

Conservation Amid COVID-19 Pandemic: Ecotourism Collapse Threatens Communities and Wildlife in Morocco

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Abstract. COVID-19 pandemic has had huge impacts on multiple industries and sectors, not just ecotourism and wildlife protection in Morocco. Ecological health and wildlife are a critical resource for the country's tourism sector recovery. Conservation is considered as one of the industries that are hit hard by the COVID-19 pandemic. Many of the threats facing biodiversity and protected areas have been exacerbated during and following, the outbreak with practices such as poaching, wildlife trafficking, and forest logging activities resumed due to the country lockdown and ecotourism collapse. Conservationists should take emergency actions in the short-term to help rural communities and grassroots organizations and review ways to achieve conservation and sustainability goals in the post-pandemic era.

1 Introduction

Travel and tourism account for 10.3 percent of the country's global GDP [1], which makes the sector larger than agriculture. In 2019 alone, it created one in four new jobs [1]. The economic contribution of wildlife tourism is equally impressive. It came to US\$343.6 billion (0.4 percent of global GDP) in 2018[2]. Wildlife tourism supported 21.8 million jobs across the world, or 6.8 percent of total travel and tourism jobs [3]. The percentage is much higher in Africa, at a percentage of 36.3 percent [3].

Globally, ecotourism has been central to thousands of conservation projects that have generated jobs and income, empowering rural communities [4, 5]. It has become a key argument in the "conserve or exploit" debate. The World Travel and Tourism Council (WTTC) estimates that up to 75 million jobs are at immediate risk, and anticipates an economic loss of up to US\$2.1 trillion lifted [6]. The recovery period after disease outbreaks has in the past averaged around 19.4 months- everything doesn't return to normal the day after the lockdown is lifted[6]. In 2020, the World Economic Forum (WEF)[7] has ranked nature loss as one of the top global risks. COVID-19 has proved that nature loss and wildlife consumption are the root cause of the emergence of zoonotic infectious diseases, such as coronavirus, Ebola and HIV/AIDS [8]. Although they are quite different at first glance, they all originated from animal populations under conditions of severe environmental pressures[9]. In addition, they all illustrate that destructive human behavior towards nature is endangering human health – a stark reality that was ignored for decades. Research indicates that most emerging infectious diseases and zoonotic spillover are driven by human activities [10, 11].

The tourism sector in Morocco is one of the important contributors to the economy of the country [12]. According to the Moroccan higher planning commission [13], its contribution to the GDP is 6.8% with an estimate of MAD 72.4 billion in 2017. But with the spread of the Coronavirus in the world the tourism industry got highly impacted as most of the countries are in the lockdown [14, 15]. This has created a major downfall in the tourism sector including ecotourism [6].

In this paper, a general commentary is made on the effect of the Coronavirus on the ecotourism sector in Morocco and its impact on rural dependent communities and conservation particularly in protected areas. In fact, many international as well as domestic flights in Morocco are forced to be canceled, as a result of the measures taken by the Moroccan authorities as a response to COVID-19 outbreak. Consequently, ecotourism and related activities are deemed to be entering into a great crisis also establishing socio-economic and conservation concerns. Incomes generating activities that are tightly linked to ecotourism are most affected as tourists are not able to visit Morocco. Also,

conservation is also seen to be facing unprecedented threats as is seen in this context. The aim of this study is to shed light on the impact of the occurrence of corona virus on ecotourism, on dependent communities and on conservation especially in key Morocco's biodiversity areas.

Ecotourism as driver of incentive conservation

Globally, ecotourism results in significant positive changes in perceptions and behaviors of local communities, both towards protected areas and Biodiversity [16, 17]. In addition, many communities living near protected areas benefit from a share of tourism revenues. As the world emerges from the COVID-19 pandemic and undertakes the unprecedented task of repairing and stimulating national economies, investments in conservation could prove game-changing for people and nature in many poor countries that are nonetheless rich in biodiversity [18].

Incentive-based conservation provides employment, ecological services, alternative incomes, health care, education, tourism, and project development [19]. Such approaches are based on the assumption that benefits derived directly from natural resources will encourage conservation and sustainable use of those resources [20, 21]. Ecotourism has proven to improve conservation, awareness, attitudes, and increase pro-conservation behaviors [22, 23]. Community participation in conservation programs and the receipt of economic and social benefits may lead to improved conservation perceptions and approaches, which may, in turn, lead to pro-conservation attitudes [24, 25]. Reduction in negative behaviors (e.g. poaching) and an increase in positive behaviors (e.g. participation in conservation projects) can lead to positive conservation results (e.g. increased species densities and/or range; habitat improvement [26].

In Morocco, ecotourism is an effective means of enhancing protection by positively changing local perceptions, attitudes and behaviors towards wildlife and their natural habitats [27, 28]. It appears to play an important role in terms of the scale and scope of the conservation impacts [29]. However, although economic returns are important, they are not the main determinant of conservation outcomes and should not be the main metric used to assess conservation success of ecotourism sites [30, 24, 31]. Conservation practitioners are aware that even small scale ecotourism ventures can result in significant benefits for conservation [32, 33, 34].

Impact of COVID-19 on tourism in Morocco

In Morocco, tourism has experienced exceptional performances during the last few years [35]. Ambitious projects have increased the beds capacity; increased flights connections and recreational ground activities. Tourism is an important provider of foreign currency and holds an important place in the Moroccan economy with a contribution of about 7% to GDP, more than 1 million jobs and 8 billion US\$ incomes in 2019 [36]. Tourism is spreading throughout the faraway lands, benefiting from a surge in demand, the proximity of the markets that generate it and, above all, the impetus of the tourism strategy (Visions 2010 and 2020), which included sustainable tourism and nature tourism among its main guidelines [37].

Unfortunately, after this promising evolution during the two decades of the 2000s, the cascading effect of the COVID-19 pandemic is crippling the Moroccan tourism and hospitality industry. Taking drastic security measures, Morocco closed its borders, suspended flights, and trips before declaring the lockdown on march 19th. Over a century tourism has never known such a catastrophic situation. The entire tourist chain is at a standstill and the entire activity is paralyzed. According to the National Tourism Confederation, the sector will have a shortage of 98% and about 3.2 billion Euros of loss [38]. Tour operators, guides, transporters and restaurants... have seen their activities going to a sudden and abrupt halt.

In Marrakech, the first which concentrates 30% of hotels and more than 42% of tourism activity, the situation is dramatic. The car parks are crowded with vehicles, the hotels emptied, employees released, and services postponed. Elsewhere, in the hinterland and far from the traditional concentration touristy areas, the hiking trails are deserted as well as the lodges and guest houses. All the mountain guides, trek logistics providers lose their jobs and incomes. The considerable development of green tourism in Morocco is completely stopped. The efforts to save nature and raise awareness, which Morocco has deployed over the past decades, are abandoned for human security measures.

The decline in international tourism should continue until the end of the year. A situation that will depend on health and hygienic conditions in the world and the end of lockdown measures taken in the issuing countries, particularly in relation to the resumption of travel abroad. The situation in Morocco will have to suffer during a long period since the policies as well as the general panic will push tourists to focus on domestic travel and destinations nearby. Meanwhile, the debate and the adopted decisions are strictly economically and socially oriented. The main concerns of the government and the stakeholders are how to absorb the losses of months of paralysis and how to deal with the shortage. Efforts have thus focused on urgent social services to compensate for the losses of household incomes on the one hand and to allow tourism operators to deal with last-minute cancellations and their engagements during the lockdown. Although the confinement argues in favor of questioning the consumer society reality and its negative effects on the environment, reality shows a concentration on the economic impacts of COVID19 and less interest to sustainability, nature, and resources safeguarding considerations.

Impact of COVID-19 on wildlife and conservation in Morocco

To better analyze the situation, we looked for information in court minutes, crime statements written by the Department of Water and Forestry and credible reports illustrated with photos that conservation NGOs shared on their websites or on different social media networks.

Indeed, from the Atlantic Moroccan Sahara to the Atlas Mountains, the COVID-19 outbreak has leveled a devastating blow to efforts to protect endangered wildlife in Morocco. For instance, in the Argan *Arganaspinos* woodland steppes of Amzi in Tiznit area as well as in the Blue Cedar *Cedrusatlantica* forests of Middle Atlas, conservation work to protect some of Morocco's most important ecosystems and flagship species is facing a crisis following a collapse in ecotourism during the pandemic lockdown. The conservation authorities and Wildlife protection NGO have recently expressed concerns about the increasing death toll and trafficking of endangered species in Morocco. Some poachers and traffickers posted pictures of themselves holding poached animals, which they caught in several regions, on their social media account. These acts are widely condemned across the country by the Forest Department, NGO and public opinion.

Amid the pandemic, scientists have repeatedly urged humanity to reset its relationship with nature or suffer worse outbreaks [39, 40, 41]. But the economic consequences of the COVID-19 lockdown have raised fears of a surge in poaching, illegal fishing, and deforestation in life-sustaining ecosystems, with thousands of jobs in the ecotourism sector and related activities at risk across the country. The national focus now is on protecting human lives in this devastating pandemic. However, in many biodiversity hotspots and protected areas, socioeconomic impact is generally observed, particularly in areas where communities rely heavily on ecotourism for their livelihoods. According to conservancies in Morocco, grass roots organizations that depend on ecotourism to fund projects for endangered species and key habitats could be forced to close, after border closures and worldwide travel restrictions abruptly halted millions of dollars of incomes.

While poaching a particular animal may not escalate owing to the current suppression of travels and negative sentiments against animal products, illegal wildlife trafficking and poaching will go up if there is nobody to monitor activities within the protected areas and outside. In Anti-atlas, the Vulnerable Cuvier's Gazelle *Gazellacuvieri*, an endemic antelope of the Maghreb ecoregion[42], was heavily poached between March and May following the collapse of the local tourism sector, according to the local populations. The Endangered Barbary Macaques *Macacca Sylvanus*, another endemic species of Morocco and Algeria[43], poaching has recovered its pace in High Atlas, in Eastern Rif region and possibly elsewhere. In Moroccan forested areas, thousands of song passerines were illegally caught while these species are breeding or migrating. Throughout the country European Bee-eaters (*Meropsapiaster*) are being heavily persecuted and killed by beekeepers who took advantage of the country lockdown to enhance persecution practices. This is also true for some apex and Morocco's highly threatened predators such as the African Golden Wolf *Canisanthis*, Honey Badger *Mellovoracapensis* and Stripped Hyena *Hyenahyena*[44] and raptors (Accipitridae, Falconidae) whose persecution and poisoning exacerbate as depredation the reaction of farmers. Moreover, shepherds are taking advantage of the country lockdown to bring their cattle in the protected areas where vegetation cover is generally better than in unprotected areas due to overgrazing and drought[45].

With regard to threatened Antelopes such as Cuvier's Gazelles, Mhorr gazelle *Nangerdamamhor*, Addax *Addaxnasomaculatus*, and Barbary sheep *Ammotraguslevia*, it could be years before these species can fully recover, increasing the risk that people come to rely on other activities to make a living, putting unsustainable pressure on natural resources[46, 47]. Additionally, it is harder to monitor land grabbing and illegal poaching. While the poaching of several species has continued during the lockdown (Table. 1), a recent report found that the illegal wildlife trade had been severely disrupted by movement and travel restrictions in Morocco (Cherkaoui *obs. pers*). Nevertheless, conservationists fear an explosion of illegal hunting if organizations are forced to lay off wildlife wardens and suspend surveillance programs.

In fact, poaching and wildlife trafficking already existed on a national scale even before the coronavirus outbreak [48, 49, 50, 51]. Nevertheless, with more people out of work, the wild animals will be more appealing than animals sold by licensed animal shops. Then the right question here is the following: if the wardens/guides have no salaries, how will they effectively monitor human activities in and out of the protected areas?"Members of these communities may lose faith in wildlife conservation if there is no money forthcoming. In addition, people who live around Morocco's protected areas and looked forward to offering guidance to tourists may resort to other income-generating activities such as farming and fueling the never-ending human-wildlife conflicts as animals invade and destroy their livestock or new farms.

At several places across the country, we have recorded a spike in poaching activities, with animals killed between March and April 2020. More importantly, several grassroots and conservation organizations have experienced delays in funding during the pandemic. While wardens are forced to stay at home, illegal land grabbing and intentional wildfires increased in many places. For instance, there's rampant deforestation in Taza, Middle-Atlas, High Atlas and Rif Mountains that rose sharply when the Moroccan government decreed health containment in early March of this year. The pandemic has not helped because there are apparently fewer patrols and rangers in the field. In the contrary, illegal loggers as well as poachers, who obviously do not care about coronavirus, saw their activity increase widely under the conjugated effect of protected areas surveillance drop.

Discussion

Sustainable and wildlife tourism is an increasing contributor to economic activity around the world. The global benefits of conservation from ecotourism have been well documented [52]. Community-based conservation areas in particular provide income support for families through a share in tourism-derived income. Also, the mere existence of species-rich landscapes provides the public opportunities to visit the national parks and preserves [53]. A number of ecosystem services are provided by global biodiversity [54, 55]. Indeed, vast quantities of carbon stored in trees and soils act as a natural hedge against climate change [56]. Existing and potential use of natural products for medicinal purposes is huge [57]. Further, wild species, from the largest to the microscopic, interact in ways that keep up delicate-running natural cycles-whether the provision of fresh water or fertile soil - that make Planet Earth habitable for humans [58]. Biodiversity provides transboundary benefits, and that not all countries can meet the costs of its conservation, it is in the interests of the world to share in the costs [58, 60].

Success would depend on investments that simultaneously reinforce the impact of conservation and mitigate or reduce wildlife trafficking and poaching activities; providing capital preservation and/or returns on investments and generating cash flows through sustainable use of nature by local communities [60]. In addition to this, both to protect wild animals and to reduce the possibility of a new pandemic like COVID-19, scientists should emphasize the importance of stopping illegal wildlife trafficking, closing wildlife markets, and protecting natural habitats.

In Morocco, protected areas are generally underfunded, resulting in insufficient funds to support communities living closest to key ecosystems and nature [62]. As a result, communities often pursue land-use practices that provide for their immediate needs, but which may undermine wildlife conservation [63]. However, when local communities have enough support, they look after the land and its biodiversity [64]. This is apparent in Morocco's national parks, reserves, and other country's biodiversity hotspot areas [62, 63]. Moreover, the ecotourism activities in Morocco dropped significantly during the Covid-19 lockdown which affected the generating income activities, seasonal employments and green jobs provided by this sector as the tourism companies associated with outbound tourism faces severe loss. Part of rural economy inside and nearby protected areas is largely reliant on the ecotourism sector and every year a significant amount of global tourists come to visit the important biodiversity destinations in Morocco [65].

In business, COVID-19 has prompted increased discussion of the importance of diversified incomes and resilient supply chains. Therefore, a fundamental lesson from the current outbreak situation is that conservancies should not overly rely on one source of income. Development of inclusive finance models such as small loans for rural communities can be a further option to promote diversified sustainable livelihood opportunities in local economies, minimizing the risk of relying on a specific sector or resource. Besides, wildlife protection in Morocco should be from now onward everybody's best interest for sustainable future and resilient rural communities and landscapes. Currently, there are even more pressing reasons to invest in communities that protect nature through wildlife tourism and conservation. COVID-19 recovery packages must include this investment in public policy. Nature underpins people's survival, wellbeing and, sustainable development.

Moreover, ecotourism will undergo great changes as it is the case for all aspects of human life. As we can already see, hygienic concerns are surfacing and should help to reshape the face of the trip by taking into consideration parameters such as social distancing, cleanliness, respect for other tourists and destinations. The conservative approach will undoubtedly be enriched with new measures and should make it possible to better protect species and resources more. General awareness should be established and the concerns about the well-being of the population and the species will gain more and more. The challenge is to be able to manage this period of emptiness between confinement and the start of travel, which will last a long time. The different ecotourism and conservationist actors must mobilize to manage several facets of the crisis.

Conclusion and perspectives

In the light of COVID-19 outbreak and its impact on Ecotourism sector and biodiversity conservation in Morocco, it is crucial to anticipate on the post-crisis situation. While many revival plans are now being considered by the various tourism organizations, conservation authorities in the country as well as NGOs and communities working in ecotourism must be more proactive and think about a real plan for the transformation of Moroccan tourism which has to take into account the ecological and environmental stakes. The challenge is no longer to seek only the growth of tourism only, but to seek the development of ecotourism with positive impacts on the environment and conservation. It will be a question of finding a balance between the preservation of ecosystems and economic realities.

The COVID-19 outbreak is an opportunity to review priorities and rethink tourism policies for the development of a new tourism model by mainstreaming ecotourism component for sustainability education and conservation. We suggest the following measures to be taken as urgently as possible:

- 1) To reflect on a new plan for the transformation of tourism by capitalizing on the unprecedented experiences of eco-tourism as a solution for climatic and health crises;
- 2) To support rural tourism as a strategy that helps to anchor rural communities in their territory and thus promote the socio-economic development of the hinterland;
- 3) To promote nature-based solutions;

- 4) To raise more fund and support to conservation projects and grassroots communities that might favor combating poaching, overgrazing and habitat destruction through a win-win situation;
- 5) To accelerate the processes of classification of new protected areas or the extension of the surface of the existing ones;
- 6) To create a new participatory approach, integrating the local population protected areas and natural resources co-management;
- 7) To promote environmental-friendly agricultural practices such as permaculture, agro-tourism, and organic farming;
- 8) To Set up a financial contribution (Green tax) on tourism products (transport, catering, accommodation, etc.) to finance ecotourism activities and conservation;
- 9) To support tourism professionals and stakeholders to develop sustainable tourism packages;
- 10) To put in place adapted and easily accessible financing tools to enable the resilience of sustainable tourism professionals (accommodation providers, guides, producers, etc.) in the event of a crisis and outbreaks,
- 11) To maintain or, ideally, increase the, increasing ranger numbers will be critical to ensure that protected areas and valuable species are adequately protected;
- 12) To promote environmental education in order to inculcate in future generations the economic, social, cultural and environmental importance of nature conservation; and
- 13) To make an evaluation of public policies on the basis of species and nature conservation indicators.

This being said, stopping natural habitat destruction, poaching, illegal possession and illegal trade of wildlife has become, more than ever, a global priority to prevent zoonosis, such as the virus causing COVID19 or other diseases spillover between wild animals and humans. Moreover, it is crucial to ensure the balance of ecosystems, halt the loss of biodiversity and increase the capacity of humankind to cope with and adapt to climate change.

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Table. 1.List of wildlife suffering from poaching and trafficking toll rise as reported from conservation groups in Morocco.Data collected between 01 March and 31 May 2020

Species or group of species	IUCN Status	Protected	Region in Morocco	Number reported
<i>Macacca Sylvanus</i> Barbary Macaques	EN	Yes	N.E, H.A	3
<i>Hyaenahyaena</i> Stripped hyena	NT	Yes	N.E	2
<i>Canisanthus</i> African golden wolf	LC	No	A.S; S.E	13
<i>Genettagenetta</i> Common Genet	LC	No	All	18
<i>Mellivoracapensis</i> Honey Badger	LC	Yes	S.A	1
<i>Herpestes ichneumon</i> Egyptian Mongoose	LC	No	All	22
<i>Mustelanivalis</i> Least weasel	LC	No	All	10
<i>Vulpeszerda</i> Fennec Fox	LC	Yes	S.E	3
<i>Vulpesvulpes</i> Red Fox	LC	No	All	> 50
<i>Felislybica</i> Lybian wild Cat	LC	No	S.A	3
<i>Gazellacuvieri</i> Cuvier's Gazelle	VU	Yes	A.A	11
<i>dorcas gazelle Gazelladorcas</i>	VU	Yes	A.S	2
<i>Ammotraguslevia</i> Barbary Aoudad	VU	Yes	S.E	3
<i>Lepus mediterraneus</i> Maghreb Hare	LC	No	All	> 500
<i>Atelerixalgericus</i> Algerian hedgehog	LC	Yes	All	> 500
<i>Chiroptera</i>		Yes	All	> 500
<i>Atlantoxerusgetulus</i> Atlas ground squirrel	LC	No	C.A	> 1000
<i>Testudo graeca</i> Common Tortoise	VU	Yes	All	> 1000
<i>Uromastyxnigriventris/Uromastyxacanthinura</i> Moroccan spiny-tailed lizard	NA	Yes	S.E	> 500
<i>Chamaeleochamaeleon</i> Common Chameleon	LC	Yes	All	> 500
<i>Najahaje</i> Egyptian cobra	NA	Yes	A.S	6
<i>Bitisarietans</i> Puff adder	LC	Yes	C.A, A.S	8
<i>Varanusgriseus</i> Desert Monitor	LC	Yes	A.S, S.E	4
<i>Bubo ascalaphus</i> Pharaoh Eagle-Owl	LC	Yes	N.E, S.E, A.S	12
<i>Buteocirtensis</i> Maghreb Buzzard	LC	Yes	All	7
<i>Falco biarnicus</i> Lanner Falcon	LC	Yes	S.A	2
Other raptors		Yes	All	> 50
<i>Alectoris Barbara</i> Barbary Partridge	LC	No	All	> 100
<i>Streptopeliaturturtur</i> Turtle dove	VU	Yes	All	> 500
<i>Upupaepopos</i> Common Hoopoe	LC	Yes	All	> 500
<i>Meropsapiaster</i> European Bee-eater	LC	No	All	> 1000
Golden finch <i>Cardualiscardualis</i>	LC	Yes	All	> 1000
Other song birds			All	> 1000

A.A= Anti-tlas; AS= Atlantic Moroccan Sahara; C.A= Central Atlantic; EN= Endangered, HA= High Atlas; IUCN= International Union for Conservation of Nature; LC= Least Concern; M.A= Middle Atlas; NA= Not Assessed; N.E= North-Eastern; NT=Near Threatened; SE= South Eastern; VU= Vulnerable,