crisis has had on the global travel and tourism industry. Until there is a vaccine, the virus will influence nearly every sector of travel from transportation, destination and resorts, to accommodations, attractions, events, and restaurants. Those involved in coastal and marine tourism may recover quicker since they are providing mainly outdoor activities, but they will have to implement measures to convince travelers that they are safe and will have to guarantee high standards of service and cleanliness.

Because consumer demands and behavior will be permanently altered by the pandemic, all stakeholders in the travel industry will need to adapt (I call it ‘COVID-aptability’). Domestic tourism will recover...
quicker than international travel, but often domestic tourists require different services to those from abroad (e.g., domestic tourists often rent villas rather than hotel rooms and bring their own food rather than eat at restaurants), so services may have to change. In general, domestic tourists spend less than international tourists, and some destinations such as Vienna and Malta are even providing locals with vouchers to incentivize them to go out to restaurants and bars and spend money!

I do believe, however, that there is a growing recognition of how important access to nature is to our physical and mental health, and this may benefit coastal and marine tourism in the long run. What the crisis has highlighted is how the tourism and hospitality sector is particularly vulnerable to ‘uncontrollable’ events. For many destinations – including those dependent on marine tourism – the crisis has been a wake-up call, and perhaps policy-makers in these destinations will either recognize the need for a more diversified economy, or invest in the tourism industry to make it more resilient and sustainable.

Skimmer: What implications might these changes in tourism have for coastal and marine ecosystem health?

Hudson: Well, during the crisis, the media has shown us images of fish swimming in the unusually bright, clear and empty waters of Venice and of coral reefs in the Great Barrier Reef getting a much-needed respite. Certainly, the coronavirus lockdowns had an effect on daily carbon emissions, causing a 17% drop globally during peak confinement measures in early April 2020 – levels last seen in 2006. However, scientists say the brief pollution break will likely be ‘a drop in the ocean’ when it comes to influencing climate change.

For some tourism destinations though, this crisis may represent an opportunity. Many have been victims of overtourism in the last few decades, so they may take this opportunity to press the ‘pause’ button and rethink the future of tourism in their communities. Residents in European tourism destinations for example, are in favor of measures geared at preventing a return to pre-pandemic levels of air pollution. Linked to this, many in the industry believe the pandemic could engender a positive change in traveler behavior. Consumers may be more aware of the impact of travel on the environment and the communities they visit, and make more considered choices. This could result in a renewed focus on sustainable and ethical travel – which could in the long run benefit the health of coastal and marine ecosystems.

Marit Miners: The COVID-19 crisis is an opportunity for us to reimagine tourism

Editor’s note: Marit Miners is co-founder and director of sales and marketing at Misool Resort and Misool Foundation, in the Raja Ampat archipelago of Indonesia. Misool is a private island resort dedicated to safeguarding some of the most biodiverse reefs in the world, empowering local communities, and demonstrating that sustainable tourism and community-based conservation are mutually beneficial.

Skimmer: What changes to coastal and marine tourism have you already seen as a result of the COVID-19 pandemic?
Miners: Raja Ampat’s marine tourism collapsed with the sudden closure of local airports in late March, and all tourism activities are still suspended at the time of writing (July 24, 2020). Where we are, in the remote southern part of Raja Ampat, the monsoon winds blow from mid-June to mid-September. Misool Resort is usually closed at this time of year anyway. We hope to reopen in late September, but no one is able to see around the corner at what is coming next. If this crisis has taught us anything, it is how much is well and truly out of our control.

We are now on Lockdown Day 122 (I think??), and our team remains busy with annual maintenance and refurbishments. We are still paying the wages of more than 200 staff members, many of whom are supporting extended families in a country with virtually no safety nets. Misool Foundation’s suite of conservation programs are still running as well: we’re still collecting ocean-bound plastics, our reef restoration project is planting hard corals, and our Rangers keep patrolling the 300,000-acre Misool Marine Reserve together with the marine police.

Since our humble beginnings in 2005, a unique partnership has been forged among four key stakeholders: private enterprise (Misool Resort), a charitable foundation (Misool Foundation), local community members, and guests. All stakeholders have been united around one common goal, which is to protect the world’s richest reefs. The collapse of tourism due to the COVID-19 crisis has removed one of those stakeholders, Misool’s guests, from the partnership. The longer guests stay away, the more precarious the future of Raja Ampat, and indeed all marine protected areas supported by tourism, becomes. For now, we’re still able to send our patrol out and keep more than 200 people employed. But even the most robust businesses aren’t able to operate indefinitely without revenue. As the crisis drags on, more and more people from vulnerable coastal communities will face unemployment. If sustainable livelihoods disappear, of course people will turn to marine extraction to feed their families. We are now exploring ways of building in additional layers of resilience, in both our business and our foundation.

We started this project 15 years ago as a ragtag bunch chasing a wild dream of safeguarding a truly spectacular reef system. Our vigilance over the Misool Marine Reserve can never, ever stop – not even when COVID-19 has pressed the pause button on the world.

Skimmer: What long-term changes do you anticipate to coastal and marine tourism as a result of the COVID-19 pandemic?
Miners: In the developed world, the effects of coronavirus on our natural world have been largely positive: CO₂ emissions have dropped, leatherback turtles are nesting in Phuket and Florida, and more people are realizing the real cost of the wildlife trade. However, in the developing world, an entirely different set of levers and knobs determine conservation outcomes.

On a routine patrol in April, our team encountered three commercial boats fishing in a no-take zone inside the Misool Marine Reserve. They were not far from Magic Mountain, an ecologically sensitive seamount and cleaning station for both oceanic and reef mantas. The boats were part of a larger operation, not local people fishing for their daily meal. These poachers were 165 km away from home, equipped with GPS and depth sounders, taking advantage of the sudden vacuum created by the collapse in tourism. With the support of marine police, our team confiscated 150 kg of fish, including groupers, giant trevally, and red snappers. The case was handed over to the Raja Ampat marine police.

Constant vigilance is required to avoid backsliding on 15 years’ worth of conservation wins. We’ve seen an average fish biomass increase of 250 percent over a six-year period, and shark populations are 25 times greater in abundance than outside our protected area[5]. Since that April bust, we have not encountered any more poachers inside the Misool Marine Reserve – I guess we made ourselves pretty unpopular. But it was a stark reminder that all that we’ve fought so hard for will disappear the moment we take our hands off the wheel.

Skimmer: What implications might these changes in tourism have for coastal and marine ecosystem health?

Miners: Prior to the COVID-19 crisis, Raja Ampat was at risk of becoming a victim of its own success. There has been a 30-fold increase in visitors over a 10-year period. In some areas of North Raja Ampat, tourists were packing dive sites with potentially devastating consequences – not only for the reefs and the long-term health of the tourism industry, but also for the local people of Raja Ampat who have depended upon this fragile ecosystem for their livelihoods for many generations.

In the last three years there have been a number of incidents in which passenger ships have grounded on North Raja Ampat’s hyperdiverse reefs, causing significant damage. Additionally, the majority of these boats dump wastewater, including raw sewage, into the surrounding waters. This dumping raises the nutrient levels in the water and creates potentially lethal conditions for coral reefs. The possible knock-on effects are frightening – coral disease, crown of thorns outbreaks, algal overgrowth, and consequently dead reefs, devoid of life. Tourism, once hailed as the savior of the environment, has become a runway threat that needs to be regulated. This will require forward thinking and decisive action from the authorities. The Raja Ampat government has demonstrated itself to be a friend of conservation and has passed a number of progressive regulations. A 2010 decree established Raja Ampat as a shark and manta sanctuary, and in 2011 a law was passed which limits to 50 the number of licenses issued to dive liveaboard vessels. The government also commissioned a carrying capacity study in 2017, which laid out thresholds for many of the most popular dive sites in Raja Ampat, including cleaning stations and spawning aggregation sites. Now is the time for those regulations to be enforced.

With the proviso that MPAs continue to be safe from poaching, which is in no way a foregone conclusion, I think the immediate implications of the lack of tourism pressure on marine ecosystem health can only be positive. It’s perhaps simplistic to draw a straight line between cause and effect, but I will note that we recorded two mass coral spawning events in March and April. In our 15 years here, this is unprecedented. We’ve had visits from rare Omura whales, and suddenly manta rays are feeding on the House Reef. Dolphin sightings, both above and below the water, have been much more frequent. I would also be curious to know how improved water quality, lack of divers, and reduced marine noise pollution have changed the ecosystem.

The COVID-19 crisis is an opportunity for us to reimagine tourism. Mass tourism has no place on the world’s richest reefs. We need to rebuild slowly, in a way that safeguards these reefs and the communities that depend upon them – not just for today or tomorrow, but for generations to come. I personally believe that there is a moral imperative to protect ecosystems and do what we can to restore them to a state of balance. However, for those who don’t see nature’s inherent value, this is an opportunity for a powerful thought reset. If tourism businesses and governments view nature as a central asset, conservation becomes a clear path to better returns. What if returns on investments were measured not just in dollars and cents but on biomass recovery, reduction of our CO₂ footprint, and restoration of key species? The world would be a very different place, one that I’d be proud to pass on to the next generation.

Cruise ship tourism temporarily halted

- As noted earlier, some of the earliest and highest-profile cases of the mass spread of the COVID-19 virus happened aboard passenger cruise ships[10], [11]. As a result, the global cruise ship industry, with its attendant greenhouse gas emissions and water pollution issues, largely shut down across the world[12] in mid-March.
- While cruises from US ports are suspended until at least September 15[13], some passenger cruises have resumed again with reduced capacity[14]. Most cruise ships remain stuck in port, however, due to safety concerns, travel restrictions, and port closures[15]. The Seychelles has taken the step of banning all cruise ships until the end of 2021[16].
- Demand for future cruises[17] remains strong[18], however, so the industry is likely to resume operations in some manner once COVID-19-related restrictions ease.

Carla Elliff: Important forms of coastal and marine pollution have continued and sometimes increased through the pandemic

Editor’s note: Carla Elliff is a postdoctoral fellow at the Oceanographic Institute of the University of São Paulo in Brazil. She is an author on the PROPLAYAS recommendations for sun and beach tourism in the face of the COVID-19 pandemic[19]. In addition, she and colleagues are currently organizing a special issue in the Ocean & Coastal Management journal about how coastal management has changed in the face of COVID-19. The call for papers opens on August 1. If you are interested in contributing, please contact Dr. Elliff at carlaelliff@gmail.com.

Skimmer: What changes to coastal and marine tourism have you already seen as a result of the COVID-19 pandemic?
Elliff: The pandemic has vastly changed coastal and marine tourism worldwide. From an economic perspective, there have been massive job losses in this area, and many tourism-related businesses are closing or going bankrupt. As stated in the PROPLAYAS report[17], tourism-based countries such as Italy, Portugal, Spain, and Greece have announced that their tourism sectors can expect losses of up to 80%. In Latin America, latitude is serving as something of a “protective factor” because effects on summertime tourism in countries such as Uruguay and Argentina are delayed. While the World Health Organization initially declared the COVID-19 pandemic during the austral summer, lockdown and social distancing measures only came into effect at the end of the season. However, tropical countries that experience national and international sun and sea tourism year-round, such as my home country of Brazil, are feeling the full impact since the pandemic began. Major events have been cancelled, beaches in many places have been shut down to avoid crowding, and the psychological effects are burdening the population.

Skimmer: What changes to coastal and marine tourism have you already seen as a result of the COVID-19 pandemic?

Elliff: It is unlikely that previous tourism rates (i.e., something like the 1.5 billion international trips reported in 2019 by the World Tourism Organization) will be achieved again anytime soon. With so many uncertainties and different responses, one major psychological effect we expect is prolonged fear. Specialists believe that even if an effective vaccine is developed, fear of contamination will remain[16]. If people are afraid to travel, domestically or internationally, we can expect a catastrophic scenario for the tourism sector, particularly small businesses that are less likely to receive government aid. This could lead to a scenario that reinforces mass tourism centered on large chains (e.g., hotel chains such as Accor and Wyndham). To avoid small localities becoming ghost towns and slowly disappearing from the tourism landscape, a first strategic step would be to promote confidence and help local economies recuperate as soon as possible.

Skimmer: What long-term changes do you anticipate to coastal and marine tourism as a result of the COVID-19 pandemic?

Elliff: Initially there was optimism about the pandemic’s effect on coastal and marine ecosystem health because of the decline in tourism activities. Fewer tourists meant fewer people trampling dunes and coastal vegetation, potentially damaging coral reefs, and generally surpassing the carrying capacities of beaches and other environments. Several coastal locations also reported increased sightings of wildlife due to noise reduction and lack of crowds. However, important forms of coastal and marine pollution have continued and sometimes increased through the pandemic.

For instance, poor sewage treatment remains a major issue for coastlines, and marine litter has shown no sign of decreasing, although it has changed in composition in some cases. Items such as plastic cups and cigarette butts, which reflect local consumption and littering, have become less abundant on some beaches, while food packages and sanitary products that originate from diffuse sources (e.g., upstream locations, mismanaged waste, and water treatment) are still common. And masks and gloves have also been reported at alarming rates in coastal and marine environments.

A silver lining in this context is that one promising strategy to boost tourism post-pandemic is to invest in good environmental management. With the expectation that people are afraid and unsure about travelling, having a safe and well-managed beach could attract visitors and promote healthier ecosystems.

Marine waters as a possible (but unlikely) viral vector

The science on COVID-19 is still developing, and one open question is whether the virus can be spread through natural water bodies, including coastal waters. Viral material from the virus causing COVID-19 is present in human feces[18] and can be found at high levels in untreated sewage[19]. (In fact, viral material in untreated wastewater is one way of monitoring local infection rates[20].) It is unclear, however, if (or at what concentrations) the viral matter found in untreated wastewater is infectious or how long it remains so in seawater, particularly when exposed to UV radiation. Untreated or inadequately treated sewage is discharged into coastal water bodies worldwide accidentally, as part of combined sewage-stormwater overflow systems, and because of inadequate or nonexistent treatment facilities. There is some speculation that this could be a vector, albeit an unlikely one, for the disease (although untreated sewage in coastal waters is most definitely a vector for other pathogens[21].) The much greater threat, however, is close proximity to an infected person while at the beach or the beach environs[22].

Annika Patregnani: The atmosphere is ‘eerie’, subdued, cloudy, uneventful, solemn, less carefree, and more traditional than before COVID-19

Editor’s note: Annika Patregnani is president of Habitat World, an international organization based in Italy with a focus on the Mediterranean, South-East Europe, the Black Sea region, and Africa. Its main objectives are the safeguarding of sustainable development and smart growth assistance to communities and entities living, working, and interacting with and within the target areas. Habitat World has hosted two webinars responding to the pandemic – an environment-Blue Economy linkages[23] and human thinking in the Mediterranean[24].

Skimmer: What changes to coastal and marine tourism have you already seen as a result of the COVID-19 pandemic?
Patregnani: Italy was the first country in the Mediterranean to impose a lockdown on all citizens, visitors, and tourists. Other Euro-Mediterranean countries followed suit, and on March 17, 2020, the EU issued a 30-day travel ban which was extended a number of times. The ban ended for Schengen Zone and other EU member states in June, but some EU countries are re-introducing quarantines on returnees from other EU locales with local outbreaks. Italy, as an example, employs around 4.5 million people (not all Italians) in the tourism industry, which produces around 14% of the country’s GDP. The Italian National Institute of Statistics announced that if it were not for the COVID-19 pandemic, from May to September of this year, Italy would welcome around 80 million tourists who would have spent around 10 billion euros.

In a survey conducted with Habitat World focal persons in the Mediterranean (Algeria, Tunisia, Morocco, Egypt, Jordan, Lebanon, Spain, France, Israel, Italy including its islands, Slovenia, Croatia, Montenegro, Albania, Turkey, and Greece) about the impact of the COVID-19 pandemic on coastal and marine tourism, they brought up the following:

- Coastal and marine tourism has moved towards a sustainable precautions operating mode (e.g., no-touch use of technology, open-air leisure and hospitality, transformation of the hotel sector into an apart-hotel environment where visitors self-cater). Our focal persons from around the Mediterranean have reported face mask wearing in most coastal and marine areas, including in the tourist sector and maritime industries such as on fishing trawlers. The Mediterranean has seen a drop of services and offers that are unable to accommodate mask wearing, distancing, and sanitizing.

- The economic meltdown generated by the COVID-19 pandemic is widely felt, with local populations that live on seasonal tourism linked to coastal and marine environments being extremely hard hit. The late start for tourism in most Mediterranean countries and the specter of the second wave of the pandemic have made it an extremely fragile financial environment. It is extremely difficult to attract tourists at pre-COVID rates no matter what precautions and safety rules and regulations are put into place, and limited air service, higher insurance rates, uncertainty and higher pricing on goods mean most visitors are seeing higher bills passed on to them by operators. Pre-COVID-19, marine and coastal tourism in the Mediterranean had an economic stability that allowed many operators to live with the proceeds of 4-5 months of operations, and this is no longer the case.

- From the social and cultural interactions perspective, our focal persons report the atmosphere is ‘eerie’, subdued, cloudy, uneventful, solemn, less carefree, and more traditional than the pre-COVID-19 marine and coastal tourism atmosphere of innovation, creativity, festivity, crowds, luminosity, and noise. Even niche tourism in the region is extremely subdued, shorter, and more laborious. Many of the outdoor events, the cornerstones of social and cultural interaction throughout the summer period in the Mediterranean region, are being re-thought. Common questions are: Are they necessary? Should we spend money on these? What precautions should we put into place? To add insult to injury, the main religious/traditional feasts and top cultural events have all been postponed, reformulated, or diminished. Local populations living and working in coastal and marine tourism seem to be losing heart in their mission – they feel abandoned and extremely anxious about what the future holds for them and their families. Museums and historical and cultural artifacts seem to be exempt from the doom and gloom surrounding the areas mentioned above, and there is a glimmer of light coming from those working in and enjoying this sector throughout the Mediterranean.

Skimmer: What long-term changes do you anticipate to coastal and marine tourism as a result of the COVID-19 pandemic?

Patregnani: All of the observations above are about the ‘new normal.’ Very few of our team believe that COVID-19 will be a distant memory anytime soon or that it will leave no lasting effect. In fact, many are anticipating that coastal and marine tourism will need to be ‘dressed’ in new clothes – that is, it will have to be precautionary with properly-implemented COVID-19 rules and regulations in which public health is the predominant feature. There seems to be a gap between what is needed and implementation, creating an urgent need for training, education, foresight, employment, financial resources, new maritime policies and structures, transportation, safety and health protocols, and marine spatial planning for the current pandemic and any future waves. In many Mediterranean countries, many have not yet ‘switched on the lights’ or even found the right switch to address these pressing issues.

Another major issue is ensuring that coastal and maritime tourism is open to all with similar degrees of safety between private and public areas and spaces. Many within our network have noted that while private and upscale areas are dealing with safety issues with relative ease (e.g., marking and monitoring indicators for social distancing), because of private funding, many public spaces have fewer resources and are unable to do so.

Skimmer: What implications might these changes in tourism have for coastal and marine ecosystem health?

Patregnani: The one area where Habitat World focal persons are in agreement is the mostly positive impacts of the pandemic on the marine and coastal environment. Marine and coastal environments are cleaner, ‘fresher’, ‘less’ people infested, with positive effects on marine life and coastal fauna and flora. Long stretches of the coast are still not being utilized or are less frequently utilized. Reduced transportation and use of marine vehicles in and around the Mediterranean have contributed to the improved environmental sustainability of the coastal regions. However, France, Greece, Italy, and some southern Mediterranean states have reported increased plastic spillage in the forms of masks and other anti-COVID-19 protection (plastic gloves, etc.) in maritime basins, fishing lanes, and coastal areas.

Marc Beyeler and Derek Brockbank: Beach managers have been put in the unenviable position of having to balance public health and safety with access to public beach and shoreline resources

Editor’s note: Marc Beyeler is executive Director of the Beach Erosion Authority for Clean Oceans and Nourishment (BEACON) in Ventura, California. BEACON is a California Joint Powers Agency to address coastal erosion, beach nourishment, and clean oceans within the Central California Coast. Derek Brockbank is executive director of the American Shore and Beach Preservation Association (ASBPA) in Washington, DC. ASBPA is a US nonprofit active in developing state and federal coastal and beach management policies and programs to improve beach and coastal management in the US. The thoughts shared here were gathered from a video call of beach managers from around the US that the ASBPA convened on July 7 to discuss beach management during the COVID-19 pandemic.

Skimmer: What changes to coastal and marine tourism have you already seen as a result of the COVID-19 pandemic?
The COVID-19 pandemic presents a unique challenge to America’s coastal and beach managers. Tasked with managing and operating a high-profile tourism and visitation destination that is also ecologically and economically valuable to its community and local region, beach managers have been put in the unenviable position during the pandemic of having to balance public health and safety with access to public beach and shoreline resources.

Some common issues of concern for US coastal and beach managers during the pandemic include:

- **Balancing public health protection and coastal and beach access.** Long-term stay-at-home orders due to the COVID-19 pandemic have resulted in extensive demands for outdoor activities that can promote individual and community safety. ‘The beach’ offers an essential landscape for safe outdoor recreation and the promotion of physical and mental health during the pandemic to communities across the nation – not just for local beach area residents but for millions of residents of adjacent metropolitan and inland communities. During the initial weeks of the COVID emergency, access to this essential community resource was restricted in locations throughout the nation to slow and stop the increasing spread and community transmission of COVID-19, and access to the coast and the beach became a political battleground.

- **Fragmented political and public ownership and operational landscapes.** The US federal government has high-level regulations and laws on environmental quality and public trust, but state and local governments are primarily responsible for management of their local beaches and coastal areas. Moreover, at the state and local level, multiple agencies (regional, county, different municipal agencies, etc.) are involved in beach operation and management and public health. This has led to extensive variation in policies and protocols on operating, managing, and funding beach facilities and beach access.

As a result, the public experienced highly variable local management restrictions and operating conditions in the early months of the pandemic. For example, the city of Port Hueneme, California, initially closed a portion of its beach parking lots but left its beaches open to active use and then later opened the beaches to passive recreation. Twelve miles away, the city of Ventura, California, on the other hand, originally closed its beaches to passive use but kept its beach parking lots open and allowed active recreation.

- **Increased beach visitation.** During the COVID-19 pandemic, beach and coastal visitation has been at unprecedented levels in many locations across the US. For example, Gary Jones, director of Los Angeles County Department of Beaches and Harbors in California, reported that visitation to county-managed beaches during the early summer months of May and June is normally about 5 million people, but during the same period this year, an estimated 8 million users visited county beaches. Officials in Galveston Island, Texas, reported beach admission receipts went from US$490,000 in May of last year to more than US$790,000 in May of this year. Beach visitation during the pandemic has been reported to be “off the charts” in some areas, including beach areas in or near large metropolitan areas, such as New Jersey shore beaches close to the New York City metropolitan area.

- **Politization of beach management and community COVID-19 practices.** Beach closures have been controversial in some locations, including southern California. Los Angeles County developed a staged management plan that involved planning with city officials including local political leaders, staging openings, and starting openings with only active recreation activities such as beach walking and water contact activities. Once beaches were opened to active recreation, however, there was a clamor for full opening, and many residents did not follow the restrictions. Increasing calls for full beach re-openings may have led to rushed openings in some cases, and extensive crowding and lack of adequate compliance with social distancing and masking led to Los Angeles County beaches being closed for the 4th of July holiday weekend.

With many people responding to the pandemic based on political alignment rather than science and many national and state public health decisions ignoring best available science, beach and coastal management decisions based on public health science have received public pushback as ‘political’. Beaches that have restricted access or required visitors to wear masks have faced protests that threaten the health and safety of visitors and community officials alike. Furthermore, with increased intensity of opposition to wearing masks and other public health protocols, some beach managers have chosen not to enforce rules out of concern for the safety of front-line beach staff.

- **Financing shortfalls.** Many sources of funding to manage beaches and coastal visitation – including beach fees (e.g., parking and concessionaire fees), sales tax revenues, and occupancy taxes from hotels and short-term rentals, and commercial business revenues – suffered shortfalls under stay-at-home orders and before beach reopenings. For example, the Galveston Parks Board, which manages the beaches on Galveston Island, has experienced a 30% reduction in its current annual personnel budget due to the COVID-19 pandemic.

These traditional beach and tourism revenues will not be forthcoming for some amount of time (an estimated 1-3 years), even though immediate visitation demands on beach and coastal areas are significant and present serious immediate management challenges. Even as visitors return to the beach, large gatherings such as conferences and conventions that provide significant revenue through hotel occupancy taxes are likely to be down until well after the end of the pandemic.
Beyeler and Brockbank: Due to stay-at-home orders and restrictions on long-distance travel, some coastal and marine ecosystems have temporarily been spared over-use, creating an opportunity for repair and regeneration of habitats. For example, Hanauma Bay, a premier snorkeling destination and one of Hawaii’s most popular tourist spots, typically has about 3,000 visitors a day. In March, the mayor of Honolulu ordered the bay closed due to COVID-19 concerns. Scientists have reported positive impacts to the marine ecosystem (e.g., more natural feeding behavior of the fish) from the elimination of human activities. Some coastal and beach managers have also noted a reduction in marine debris and beach and coastal trash levels.

At the same time, relaxation of restrictions on beach and coastal visitation (resulting at times in overcrowding) in some areas has already led to renewed and increased negative impacts to sensitive habitat areas. Beach visitation has the potential to degrade and damage a range of coastal natural resources, including beach dune habitats and nearshore intertidal areas. In California, legal and illegal harvesting of species is decimating many rocky intertidal tidepool habitats and populations. Reductions to beach and coastal management budgets now and in the future may mean reduced personnel for managing and reducing these impacts. In addition, the re-openings of beaches and coastal areas to visitors has led to significant increases in marine debris and beach and coastal trash levels in some areas.

Figure credits:
- Figure 1: Marketing Greece’s ‘till then #staysafe’ campaign. Photo courtesy of Marketing Greece. [Figure 3.6 in COVID-19 & Travel: Impacts, Responses and Outcomes by Simon Hudson]
- Figure 2: Misool Resort in Raja Ampat, Indonesia. Photo by Sabine Templeton.
- Figure 3: Beach in the Governador Celso Ramos municipality, Santa Catarina, Brazil. Photo by Briana Bombana.
- Figure 4: Manfi Beach Club, Silvi Marina, Italy. Photo courtesy of Habitat World network.
- Figure 5: Comparison of Carpinteria City Beach, California, usage on July 4, 2019 and 2020. Photo by Matt Roberts.
- Figure 6: LA County Department of Beaches & Harbors beach maintenance district manager Jose Bedolla takes down a sign from a lifeguard tower saying the beach is closed at Redondo Beach, Tuesday, May 12, 2020. Photo by Michael Owen Baker. [Image 34x227 to 1160x977]

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- New marine planning and management trainings added to Skimmer database
- New tools compilations added to Skimmer database
• New resource available for finding ocean webinars
• One-fifth of ocean floor now mapped (while less than one-fifth of deep sea life is identifiable)
• New study assesses vulnerability of shelffish aquaculture to climate change and ocean acidification
• Loss of endangered shallow marine megafauna could have catastrophic impacts on marine ecosystems
• Experts call for a rethinking of how ocean data are collected, shared, and accessed
• Free smart buoys available to monitor reef temperature, wind, and waves in real time
• Step-by-step guide to ecosystem services valuation available
• New toolkit available for developing a coastal restoration project
• New model predicts ocean acidity up to five years in advance
• Study identifies coastal regions that would benefit most from ecosystem-based adaptation
• New report highlights value of seagrasses to environment and people
• Study finds existing mangroves provide US$65 billion in flood protection globally
• European Commission commits to protecting 30% of the EU’s land and oceans by 2030
• EU countries have overfished 878 million tons over last 20 years
• Finland releases draft national marine spatial plan
• Construction finished on US’s second offshore wind farm
• Responses requested to survey to improve understanding of the use of marine data

Some plastic pollution-related news and resources:
• Report and inventory of plastic pollution public policies from around the world now available
• Satellites combined with artificial intelligence can now detect small ocean plastics
• New guidelines for reporting microplastics allow research to be reproduced and compared
• Higher ocean concentration of microplastics on seafloor found in Mediterranean
• New report finds most companies not doing enough to fight plastic pollution
• Scientists find microplastics in sea spray
• Japan begins charging for plastic bags

Some deep sea-related news and resources:
• Deep ocean marine species may be more at risk from climate change than surface dwellers
• Report suggests deep-sea mining would negatively impact ecosystems, biodiversity, fisheries, socioeconomies of Pacific island nations
• Cook Islands to allow deep-sea mining in coming years
• Experts say effective deep-sea management needs to consider climate change
• Paper calls for examination impacts of deep-sea mining on midwater ecosystems

Some more climate change-related news and resources:
• Rising water temperatures could endanger the mating of many fish species
• Climate change leading to big fish getting bigger and small fish getting smaller
• 2020 forecast to be the warmest year on record, even without El Niño event
• Antarctica warming at three times the global average rate
• New modeling predicts climate change will lead to increase in tropical phytoplankton
• Mangrove restoration can help countries meet carbon emissions goals

And some other recent news articles that caught our attention:
• Great Barrier Reef home to new underwater art museum
• Analyses revealing hotspots for recruiting and switching forced laborers in the fishing industry
• Global recreational fishing catch estimated to be ~ 1% of total global fishing catch
• New research finds ship strikes affect at least 73 species, including dolphins, sharks, sea otters, seals, penguins, and sea turtles
• New study suggests killer whales migrate to tropics to molt
• Seabirds attracted to fishing vessels used to detect illegal fishing
• Lobsters and other animals all socially distance to avoid disease
• Comic-style guide to educate public about MPAs now available
• Deep sea expedition finds 47-m long siphonophore, world’s longest known animal

How to do science so it influences marine policy and management: An interview with Jon Fisher of The Pew Charitable Trusts

Editor's note: Jon Fisher is currently a conservation science officer at The Pew Charitable Trusts where he provides scientific expertise to inform and improve research projects and helps to increase the impact of scientific research. He was formerly a senior conservation scientist at The Nature Conservancy where he led and conducted research as a principal investigator and conducted internal theory of change work. He and co-authors recently published a paper ”Improving scientific impact: how to practice science that influences environmental policy and management,” in the journal Conservation Science and Practice. Fisher presented a webinar on this research to the OCTO networks (including the EBM Tools Network) in December 2019, and we highly recommend reading the paper and watching the webinar recording.

Skimmer: As you describe in your paper, a lot of scientific research that is intended to be applied isn’t ever used - because decision-makers are unaware of it, aren’t able to access it, don’t understand it, or don’t see it as relevant. Your recent paper outlines practical steps for improving the impact of science on decision making. Could you give us a summary of those steps?

Fisher: Sure, at a high level we recommend four steps:

1. Identify and understand the audience (e.g., a decision-maker with whom you can partner)
2. Clarify the need for evidence (i.e., how new information could lead to action)
3. Gather “just enough” evidence (i.e., so there is enough rigor to be credible without missing key decision-making deadlines or wasting resources on gathering extraneous information)
4. Share and discuss the evidence (i.e., help people learn about your results and motivate them to act on them).

These are guidelines rather than a strict recipe for success because there are many factors that determine the impact that research has. But following these steps improves the odds of research being influential. In fact, we ourselves have found that not following these steps in past projects has led to disappointing outcomes.
Skimmer: You and your co-authors conducted this research in a very open, collaborative way — soliciting peer review on drafts and even presenting this research on one of OCTO’s webinars. You have said that this feedback changed your thinking in some ways. Can you tell us more about this?

Fisher: Yes, this has been quite a journey! The idea for developing these guidelines began in a subgroup discussion from a Science for Nature and People Partnership soil carbon group about 2.5 years ago. We spoke to experts in the field to ask their advice on what they thought scientists needed to be doing to have their science influence policy and management. We also talked to colleagues who were wishing for a guide like this to see what they needed to be doing. From these conversations we came up with an early outline. As we heard different perspectives, our understanding of what would be most useful shifted a lot. We wrote an early draft of a manuscript and got input from ~20 people, including non-scientists, to get their input and check for clarity.

At that point (after ~1.5 years ago) we had a paper we were happy with, but we didn’t know whether the feedback we got was representative of the broader conservation science community. So, we uploaded a preprint to EcoEvoRxiv in March 2019, something none of us had ever done before, and asked readers to send us more input. Every time we revised the paper, we updated the preprint. We also started giving small talks based on the paper in May 2019. The OCTO webinar in December 2019 was the first time we shared it with a big audience.

It was validating to see how much hunger there was for guidelines like this, and this process helped us see which parts of the paper were working well. At the same time, we got critiques that forced us to continually reevaluate our beliefs and assumptions. So, while it was humbling and required lots of patience, it was overall a phenomenal experience. Between talks and sharing the preprint, we reached well over a thousand people before the paper was even accepted!

Skimmer: One of the recommendations that really struck me was about gathering “just enough evidence”. Can you tell us more about how a scientist figures out what “just enough evidence” is and what some of the pitfalls of gathering too much evidence are?

Fisher: This concept was what got us interested in this topic in the first place. There is a field called “value of information” which studies this, but this field is typically pretty mathematical and abstract. As scientists, we often think about the knowledge we want to generate rather than the decision we need to inform. To be relevant to decision making, we may need less information than we think, and we probably need it faster than we would like.

One example was a project I worked on in Brazil. The idea was to use natural processes to help reduce erosion and associated sediment loading and thus bring down water treatment costs. We did some exciting research using very high-resolution satellite imagery, predicting future land use change, hydrological modeling, and economic analysis. We were proud that we could rigorously show the water treatment company how many years it would take for them to recoup their investment in conservation. But it turns out that they decided to move ahead with the work before we even completed our modeling, so they did not need nearly as much detail as we needed.
Do you have a user in mind? Yes

Have you contacted the target user?

Have you discussed their organizational goals?

Do their goals match your research skills?

2 Clarify the need for evidence

Do they see an evidence gap?

Would more/better evidence enable them to act?

Proceed to Part B

thought. The Nature Conservancy spent roughly the same amount of money on the research as we did paying landowners to make changes on the ground that would improve water quality! When we quickly repeated the analysis using coarser (and free) satellite imagery, we found we probably could have saved tens of thousands of dollars, which could then have been spent on more conservation to improve water quality. So “too much” research has real costs in conservation. But it takes careful discussion and planning to get it just right.
Skimmer: Was there anything that really surprised you from your research or anything that you found counterintuitive?

Fisher: Our biggest surprise was how hard it was to follow our own advice at times! We laughed about this a lot when writing the paper, but it also helped us to improve it. For example, early on we realized we were still a bit muddy on who our audience was and how our paper could empower them to make change. There were several points like this where we needed help from outside our group: other conservation scientists, policy experts, communications professionals, etc. But while it was hard to figure all of this out, we were surprised and pleased by how much better the paper got as a result. Another surprise was that we heard very strong demand for a paper like this, but the people we spoke to with the most expertise in the field (including the editor and reviewers at the first journal we submitted to) didn’t see it as novel.

Action steps – Part B

3 Gather “just enough” evidence

Translate knowledge of actions
- If user needs quantitative or qualitative evidence
- Is new data needed, or would you use existing evidence?
- Timeline for action
- Amount and quality of evidence

Design work plan with some up-front analysis, but also a plan to monitor the impact of implementation

1. Create context
2. Conduct analysis
3. Prepare for action
Develop a clear, compelling message

Communicate
- Discuss findings
- Write journal articles
- Prepare presentations
- Write blogs

Essentially, we worked to produce a stand-alone publication that makes research impact advice accessible to a broad range of scientists. Most of our recommendations have already been published elsewhere, but we have found a very low level of awareness of those recommendations in our target audience. It is ironic that advice for planning effective communications has not been well communicated to scientists.


Why marine conservation and management need to be anti-racist and anti-colonial

Two recent articles we read really struck home about why it benefits EVERYONE to make marine conservation and management anti-racist and anti-colonial: 

Ayana Elizabeth Johnson is a American marine biologist, policy expert, and strategist; founder and CEO of Ocean Collectiv, a consulting firm for conservation solutions grounded in social justice; and founder of Urban Ocean Lab, a think tank for coastal cities. In a Washington Post perspective piece "I'm a black climate expert. Racism derails our efforts to save the planet," she writes:

"Black Americans are disproportionately more likely than whites to be concerned about — and affected by — the climate crisis. But the many manifestations of structural racism, mass incarceration and state violence mean environmental issues are only a few lines on a long tally of threats. How can we expect black Americans to focus on climate when we are so at risk on our streets, in our communities, and even within our own homes? How can people of color effectively lead their communities on climate solutions when faced with pervasive and life-shortening racism?

"If we want to successfully address climate change, we need people of color. Not just because pursuing diversity is a good thing to do, and not even because diversity leads to better decision making and more effective strategies — but because black people are significantly more concerned about climate change than white people (57 percent vs. 49 percent), and Latinx people are even more concerned (70 percent). To put that in perspective, it means that more than 23 million black Americans already care deeply about the environment and could make a huge contribution to the massive amount of climate work that needs doing."

Similarly, Asha De Vos is a marine biologist and ocean educator from Sri Lanka. She is founder of Oceanswell and a National Geographic Explorer, Pew Fellow, and TED Fellow. In a Scientific American opinion piece "The Problem of 'Colonial Science'," she writes:

"Then the COVID-19 pandemic hit, and the world shut down. I saw researchers and conservationists panicking that they could not get to their field sites across the world; that their multiyear data sets would have a gaping hole; and, finally, that if they had ensured that they trained local partners on the ground to do the work, then their data collection would have continued. Did it really take a pandemic for us to realize this?

"Colonial science is the conservation model where researchers from the developed world come to countries like mine, do research and leave without any investment in human capacity or infrastructure. It creates a dependency on external expertise and cripples local conservation efforts. The work is driven by the outsiders' assumptions, motives and personal needs, leading to an unfavorable power imbalance between those from outside and those on the ground."

Some additional reading and resources:

- A new network of Black women in marine science is forming
- "How Green Groups Became So White and What to Do About It"
- Why Every Environmentalist Should Be Anti-Racist
- "Growing and frustrated: Black scientists call out racism in the wake of police killings"

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