Galápagos Islands

2020 Conservation Outlook Assessment

SITE INFORMATION

Country: Ecuador
Inscribed in: 1978
Criteria: (vii) (viii) (ix) (x)

Situated in the Pacific Ocean some 1,000 km from the South American continent, these 19 islands and the surrounding marine reserve have been called a unique ‘living museum and showcase of evolution’. Located at the confluence of three ocean currents, the Galápagos are a ‘melting pot’ of marine species. Ongoing seismic and volcanic activity reflects the processes that formed the islands. These processes, together with the extreme isolation of the islands, led to the development of unusual animal life – such as the land iguana, the giant tortoise and the many types of finch – that inspired Charles Darwin’s theory of evolution by natural selection following his visit in 1835. © UNESCO

SUMMARY

2020 Conservation Outlook

Finalised on 08 Dec 2020

The OUV of the site are in relatively good condition as a result of the site's isolation along with an improved legal and governance framework and several actions lead by the Park Directorate with key stakeholders' support. However, with the exception of the unique geological and geomorphological features of the island that remain in good condition and of low concern, all other values are of high concern owing to a number of threats, including marine traffic, illegal fishing and over-exploitation of marine resources within the Marine Reserve, increasing tourism visitation in the island's urban areas, and subsequent increasing demand for imported goods and products from the mainland. The latter increases the possibility of introducing invasive marine and terrestrial species, which constitutes the greatest threat to biodiversity conservation as one of the primary causes of extinctions on these island ecosystems that are naturally vulnerable to alien and invasive species. Another significant threat is climate change and El Niño and La Niña patterns that cause extreme weather events that have become more intense, impacting the values of the site. Governance and enforcement have demonstrated major advancements in the last years, including the 2015 Galápagos Special Regime Law (LOREG) which provides a solid institutional and legal framework for the site protection and management such that ongoing programmes for the protection and management of the site can be ranked as mostly effective. However, the capacity of local and national institutions to address current and potential threats is a concern, especially in light of the financial implications of substantial revenue loss associated with the decline in the foreign tourism market in 2020 and concurrent decreases in staffing numbers and capacity. Threats from outside the site like marine resources over-exploitation, illegal fishing, introduction of terrestrial and marine invasive species, climate change and the potential for further increase
in tourism upon recovery of the market, also still pose great challenges for the Park Directorate.
FULL ASSESSMENT

Description of values

Values

World Heritage values

► Unique underwater wildlife spectacle

The Galápagos Marine Reserve is an underwater wildlife spectacle with abundant life ranging from corals to sharks to penguins to marine mammals. No other site in the world can offer the experience of diving with such a diversity of marine life forms. The diversity of underwater geomorphological forms is an added value to the site producing a unique display, which cannot be found anywhere else in the world (World Heritage Committee, 2013).

► Unique geological and geomorphological features

The Galápagos Islands are located where three major tectonic plates meet at the basis of the ocean – the Nazca, Cocos and Pacific plates – which is of significant geological interest. In comparison with most oceanic archipelagos, the Galápagos are very young with the largest and youngest islands, Isabela and Fernandina, being less than one million years, and the oldest islands, Española and San Cristóbal, only somewhere between three to five million years. On-going geological and geomorphological processes, including recent volcanic eruptions, exposed lava flows, small seismic movements, and erosion provide key insights to the puzzle of the origin of the Galápagos Islands. Almost no other site in the world offers protection of such a complete continuum of geological and geomorphological features, presenting for example 35 volcanic cavities on Santa Cruz Island alone, among them a 3 km long lava tunnel (World Heritage Committee, 2013).

► Unique example of how ecological, evolutive and biogeographic processes model island's flora and fauna

The origin of the flora and fauna on the Galápagos Islands has aroused the interest of humanity since the publication of the "Voyage of the Beagle" in 1839 by Charles Darwin. The islands constitute an almost unique example of how ecological, evolutive and biogeographic processes model the flora and fauna on particular islands and an entire archipelago. Thus, Darwin’s finches, mockingbirds, land snails and giant tortoises represent some of the best examples of adaptive radiation in different ecological niches in a geologically recent place that has allowed the survival of intermediate species. Under this dynamic scenery, many other biotic components have evolved in isolation, converting themselves into organisms not found anywhere else on Earth. This includes birds, insects, trees, rodents, iguanas and other endemic reptiles. Likewise, the Marine Reserve is a dynamic example of species interchange influenced by climatic phenomena such as El Niño, observed on the islands and providing important clues about how species evolve under changing conditions (World Heritage Committee, 2013).

► High species diversity, including endemic and endangered terrestrial species

The Galápagos Islands have relatively high species diversity for such young oceanic islands, and contain emblematic taxa such as giant tortoises and land iguanas, the most northerly species of penguin in the world, flightless cormorants, as well as the historically important Darwin’s finches and Galápagos mockingbirds. Endemic flora, such as the giant daisy trees Scalesia spp. and many other genera, have also radiated on the islands, forming part of a native flora including about 500 vascular plant species of which about 180 are endemic. Examples of endemic and threatened fauna include 12 native terrestrial mammal species (11 endemic, with 10 threatened or extinct) and 36 reptile species (all endemic and most considered threatened or extinct), as well as the only marine iguana in the world (World Heritage
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Committee, 2013).

Endemic and endangered marine species

Likewise, the marine fauna has an unusually high level of diversity and endemism, with 2,909 marine species identified with 18.2% endemism. High profile marine species include sharks, whale sharks, rays and cetaceans. The interactions between the marine and terrestrial biotas (e.g. sea lions, marine and terrestrial iguanas, and seabirds) are also exceptional. Recent exploration of deep-sea communities continues to produce new additions to science (World Heritage Committee, 2013).

Assessment information

Threats

Current Threats

Climate change and El Niño and La Niña patterns that cause extreme weather events have become more intensive impacting species as well as agriculture, fisheries and tourism. Marine traffic and illegal fishing activities in the Marine Reserve still pose high threats to the site. The demand for imported goods and products from the mainland, from local people and tourists, increases the possibility of introducing invasive marine and terrestrial species. Invasive species constitute the greatest threat to biodiversity conservation and are considered one of the causes of extinctions since native species evolved protected by insular isolation and are not prepared for competitors, predators, pests and parasites. Other important threats related with the increasing demand of good and services for the local population and visitors include disorderly urban planning; poor management of solid and liquid waste; high dependence on non-renewable energy sources; increase in the dependency of fossil-fuel for transportation, all threatening the conservation of the Galápagos biological diversity and the viability of the human population in the islands.

Habitat Shifting/ Alteration, Droughts, Ocean acidification, Temperature extremes (Climate change and extreme events)

Climate change already had great impact on the islands ecosystems. Rises in sea temperatures and ocean acidity have significantly affected rocky and coral reefs around the islands. Rising ocean surface temperatures reduce the upwelling of nutrients around the islands that are essential to maintain the food chains healthy that nourish large marine species, fish, marine mammals and birds. Increased precipitation and temperatures affect a host of native species and in some cases favour invasives. El Niño and La Niña patterns that cause extreme weather events have become more intense impacting species as well as agriculture, fisheries, and tourism (Smithsonian, 2015). Climate change might also change the distribution and foraging ranges of species as has been shown elsewhere, which could lead to reduced overlap between species ranges and conservation area, and/or increase overlap between species ranges and areas with commercial or illegal fishing (IUCN Consultation, 2020). These changes will likely alter the marine and terrestrial ecosystems in ways that are difficult to predict. Major uncertainties exist concerning the relationship between the expected regional changes in ocean temperatures, precipitation, upwelling and seawater pH that most climate models consider, and the local changes in the Galápagos (Sachs, J. and Ladd, N., 2011).

Invasive Non-Native/ Alien Species (Invasive marine and terrestrial species)

Invasive species constitute the greatest threat to the conservation of terrestrial and biodiversity and among the largest to marine systems, both in the Galápagos islands. Invasive species are in fact, considered one of the main causes of extinctions. Native species, which evolved protected by insular isolation, are not prepared for competitors, predators, pests and parasites from the continent. So far, 1,522 species (terrestrial and marine) have been introduced and have stablished in the archipelago (Toral-Granda et al. 2017; Carlton et al. 2019). At least 60 species of them, are considered highly invasive (Atkinson et al. 2012). There are currently 1,469 introduced terrestrial species established in
Galápagos. Many of these are not problematic, such as agricultural and ornamental plants. However, some have become invasive negatively affecting the flora and fauna of the islands. The best-known examples are invasive rats (Rattus rattus, R. norvegicus), cats (Felis catus), goats (Capra hircus), a parasitic fly (Philornis downsi), blackberry plant (Rubus niveus), the quinine tree (Cinchona pubescens) and the tropical fire ant (Solenopsis geminata), among others. The Galápagos National Park Directorate, are studying the impacts of invasive species to improve control actions to reduce their abundance. They are also working on reducing the impacts caused by control actions on threatened ecosystems (CDF, 2019), and along with Island Conservation and Charles Darwin Foundation, have successfully eradicated or established biological controls for several species on specific islands (e.g. invasive rats), or Galápagos-wide (e.g. Rock pigeon (Columba livia)). However, the number and extent of existing invasive species, and the ever-present threat of new introductions or re-introductions, mean that invasive species remain a high threat.

**Shipping Lanes**

(Marine traffic)

High Threat

Inside site, scattered(5-15%)

Outside site

Marine traffic in the Galápagos Marine Reserve has been expanding gradually, due to increasing tourist activities that include boat tours on various routes, increase of foreign vessels for research and tourism purposes, and cargo ships that transport materials and food for the human populations of Galápagos. Military vessels with training itineraries within the Reserve, as well as transitory passage or forced arrival (accidents, repairs, etc.) of fishing boats from continental Ecuador. All this traffic entails the need of coordination among control agencies and merchant maritime administrators, to establish general rules for the prevention of contamination damage, collisions, sound pollution, and invasive species introduction, and minimize pressures over the Marine Reserve species and ecosystems (MAE, 2014). Increased marine traffic increases the risk of accidents, vessel failures and oil spills, with potential catastrophic impact on the marine flora and fauna - such as the oil spill of the tanker Jessica in 2001 which led to a 62% mortality of the marine iguana population on Santa Fe (Wikelski et al 2002).

**Tourism/ visitors/ recreation**

(Tourism increases and immigration)

High Threat

Inside site, scattered(5-15%)

In 2018 and 2019, the islands were visited by around 280,000 tourists, with approximately 70% staying in urban areas on land and 30% on boat cruises, representing an annual growth of +5.10% over the past decade (Observatorio de Turismo de Galápagos 2020), not accounting for the effects of COVID-19 on visitation in 2020. The number of cruise ship tourists had remained fairly constant over the last 10 year period (2009-2018), however, land-based tourism has more than doubled, growing from about 80.000 visitors in 2009 to over 180.000 in 2018 (State Party of Ecuador, 2019). From 2017 to 2018 the two airports (Baltra and San Cristóbal) saw a 7% and 12% increase in flights respectively, contributing to a 25% increase in land-based tourists. The 70% of the tourists who stay in urban areas, along with permanent residents, demand goods and services that have a cumulative anthropogenic effect on the limited resources of the islands (e.g., energy, water, sanitation, waste treatment, fossil-fuel based mobility) (State Party of Ecuador, 2019).

**Fishing / Harvesting Aquatic Resources**

(Illegal fishing and bycatch of protected and commercial species)

High Threat

Inside site, widespread(15-50%)

Outside site

Illegal, unreported and unregulated (IUU) fishing represents, together with climate change, one of the greatest threats to the sustainability of tuna fisheries and the conservation of marine biodiversity of the Galapagos Marine Reserve (GMR) and the rest of the Marine Corridor of the Eastern Tropical Pacific. IUU fishing involves different types of activities. The most common, and the one that affects directly the marine biodiversity of the GMR, is the illegal fishing of sharks and tuna by national and foreign flag vessels within and around the boundaries of this multiple-use MPA. Furthermore, the incidental catch (or bycatch) and discard of sharks and other protected and commercial species that occur legally within and around Galapagos is another recurrent problem that, together with illegal fishing, threatens the marine biodiversity of the GMR. The legal framework of Ecuador prohibits shark finning and commercial exploitation of this species nationwide. The landing and trading of sharks is permitted only in those cases when these species are caught incidentally and as long as they are landed whole (fins and body).
In contrast, the capture, landing, and trading of sharks are prohibited in the GMR, even if they were caught incidentally. Despite these measures, approximately 200,000 sharks are landed annually on the main fishing ports of mainland Ecuador, suggesting the existence of a fishery within the EEZ that targets sharks illegally, probably around the GMR. Unfortunately, the magnitude of illegal fishing and bycatch of commercial and protected species within and beyond GMR’s boundaries are poorly known due to lack of proper fishery monitoring of longline fisheries from mainland Ecuador and tuna artisanal fishery in Galápagos either by on-board observers or electronic monitoring systems. However, recent research showed that foraging areas of pinniped species fall predominantly outside of the Conservation Zone within the Galapagos Marine Reserve, likely contributing to conflict between fisheries and endangered fauna (Ventura et al., 2019).

▶ Housing/Urban, Commercial/Industrial Areas, Tourism/Recreation Areas

(Urbanization pressures and increasing demand of good and services from the local population and visitors)

The local population on Galápagos is growing, mainly due to immigration from the mainland (IUCN, 2017). Santa Cruz and San Cristóbal islands are the most developed and inhabited, whose main towns show clear signs of pressure for growth, despite their low density and inefficient use of space. Urbanization can become a destructive force in the islands if its process is not understood and guided (López, J. and Quiroga, D., 2019). There is an increasing demand of good and services from the local population, but also from tourists staying in the islands (State Party of Ecuador, 2019).

Disorderly urban planning; poor management of solid and liquid waste; high dependence on non-renewable energy sources; increase in the dependency of fossil-fuel for transportation; increase in the demand and reliance of products and goods coming from the mainland, which logically increases the possibility of introducing invasive marine and terrestrial species; substantial increase in the number of tourists per year; are major risks threatening the conservation of the Galápagos biological diversity and the viability of the human populations in the islands (CDF, 2019).

▶ Solid Waste

(Marine litter)

Marine litter of all sizes, including pollution with microplastics (particle size < 5 mm) has significantly increased over recent decades and is now observed everywhere in the ocean, afloat, washed up on beaches, and accumulating on the sea floor. There is a lack of quantitative and comprehensive assessment of marine litter pollution for the Galapagos archipelago. A recent study graded 88% of sampled beaches in Galapagos as excellent in terms of cleanliness (Mestanza et al 2019), but the study only monitored 8 beaches on Santa Cruz and San Cristobal once, and did not include microplastics. Another recent study monitored only one beach on the Galapagos archipelago (Tortuga Bay, Santa Cruz) and found on average less than one item per square meter, 75% of litter consisted of plastic (Gaibor et al., 2020). However, qualitative evidence shows that marine litter is ubiquitous, even on remote islands like Fernandina. The effect of litter and in particular marine plastic pollution on the Galapagos biota is unquantified. Anecdotal evidence includes observations of large scale scarring due to permanent entanglement in fishing debris in Galapagos sea lions. Ocean debris can also facilitate the intrusion of invasive species to the archipelago (IUCN Consultation, 2020).

Potential Threats

The prevention of new introductions and re-introduction of marine and terrestrial invasive species is focused in the ports and airports of origin (Quito and Guayaquil) and arrival to the islands where inspection and quarantine actions are carried out by the Galápagos Biosecurity Agency. The demand for imported goods and products from the mainland, from local people and visitors, increases the possibility of introducing and re-introducing invasive species.

Another potential threat is sea level rise caused by global warming, however, there has been no discernible trend in sea level over the last 26 years on Santa Cruz Island. Adaptation to sea level changes may be viewed through the lens of strong El Niño events, which cause sea level in the Galápagos to increase by up to 45 cm during the 1997–8 event. Recent land use changes (e.g. coastal development)
have made the Galapagos much more vulnerable to even modest rises in sea level, including those associated with El Niño.

**Temperature extremes**

*(Sea level rise)*

Global mean sea level has risen by c. 20 cm since 1880 A.D. as a result of global warming and the rate of increase has accelerated since about 1930. There has been no discernible trend in sea level over the last 26 years on Santa Cruz Island in the Galápagos. Nevertheless, global mean sea level is projected to rise by 20-50 cm or more over the 21st century. In the Galápagos, subsidence of some of the islands, or portions of them, has the potential to exacerbate local sea level rise in the coming decades. Adaptation to sea level changes may be viewed through the lens of strong El Niño events, which cause sea level in the Galápagos to increase by up to 45 cm, as occurred during the 1997-8 event. Recent land use changes (e.g. coastal development) have made the Galápagos much more vulnerable to even modest rises in sea level, including those associated with El Niño. It is important to determine why local sea level in the Galápagos has not been observed to rise in concert with the modest rise in sea level in the eastern equatorial Pacific, and to monitor local rates of subsidence, which may exacerbate the rise in global sea level. It would therefore be advantageous to augment the tide gauge on Santa Cruz with additional gauges throughout the archipelago (Sachs, J. and Ladd, N., 2011).

**Invasive Non-Native/ Alien Species**

*(New introductions and re-introduction of marine and terrestrial invasive species)*

The Park Directorate and the Galápagos Biosecurity Agency carry out monitoring activities to identify, control and eradicate invasive species in the protected areas and also in the urban areas. The prevention of new introductions is concentrated in the ports and airports of origin (Quito and Guayaquil) and on arrival at the ports and airports of the islands where inspection and quarantine actions are carried out. Control and eradication actions includes: 1) Phytozoosanitary control and inspection in ports and airports of Quito, Guayaquil and Galapagos; 2) Pest monitoring and epidemiological surveillance for the early detection of new introductions into the archipelago; and 3) Emergency actions and quick response to pests introduced on the islands (State Party of Ecuador, 2019).

**Overall assessment of threats**

Climate change and El Niño and La Niña patterns that cause extreme weather events have become more intensive, impacting species as well as agriculture, fisheries and tourism. Marine traffic and illegal fishing activities in the Marine Reserve still pose high threats. The increasing demand for imported goods and products from the mainland, from local people and visitors, increases the possibility of introducing and re-introducing invasive marine and terrestrial species. Invasive species constitute the greatest threat to biodiversity conservation. Sea level rise as a result of global warming and El Niño events is a potential threat to the site.

**Protection and management**

**Assessing Protection and Management**

**Management system**

The Management Plan for the Galápagos Protected Areas (2014) highlights the functionality and interdependence of the Galápagos National Park and the Galápagos Marine Reserve and its terrestrial and marine ecosystems, as well as the need to integrate the communities that inhabit the archipelago into its management. The plan identifies values, management objectives, key threats and desired management outcomes for a ten year period. Stakeholders from the Galápagos Government Council;
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Provincial Agricultural Direction; Provincial Tourism Direction, parish councils and the Galápagos Biosecurity Agency participated in the plan development process lead by the Galapagos National Park Directorate. The Park Directorate is an administrative decentralized entity of the Ministry of the Environment, responsible for the management, control, law enforcement and inter institutional coordination of both protected areas (MAE, 2014). Although the Galapagos Protected Areas begun a process of zoning delineation and designation in 2014, their implementation has yet to be realised and therefore activities are still permitted as per the previous 2000 zoning system, which does not account for valuable areas that require protective legislation to be enacted (IUCN Consultation, 2020). The Galápagos Special Regime Law (LOREG) defines the role of the Government Council, local governments and other state agencies within the islands, facilitating sustainable development actions and the implementation of planning instruments in the urban areas of the inhabited islands. The Government Council Plenary, with a key role in decision making, includes the participation of local governments and parishes (LOREG, 2015). The Participatory Management Advisory Council, integrated by governmental and non-governmental stakeholders, with a key role in supporting and advising the Park Directorate, was created by LOREG in 2015 and regulated in 2019 (CGREG, 2019).

Since 2018 the Galápagos Biosecurity Agency has been strengthened with equipment, infrastructure and qualified permanent staff, to ensure the phytosanitary conditions of the islands and comply with the prevention, control and eradication of non-native species. Main activities carried out lately include the creation of a biosecurity laboratory in Santa Cruz island, the development of an Invasive species management plan (2019) and the reactivation of the Invasive Species Fund within the Ecuadorian Environmental Sustainable Investment Fund (State Party of Ecuador, 2019).

Effectiveness of management system

The Management Plan for the Galápagos Protected Areas considers the results of the 2012 management effectiveness evaluation for the Galápagos National Park and the Galápagos Marine Reserve, as the basis for long term planning of the site, proposing actions and measures to address key pressures and threats (MAE, 2014).

As of November 2019, the Galápagos National Park Directorate had 330 staff, 92% of which were permanent highly trained staff, leading to an improved institutional management of the site during the last years. Around 73% of the total staff has operative roles distributed among four islands (State Party of Ecuador, 2019). However, recent operational budget reductions (López-Feldman et al., 2020), have reportedly reduced the capacity of the staff to effectively achieve the management objectives of the Management Plan, despite technical assistance and funding for projects from the NGO sector (Montaño, 2020; IUCN Consultation, 2020).

Boundaries

The Galápagos National Park and the Galápagos Marine Reserve have clear and well established boundaries and the Management Plan for the Galápagos Protected Areas includes a zonation proposal for the protected areas (MAE, 2014). Pressure does exist from urban areas outside the protected areas, although this corresponds to just 3% of the total area of the islands.

In 2018, the Galápagos Governing Council approved the territorial planning component of the Sustainable Development Plan aligned with the protected areas Management Plan (State Party of Ecuador, 2019). Currently the Development and Territorial Planning Plan for Galapagos is being updated, as well as the process to review (or replace) the Special Law for Galapagos (LOREG), which is the normative instrument that rules Galapagos as a “Special Territory” under Ecuadorian legislation.

Integration into regional and national planning systems

At local level, in 2018, the Galápagos Governing Council approved the territorial planning component of the Sustainable Development Plan, that includes guidelines to spatial and functional organization of the urban areas of the inhabited islands (3% of the total islands territory are urban areas outside the protected areas) including productive areas and buffer strips, aligned with the Management Plan (State Party of Ecuador, 2019).

At national level, Galápagos National Park and Galápagos Marine Reserve are part of the Ecuadorian National System of Protected Areas (SNAP) (MAE, 2014).
At regional level, the Park Directorate signed a Cooperation Agreement with the National System of Conservation Areas of Costa Rica, to design, develop and implement joint actions to promote conservation of the Galápagos Marine Reserve and the Cocos Island National Park in Costa Rica. The Park Directorate also promoted the integration of the site with wider seascape management and sustainable development priorities, strengthening the Tropical Eastern Pacific Marine Corridor agreement (CMAR) between Ecuador, Colombia, Costa Rica and Panama, to ensure the protection and connectivity of the site with the other protected areas located in this biogeographic region of the eastern tropical Pacific (State Party of Ecuador, 2019).

**Relationships with local people**

Mostly Effective

The Participatory Management Advisory Council of the Galápagos Marine Reserve, created by LOREG (2015) and regulated in 2019, is a consultative body that promotes agreements between the public and private sector regarding the management and sustainable use of the Galápagos Marine Reserve. Its main goal is to advice the Park Directorate and other state agencies. The Council is integrated by representatives of fishermen groups, tourism sector including tourist guides, and other civil society and non-governmental organizations, the Galápagos National Park Director and other state agencies representatives (CGREG, 2019).

Although the distribution of benefits among the local population (Muñoz-Barriga, 2015), Galapagos has a legacy of collaboration and participation and the Park Directorate leads communication, environmental education and social participation processes with more than 2,500 children and young people participating in such activities per year (State Party of Ecuador, 2019).

**Legal framework**

Mostly Effective

The Galápagos Special Regime Law (LOREG) provides a robust legal framework for the Galápagos National Park and Galápagos Marine Reserve protection and sustainable use, addressing institutional, protected areas, sustainable development and land use planning issues, based on the precautionary principle, rights of nature and stakeholders participation, among others. LOREG and other related regulations are aligned with the protected areas Management Plan, including key issues like land use planning of the urban areas, facilitating sustainable development actions. The competencies given to the Galápagos Biosecurity Agency are key to ensure law enforcement to maintain the phytosanitary conditions of the islands (State Party of Ecuador, 2019).

**Law enforcement**

Some Concern

The Park Directorate as manager of the Galápagos National Park and Galápagos Marine Reserve, has physical and technological resources to carry out control and surveillance activities, and monitor terrestrial and marine ecosystems of both protected areas for the control of the 138,000 km² of the Galápagos Marine Reserve. The ratification of the sentence for the environmental crime committed by the China Fu Yuan Yu Leng 999 vessel, and the sentence against the Ecuadorian fishing boat “Don Gerard”, whose crew got a sentence of between 1 and 3 years, in both cases for the crime of possession and transport of protected and endangered species within the Galápagos Marine Reserve, are considered law enforcement milestones lead by the Park Directorate with support of the Ecuadorian Navy. The Cooperation Agreement with the Ecuadorian Navy to create a control center within the archipelago, allows to extend the range of military control and support to the actions of the Park Directorate. The strengthening of human, technical and financial capacities of the Galápagos Biosecurity Agency with phytosanitary and quarantine competencies is a milestone in law enforcement to undertake biological control of the archipelago. The Park Directorate and other key stakeholders have made a big effort to improve law enforcement, however, threats outside the Marine Protected Area like illegal fishing still pose a great challenge over the site (State Party of Ecuador, 2019).

**Implementation of Committee decisions and recommendations**

Some Concern

Progress has been made in implementing World Heritage Committee recommendations, for which the State Party of Ecuador has been commended by the World Heritage Committee. However, the most recent decision noted ‘with concern that, despite this progress, some of the requests made during its
34th session in 2010 when the site was removed from the List of World Heritage in Danger remain unresolved. Major challenges include achieving the long term vision to sustain the tourism market without increasing visitation to the islands, including the need to 'implement a clear tourism strategy that ensures that suitable measures are sustained in the long term as permanent regulations'; challenges in addressing illegal fishing, with an emphasis on collaboration with other States Parties, particularly those of Colombia, Costa Rica, Ecuador and Panama, in meeting these goals; enforcement of the zonation restrictions following the establishment of a new zoning system (World Heritage Committee, 2018).

**Sustainable use**

The only sustainable use activities allowed in the site are artisanal fishing and tourism. The Park Directorate jointly with key stakeholders has made important progress towards a more sustainable artisanal fishing. Some of the main measures and tools developed are: i) A Fishing Calendar defined as a participatory adaptive and dynamic planning tool for management and sustainable use of artisanal fisheries, including technical studies to support decision making; ii) Closure of sea cucumber (Isostichopus fuscus) fishing between 2016 and 2021, research activities to monitor populations growth; iii) Monitoring and follow up of red and green lobster (Panulirus penicillatus and P. gracilis) populations; iv) Action plan for the yellowfin tuna including a fishing framework agreement between key stakeholders within the Marine Reserve; v) Fisheries digital monitoring system; vi) Galápagos certification of artisanal fishery products label; vii) Census of the artisanal fishing fleet.

Regarding tourism, since 2015 LOREG prohibits the construction of new tourist infrastructure or the expansion of existing infrastructure that does not comply with the regulations established by the National Tourism Authority. During 2018 the islands were visited by 276.000 tourists, around 70% stayed in urban areas on land and 30% on boat cruises. Due to regulations, the number of cruise ship tourists has remained fairly constant over the last 10 year period (2009-2018), however, land-based tourism has more than doubled, growing from about 80.000 visitors in 2009 to over 180.000 in 2018 (State Party of Ecuador, 2019).

**Sustainable finance**

Galápagos has served as a model for sustainable finance with the early establishment of a market-based entrance fee system. Additionally, considerable international funding has been mobilized over the years for multiple activities within the National Park and Marine Reserve and the urban areas of the inhabited islands, particularly to address the most important threats to the OUV like invasive species and illegal fishing (IUCN, 2017). The reactivation of the invasive species fund, with a USD 20 million patrimony, whose returns allowed to finance projects for the control and eradication of invasive species for USD 6.7 million for the next years is another milestone in Galápagos sustainable finance (State Party of Ecuador, 2019). However, there are rising concerns due to the negative impact of the COVID-19 crisis on the Galapagos National Park finances. A significant decline in the foreign tourism market associated with the outbreak of Covid-19 has drastically reduced revenue from visitor’s fees and other tourism operations fees, which cumulatively represent around 59% of the annual budget of the National Park (GNP, 2018). Operational budget reductions (López-Feldman et al., 2020), have also reportedly reduced the capacity of the staff to effectively achieve the management objectives of the Management Plan, despite technical assistance and funding for projects from the NGO sector (Montaño, 2020; IUCN Consultation, 2020) and therefore sustainable finance is of some concern.

**Staff capacity, training, and development**

Prior to 2020, important increases in staff number and capacities have taken place over the last few years. The Galápagos National Park Directorate was reported to have 330 staff, 92% of which were permanent highly trained staff. Furthermore, since 2018 the Galápagos Biosecurity Agency has been strengthened with equipment, infrastructure and qualified permanent staff with 171 highly trained staff (of which 85% are permanent positions) distributed among four islands, Quito and Guayaquil. The Park Directorate has been supporting nature-based tourist guide training to allow them to lead maritime and terrestrial tours (State Party of Ecuador, 2019). However, recent concerns have been noted related to the impacts of Covid-19 on staff budgets, and concurrent impacts on staffing levels and capacity (López-
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Feldman et al., 2020; Montaño, 2020).

Education and interpretation programs  Mostly Effective

The Park Directorate leads communication, environmental education and social participation processes with participation of more than 2,500 children and young people per year, that take part in ecological restoration, control and monitoring of introduced species and other programmes like the campaign +Life -Garbage that aims to reduce the consumption of single-use plastics with participation of 21 local schools (State Party of Ecuador, 2019). Additionally, the GNP with the support of local tourism operators has established “conoce Galápagos!” which is a strategy that aims to take local community members to the islands to allow them to visit places where they would not normally go, and to learn the importance and fragility of the place they live in.

The Charles Darwin Foundation has a permanent education and interpretation programme. The environmental education programme addresses mostly local schools children while the interpretation center targets tourists visiting Santa Cruz Island (CDF, 2020).

Tourism and visitation management  Some Concern

During 2018 and 2019, around 280,000 tourists visited Galápagos (Observatorio de Turismo de Galapagos, 2020). Around 70% stayed in urban areas on land and 30% on boat cruises. Due to regulations, the number of cruise ship tourists has remained fairly constant over the last 10 year period (2009-2018), however, land-based tourism has more than doubled, growing from about 80,000 visitors in 2009 to over 180,000 in 2018 (State Party of Ecuador, 2019). Maximum permanence of tourist boat cruises is 15 days. From 2017 to 2018 the two airports (Baltra and San Cristóbal) saw a 7% and 12% increase in flights respectively, contributing to a 25% increase in land-based tourists. The Government of Ecuador has committed to adopt measures that promote a Zero Growth policy model for tourism, however, it is still unclear how this target will be achieved (State Party of Ecuador, 2017; IUCN, 2017).

The 70% of the tourists who stay in urban areas, along with permanent residents, demand goods and services that have a cumulative anthropogenic effect on the limited resources of the islands. LOREG prohibits the construction of new tourist infrastructure or the expansion of existing infrastructure that does not comply with the regulations established by the National Tourism Authority (State Party of Ecuador, 2019).

Monitoring  Mostly Effective

Park Directorate leads monitoring activities for native and endemic species including: petrels, penguins, flamingos, iguanas and turtles. The Galápagos Biosecurity Agency is responsible of pest monitoring and epidemiological surveillance for the early detection of new introductions into the archipelago (State Party of Ecuador, 2019).

Research  Highly Effective

The Park Directorate collaborates in scientific research activities including the varied initiatives involving the participation of key governmental and non-governmental stakeholders, mainly to support decision making. There are a number of local, national and international organizations conducting scientific research (e.g., CDF, USFQ), conservation actions (e.g., GC) and other projects focused on the terrestrial and marine species and ecosystems of Galápagos (State Party of Ecuador, 2019). The Charles Darwin Foundation stands out as a consolidated research center. Since the renewal of the Cooperation Agreement between the CDF and the Ecuadorian State in 2016, a conceptual and methodological shifting of research priorities has heralded a more holistic and integrative approach, recovering research activities in the social sciences to complement the natural sciences. The main research areas include: i) conservation of ecosystems; ii) ecosystems restoration and iii) sustainable development and human well-being (CDF, 2020).

Overall assessment of protection and management  Mostly Effective

Ongoing programmes and activities for the protection and management of the Galápagos National
Park and Galápagos Marine Reserve can be assessed as mostly effective. The 2015 Galápagos Special Regime Law (LOREG) provides a solid institutional and legal framework for the site protection and management. Greatest concern relates to the capacity of local and national institutions to address increasing tourism staying in the urban areas and law enforcement regarding land use in urban areas, including productive zones and buffer strips, according to recently approved regulations. The financial impacts of reduced tourism income during 2020 may further exacerbate these concerns. However, governance and enforcement have demonstrated major advancements in recent years. Threats from outside the site like marine resources over-exploitation, illegal fishing, introduction of terrestrial and marine invasive species, climate change and increase in tourism, still pose a challenge for the Park Directorate.

Assessment of the effectiveness of protection and management in addressing threats outside the site

Ongoing programmes and activities for the protection and management of the Galápagos National Park and Galápagos Marine Reserve are addressing most of the threats outside the site like marine traffic and illegal fishing in the Marine Reserve. The increased demand for imported goods and products from the mainland, for local people and tourists, opening the possibility of introducing or re-introducing invasive marine and terrestrial species, is addressed by control and surveillance in the ports and airports of origin (Quito and Guayaquil) and arrival in the islands where inspection and quarantine actions are carried out by the Galápagos Biosecurity Agency; monitor, control and eradication are also in place inside the islands. The intersecting threats represented by climate change and El Niño and La Niña patterns, and potential sea level rise, are out of the scope of the protection and management actions lead by Park Directorate.

Best practice examples

Efforts made by the Park Directorate and key stakeholders towards a more sustainable artisanal fishing including: i) A Fishing Calendar defined as a participatory adaptive and dynamic planning tool for management and sustainable use of artisanal fisheries, backed up by technical and scientific research studies to support decision making; and ii) Galápagos certification of artisanal fishery products label, are examples of best practices. The ecosystems and species restoration programme led by the Charles Darwin Foundation, and the collaboration between Park Directorate and Island Conservation to systematically eradicate invasive mammals are other best practice examples.

State and trend of values

Assessing the current state and trend of values

World Heritage values

Unique underwater wildlife spectacle

The Galápagos National Park and Galápagos Marine Reserve harbor one of the best-preserved marine environments on the planet. However, the achievements at governing this marine area is not homogenous for all the marine species and ecosystems within the archipelago. As an illustration, while the Park Directorate has been effective in protecting charismatic species such as mammals, turtles, seabirds, or even some species of sharks and pelagic fish, the deficiencies at successfully governing the artisanal fisheries activities, allowed under license within this multi-purpose protected area, has resulted in over exploitation and even collapse of valuable fishing resources. These governance pitfalls are illustrated by the degradation of coastal ecosystems through affectation of trophic cascades or even by the by catch incidence of protected and threatened species, with the consequent risk to become extinct, due to the use of non-selective fishing gear, such as surface long lines. This problem becomes more
worrisome if one takes into account the legal and illegal industrial fishing carried out by national and international long line fleets, in areas near the Marine Reserve. Areas fully protected against fishing activities, are among the few tools available to build resilience for the marine ecosystems and to diminish vulnerability (CDF, 2019).

**Unique geological and geomorphological features**

The geological features of the islands are not threatened.

**Unique example of how ecological, evolutive and biogeographic processes model island’s flora and fauna**

The ecological integrity of the islands depends on the conservation of the structure and functionality of the terrestrial and marine ecosystems, which supports biodiversity and evolutionary processes within the islands (MAE, 2014). Threats like invasive species, climate change, human activities, fishing and marine resources over-exploitation and tourism pose great threats to ecological, evolutive and biogeographic processes.

**High species diversity, including endemic and endangered terrestrial species**

There are currently 1,469 introduced terrestrial species that have been established in Galápagos. Many of these are not problematic, such as agricultural and ornamental plants. However, some have become invasive and negatively affect the flora and fauna of Galápagos. A habitat that has declined drastically is the Scalesia forest in Santa Cruz, dominated by the daisy tree Scalesia pedunculata -endemic and endangered-, due to agricultural activities and invasive plant and animal species, it is estimated that the forest currently covers less than 1% (100 hectares) of its original distribution. Another example is the decrease by 85% of the cactus population (Opuntia echios var. Echios), the main food of terrestrial iguanas. The Park Directorate has been promoting restoration efforts focused on endemic and endangered terrestrial species (CDF, 2019).

**Endemic and endangered marine species**

Industrial illegal fishing conducted mostly by large-scale fleets within the Marine Reserve, as well as rising ocean surface temperatures reducing the upwelling of nutrients around the islands, are negatively affecting marine species. However, not enough data is available to determine the state or trend of this value.

**Summary of the Values**

**Assessment of the current state and trend of World Heritage values**

The only un-threatened value is the unique geological and geomorphological features of the site. All other values are threatened mainly by invasive species, human activities and climate change, although management and conservation measures are underway to reduce or minimize impacts including the restoration of ecosystems and species focused on endemic and endangered terrestrial species. Conservation can not be achieved with interventions limited to the biological scope, curbing degradation trends requires a comprehensive intervention that addresses the underlying causes of biodiversity degradation most of them having their roots on socio economic issues as Galapagos society has become a thriving human community with a highly connected economy to the world. For instance, invasive species and fisheries should be confronted in a comprehensive way facing cross sectional issues such as food security, gender-based violence, consumption and production patterns, and unfair income distribution to identify long lasting solutions for reconciling
human and ecological systems.

Additional information

Benefits

Understanding Benefits

► Outdoor recreation and tourism, Natural beauty and scenery

The Galápagos Islands are one of the iconic nature-based tourism destinations of the world. However, increase in visitors staying in the urban areas of the islands are a major threat to the site's conservation.

Factors negatively affecting provision of this benefit:
- Climate change: Impact level - Moderate, Trend - Increasing
- Invasive species: Impact level - Moderate, Trend - Increasing

► Fishing areas and conservation of fish stocks

The Marine Reserve is an important source of fish for local and national markets, besides being a major (along with tourism) income source for local people.

Factors negatively affecting provision of this benefit:
- Climate change: Impact level - High, Trend - Increasing
- Overexploitation: Impact level - High. Trend - Increasing
- Invasive species: Impact level - Moderate, Trend - Increasing

Defeo et al. (2013a) suggest that spiny lobsters landings are positively impacted by El Niño, particularly during extreme El Niño events, while Wolff et al. (2012), based on a trophic mass balance model for the Bolivar Channel ecosystem, suggest that lobsters biomass increased following the 1997/98 El Niño event. In contrast, the study of Szuwalski et.al (2016) suggests that El Niño does not affect the biomass and recruitment of red lobster stocks, while the cross-correlation analysis presented by Castrejón and Charles (2020) did not find any influence of El Niño on spiny lobsters catch and CPUE from 1997 to 2018. The uncertainty about the observed impact of El Niño over the spiny lobster fishery could be associated with variations on the intensity of this climatic event. According to (Bertrand et al. 2020), no two El Niño events are alike, nor are the resulting ecological responses.

► Direct employment, Tourism-related income, Provision of jobs

Tourism is the main economic activity in the Galápagos for local people, having great importance at national level since most international tourists visiting the islands also visit the mainland.

Factors negatively affecting provision of this benefit:
- Climate change: Impact level - Moderate, Trend - Increasing
- Invasive species: Impact level - Moderate, Trend - Increasing

► Importance for research, Contribution to education

The Galápagos National Park Directorate, the Charles Darwin Foundation and other national and international organizations and universities implement research programmes within the islands, targeting the site's OUV and lately socio economic issues as well.

Factors negatively affecting provision of this benefit:
- Climate change: Impact level - Moderate, Trend - Increasing
- Overexploitation: Impact level - Moderate, Trend - Increasing
- Invasive species: Impact level - Moderate, Trend - Increasing

**Carbon sequestration,**
**Soil stabilisation,**
**Coastal protection,**
**Water provision (importance for water quantity and quality),**
**Pollination**

The marine and terrestrial ecosystems of the site provide a series of ecosystem services to the local, national and international community.

Factors negatively affecting provision of this benefit:
- Climate change: Impact level - High, Trend - Continuing
- Overexploitation: Impact level - Moderate, Trend - Increasing
- Invasive species: Impact level - High, Trend - Continuing

**Summary of benefits**

The Galápagos National Park and Galápagos Marine Reserve provide key benefits to local, national and international community including: health and recreation, food, knowledge through ongoing research programmes, and ecosystem services. For local stakeholders, the site also sustains the local economy, mainly through tourism and fisheries. Over exploitation, climate change and invasive species are factors negatively affecting the provision of the selected benefits.

**Projects**

**Compilation of active conservation projects**

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<th>Organization</th>
<th>Brief description of Active Projects</th>
<th>Website</th>
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<tr>
<td>4</td>
<td>Galapagos Conservancy</td>
<td>Multiple projects to conserve endangered species, develop support of local communities, ecological restoration, and coastal monitoring.</td>
<td><a href="http://www.galapagos.org/2008/">http://www.galapagos.org/2008/</a></td>
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<td>5</td>
<td>Wild Aid</td>
<td>Support to the GNPS for control and execution of marine surveillance; biosafety</td>
<td><a href="http://wildaid.org/ecuador">http://wildaid.org/ecuador</a></td>
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<td>7</td>
<td>Migramar</td>
<td>Shark conservation: monitor and systematize data on whale and hammerhead sharks in the Eastern Tropical Pacific; inform policy-makers for threat addressing strategies</td>
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<td>№</td>
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<td>8</td>
<td>Pontificia Universidad Católica del Ecuador</td>
<td>The Socio Ecological Research Group of the Faculty of Human Sciences is carrying out several research in coordination with CDF in relation with tourism, geography, social aspects among others.</td>
<td><a href="http://www.puce.edu.ec">www.puce.edu.ec</a></td>
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# REFERENCES

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