IUCN Conservation Outlook Assessment 2017 **(archived)**
Finalised on 10 November 2017

Please note: this is an archived Conservation Outlook Assessment for Blue and John Crow Mountains. To access the most up-to-date Conservation Outlook Assessment for this site, please visit https://www.worldheritageoutlook.iucn.org.

Blue and John Crow Mountains

SITE INFORMATION

Country:
Jamaica
Inscribed in: 2015
Criteria:
(iii) (vi) (x)

Site description:

The site encompasses a rugged and extensively forested mountainous region in the south-east of Jamaica, which provided refuge first for the indigenous Tainos fleeing slavery and then for Maroons (former enslaved peoples). They resisted the European colonial system in this isolated region by establishing a network of trails, hiding places and settlements, which form the Nanny Town Heritage Route. The forests offered the Maroons everything they needed for their survival. They developed strong spiritual connections with the mountains, still manifest through the intangible cultural legacy of, for example, religious rites, traditional medicine and dances. The site is also a biodiversity hotspot for the Caribbean Islands with a high proportion of endemic plant species, especially lichens, mosses and certain flowering plants.
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SUMMARY

2017 Conservation Outlook

Good with some concerns

The impressive dedication of many governmental and non-governmental actors and external supporters and of course the local Maroon Community are fully acknowledged. The World Heritage initiative and eventual inscription as a mixed property have generated further momentum and visibility, including in exemplary form as regards the culture-nature nexus. The severity and large number of threats, likely to be aggravated by anticipated climate change, combined with limited management resources, however, are of concern. Permanent and increased management responses will be needed in order to maintain the extraordinary cultural and natural heritage of the property.

Current state and trend of VALUES

Low Concern
Trend: Deteriorating

The establishment of the national park and the perseverance and dedication of many supporters are very encouraging. The property and the larger national park have a high profile. The conceivable decision to selectively nominate only the highest elevations of the national park according to their integrity means that the property per se is in a comparatively good state of conservation. This approach, however, should not disguise that the national park includes large areas of deforested or otherwise visibly degraded land. Even though the property continues to boast impressive and globally important conservation values, these are very vulnerable. The laudable management efforts significantly contribute to addressing the many threats but they fall short of reversing the overall trend of deterioration.

Overall THREATS

High Threat

There is reason for cautious optimism given the dedicated support to the property on the part of the Jamaican conservation and research community. The successful World Heritage nomination is evidence of a strong governmental commitment which came with an explicit declaration to refrain from any mineral exploration and extraction. Nevertheless, due to the small size and vulnerability combined with the multitude of severe and potential threats, the property is considered to be under high threat.

Overall PROTECTION and MANAGEMENT

Some Concern

When strictly referring to the property, protection and management are effective overall. This is on the hand a function of the inhospitable terrain and vegetation. On the other hand, JCDT and its partners deserve credit for many years of hard work under often adverse circumstances.

FULL ASSESSMENT

Description of values

Values

World Heritage values

- **Important centre of Caribbean plant endemism**
  Criterion:(x)

  There are 1,357 recorded species of flowering plant within the property despite its relatively small size. Some 294 of these species are Jamaican endemics and 87 of them are restricted to the property. An impressive number of Jamaica's more than 500 fern species is also found in the property. Noteworthy bryophytes, non-vascular "lower" plants, encompass 61 recorded species of mosses and liverworts (Anadón-Irizarry et al. 2012, Bertzky et al. 2013, Davis et al. 1997).

- **Significant populations of globally (critically) endangered plant and vertebrate species**
  Criterion:(x)

  The property boasts an impressive number of endangered and critically endangered species of flora and fauna. As for the flora, three critically endangered endemics stand out: Blue Mountain Yacca (Podocarpus urbanii), one of the rarest conifers in the world, Eugenia kellyana and Psychotria danceri. Noteworthy vertebrates include the Jamaican Peak Frog (Eleutherodactylus alticola), which has triggered a so-called Alliance for Zero Extinction (AZE). It is hoped that the critically endangered Arntully Robber Frog (Eleutherodactylus orcutti) continues to have its probably last refuge in the national park, as detailed in IUCN Red List information. Endangered bird species include the Jamaican Blackbird (Nesopsar nigerrimus), (Jamaican

Government, 2014). Another bird species, listed as critically endangered in the IUCN Red List, but possibly extinct, is the Jamaican Petrel (Pterodroma caribbaea). What is today the property is the species' only proven nesting site. While the last confirmed record dates back to 1879, the IUCN Red List concludes that it "may conceivably survive" in the Blue and John Crow Mountains. The species has likewise triggered an AZE site.

Other important biodiversity values

► Rare and relatively intact forest and other vegetation types

The highest and mostly rugged elevations of the property are home to unique forest types and other vegetation types. There are patches of cloud forests and elfin forests which not remnant forests but naturally occur as small "islands" restricted to particular micro-climates and other ecological conditions and which may have a degree of plant endemism of around 50 % (IUCN, 2015, see also Dinerstein et al., 1995). There are also rare high altitude grasslands, sometimes, referred to as “montane summit savannas”, featuring local endemic plants with extremely small ranges (JCDT, 2011).

► Mosaic of diverse forest types

While the altitudinal gradient of the historically uninterrupted forests from the coast to the summits does not exist anymore, there continues to be a relatively intact mosaic of remarkably diverse forest types within the property. In essence, the mosaic is restricted to the high and rugged parts of the much larger national park (IUCN, 2015). However, it is assumed that the remnant forest patches in the lower elevations continue to be of high conservation value and there is potential for natural regeneration and active restoration in the long run (IUCN Consultation, 2014).

► Recognised importance for migratory birds

Besides the high degree of endemism of the Jamaican avifauna and the importance of the property for the survival of many of these endemic species, the property is also known as a haven for migratory bird species both from the Northern and Southern Hemispheres. According to Devenish

(2009) , there are more than 170 species of wintering Neotropical migrants, transients or vagrants. Haynes et al. (1989) referred to the montane forests of Eastern Jamaica as "the largest intact wintering habitat blocks for migratory birds in the insular Caribbean".

► **Noteworthy endemic freshwater fauna**

The numerous creeks and small rivers contain a high number of endemic freshwater biodiversity, in particular invertebrates (JCDT, 2011). Many species have historically been used by the Maroon as an important source of protein. Such use continues to this day, some of the used species are local specialties, the most famous one being the mollusk "Bussu" (Neritina punctulata).

► **Highly diverse and largely endemic terrestrial invertebrate fauna**

A large number of Jamaica's more than 500 endemic land snail species are believed to occur in the property; many of them remain to be described scientifically (JCDT, 2011). Other particularities include rare velvet worm species, some of which are likewise endemic (Jamaican Government, 2014).

► **Critical habitat for Giant Swallowtail**

The property is critical for the survival of the endemic Homerus or Jamaican Swallowtail Butterfly (Papilio homerus), the largest butterfly in the Western Hemisphere. The species is today restricted to two locations on Jamaica (JCDT, 2011), the national park and one other location, the Cockpit Country (Jamaican Government (2014). It is a flagship species and an explicit conservation target species.

Assessment information

Threats

Current Threats

High Threat

Alien invasive species, both flora and fauna and both on land in freshwater systems pose a complex and severe direct and indirect threat through competition for habitat, nest predation and other forms of predation of a range of diverse species, including reptiles and amphibians. There is further concern that several alien invasive plants directly increase the fire risks in and around the property. Natural regeneration of the large areas of degraded forests and deforested land is impeded and/or compromised by competing plants but also by seed predation by introduced rodents. Consumptive use of wild terrestrial and freshwater species is not well known but a major challenge, buffered only by the inhospitable terrain. The extent of harvesting of freshwater species is insufficiently known, the priority is to stop use of toxic chemicals as a destructive harvesting method. Compared to these fundamental challenges, fire and tourism and recreation appear secondary. Nevertheless, all of the above threats require permanent management attention. Anticipated climate change is another key concern. As the exact implications remain cloudy, it is considered as a potential threat for the purpose of this assessment.

► Hunting (commercial/subsistence), Poaching, Logging/ Wood Harvesting, Fishing / Harvesting Aquatic Resources

High Threat
Inside site, scattered(5-15%)
Outside site

Hunting appears to focus on non-native mammals and as such would appear to be a contribution to managing some of those species, in particular feral pigs. Pig hunting has elements of both commercial and subsistence hunting and also has cultural importance attached to it. Hunting of Jamaica's only native non-flying mammal, the Hutia or Coney, for meat is reported, both for consumption and for sale (JCDT, 2011). The same source expresses concern about destruction of coney holes as part of he hunting technique. Following massive historic logging (see for example Evelyn et al., 2003), there is some illegal logging and wood collection for local construction and fuelwood, valuable timber resources in accessible locations have been exhausted. Commercial extraction of orchids and other plants as well as birds, reptiles,

amphibians and butterflies for sale as ornamental plants, pets or souvenirs, is also known to occur. Harvesting of freshwater fish and crustaceans and mollusks is an integral part of local livelihood systems and part of traditional dishes. There is a risk of overharvesting and there a particular concern as regards the direct and indirect impacts of the apparently common use of toxic chemicals to harvest shrimp and crayfish (JCDT, 2011).

► Invasive Non-Native/ Alien Species, Hyper-Abundant Species

Very High Threat
Inside site, widespread(15-50%)
Outside site

Alien invasive species of both fauna and flora are major conservation concerns across the property and its surroundings, as they are across all of Jamaica and the entire Insular Caribbean, including in the diverse freshwater systems. The following brief overview draws on CEPF (2010), Goodland et al. (1996), IUCN (2015), Jamaican Government (2014), JCDT (2011) and references therein. There are more than 10 recorded non-native mammals in the property, which include rats, mongoose, feral pigs and dogs and possibly white-tailed deer, all well-known to heavily impact on island systems across the world. In the deforested and/or degraded lower elevations of the national park, which serves as the buffer zone of the property, and on adjacent land, invasive plants are omnipresent and in many places hyper-abundant, for example Bracken Fern and Wild Ginger. The nomination dossier singles out Pittosporum undulatum, an Australian tree species sometimes called Mock Orange, as particularly damaging by out-competing native trees and thereby preventing natural forest regeneration (Jamaican Government, 2014, see also Goodland et al. 1996). With the exception of higher elevations in remote and rugged locations with intact native vegetation, even the property itself is affected by a large number of invasive species. There are also remnants of domestic species stemming from past agriculture and failed attempts to establish timber plantations using non-native pine species. An additional concern is that non-native grasses, such as Molasses or Wynne Grass (Melinus minutiflora) and bamboo species may provide entry points for fire. Fire is commonly used in the agricultural areas around the property. It is believed that the Maroon, and possibly indigenous Peoples prior and during the times of maroonage, influenced species distribution by promoting or

planting preferred species for use as food or medicine.

► Water Pollution

High Threat
Inside site, extent of threat not known
Outside site

While most of the property is upriver of any agricultural use and generally difficult to access, there are some concerns about agro-chemicals entering rivers and creeks (JCDT, 2011). Even more alarming is the unacceptable use of chemicals as a technique to harvest freshwater species for food, see biological resource use.

► Droughts, Storms/Flooding

, throughout(>50%)

The threats are occurring in a heavily modified environment. With the exception of the more resilient remnant native forests, the degraded forests are known to be very vulnerable to heavy rains and resulting erosion and to tropical storms.

► Fire/ Fire Suppression

High Threat
Inside site, scattered(5-15%)
Outside site

Fires pose a high threat to the property, as large parts of the once much larger forest ecosystem have been lost or degraded, thereby decreasing their resilience. Changed micro-climate, a consequence of forest loss and degradation, more pronounced droughts and invasive grass and bamboo species favouring the spreading of fires all contribute to elevating the risks. Sources of wildfires can be natural but fire is not considered a major natural disturbance factor of the forest types under consideration (JCDT, 2011). Typically, fires are related to the widespread use of fire in agriculture or unintentionally caused by visitors with an additional risk of arson as a form of vandalism. The 2010-2016 management plan even refers to fires started for "entertainment" (JCDT, 2011). A major concern is that fires not only prevent natural regeneration but appear to favour several alien invasive plant species

(JCDT, 2011).

► Crops, Other Ecosystem Modifications

High Threat
Outside site

Conversion of forests into agricultural land is part of the broader land use dynamics of the mountainous Eastern part of Jamaica (JCDT, 2011, Weis, 2000). This process has visibly affected large parts of the lower elevations of the national park. Small-scale agricultural activities along the boundaries of the property reach into the property, which coincides with the higher elevations of the national park. JCDT (2011) argues that such unexpected cultivation in hardly accessible remote areas is a response to fear of crop theft.

Potential Threats

High Threat

It is difficult to draw a line between current and potential threats. In principle, most concerns about the future of the property can be described as a feared aggravation of existing threats. It is also important to understand that both the likelihood of the threat becoming a reality and the severity of the possible impacts are factors to be considered. At this stage, mining or quarrying appears highly unlikely given the corresponding governmental commitment in 2015. Similarly, there is no indication of acute plans to promote tourism in ways which would raise environmental or other concerns. The same holds true for possible pressure to extend coffee cultivation. If some of such threats will become reality, they may have to be re-assessed at that point in time. The low likelihood of several of the potential threats becoming a reality in the foreseeable future is acknowledged. Given the multitude of potential threats and the high vulnerability of the small property surrounded by highly degraded land, the current assessment concludes that the potential threats are high overall.

► Mining/ Quarrying

Low Threat

Outside site

There is a legal possibility of mineral exploration and extraction despite national park status. According to applicable national park regulations, mining is only illegal when occurring "without written permission of the Authority" (JCDT, 2011). The management plan notes prospecting licenses which were apparently granted prior to the formal establishment of the national park. Given the direct vicinity of the property and the larger national park to Jamaica's capital some observers have pointed out that there are incentives to extract construction material from the national park even though the Forest Act stipulates that extraction of "soil, sand or gravel" are not permitted (JCDT, 2011).

► Tourism/ visitors/ recreation

Low Threat
Inside site, localised(<5%)
Outside site

Given its localized occurrence and overall adequate management, tourism and recreation are not considered major threats. There is a well-managed visitor centre and recreation area (Holywell) easily accessible from the capital city of Kingston and a number of well-known trails, such as the renowned Blue Mountain Peak Trail. Limited numbers of hikers enter the few trails into the more remote areas of the property. On the contrary, there is further potential to use tourism and recreation as a vehicle for visitor education, conservation financing and to generate local economic benefits. At the same time, hiking to remote areas can pose severe threats in terms of invasive species, accidental fires, and damage to or even destruction of rare habitats and requires adequate regulation, patrolling and enforcement. The biggest threat is likely to be the possible opening of hitherto inaccessible remote locations which have the highest degree of naturalness and as thus are among the most valuable and fragile areas within the property.

► Crops

High Threat
Outside site

Most coffee farmers are probably aware of the critical importance of maintaining forest cover in the highest elevations to ensure reliable water

provision and to prevent flooding and erosion after heavy rains. Nevertheless, there have been controversial attempts to expand lucrative coffee plantations. While there is no indication of acute pressure, further price increases of the already highly priced Blue Mountain coffee would most likely result in pressure.

▶ **Habitat Shifting/ Alteration, Droughts, Temperature extremes, Storms/Flooding**

High Threat
Inside site, throughout(>50%)
Outside site

It is impossible to quantify the future impacts and there is no clear analysis of existing impacts which may be attributable to climate change. The current management plan plausibly argues that climate change is likely to increase the effects of existing impacts, such as land degradation which per se are not caused by climate change (JDCT, 2011). Detailed research by Bellingham et al. (1995, 1994, 1992) indicates that the remaining intact montane forests were remarkably resilient to Hurricane Gilbert which heavily hit Jamaica in 1988. The concern is that, droughts, heavy precipitation events and storms may increase in frequency and intensity.

Protection and management

Assessing Protection and Management

▶ **Relationships with local people**

Some Concern

Besides historic relationships between the mountain environment and the extirpated Indigenous inhabitants of Jamaica, the most intricate relationship between the property and local people is without doubt the critical role the mountains and forests have been playing for the Windward Maroon - and continue to play to this day, both in terms of culture and livelihood systems. This is fully reflected in the very approach of the World Heritage nomination. Historic cooperation between the Maroon and the Indigenous Taíno is documented and it is thus fair to say that some of the indigenous heritage

became part of the Maroon culture (Jamaican Government, 2014). Without the rugged mountain terrain covered in almost impenetrable forests, the Maroon would not have survived their impressive journey from slavery to freedom. This history and meaning of the place is well known in Jamaica, not at least through the legendary leader Queen Nanny or Nanny of the Maroons, who was declared a national heroine in 1975. The Maroon are respected stakeholders and rightsholders and hold much of the land of the Rio Grande Valley adjacent to the national park. The Maroon significantly contributed to the mixed World Heritage initiative. There are many other local communities in the mostly poor rural surroundings of the property. Tensions stem from illegal and partially unsustainable resource use of wild biodiversity for food, construction, energy and sale of ornamental plants and pet birds. One particular stakeholder group are coffee farmers who benefit from and even depend on the park's environmental services. Tourism and recreation play a localized role and modestly contribute to the local economy. Given the limited number of visitors, no major conflicts are known to occur. While it is simplistic to generalize across the heterogeneous stakeholder groups, there are no known major tensions between park management and local people beyond common and manageable resource use conflicts, well-known from protected areas around the world. The Maroon are an example of direct and explicit support to cultural and natural heritage conservation on the part of a local community, including an active role in the World Heritage nomination efforts.

► Legal framework

Some Concern

There is concern that mineral exploration and extraction are in principle not excluded by law despite national park status of both the property and the buffer zone (ICOMOS, 2015; IUCN, 2015; JCDT, 2011). Thereby, some are concerned, threats may arise in the future regardless of existing and strong commitments made by the government at the time of World Heritage inscription. Otherwise, there are multiple designations and layers of protection through a number of laws which raises some concerns about consistency of the legal framework. In addition to national park status, there is overlap with a formally designated forest reserve and an area of “Protected National Heritage”. A clear affirmation of the extraordinary significance of the site, the overlap of designations raises questions in terms

of clarity of the legal framework and the exact roles among and between involved institutions. Given that only a part of the larger national park was inscribed as a World Heritage property, the de facto buffer zone is located within a national park which legally ensures a high level of protection. A detailed analysis of a possible need to harmonize the complex framework would be desirable.

► Enforcement

Data Deficient

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► Integration into regional and national planning systems

Some Concern

As stated in the previous section, it is important to recall that the immediate surroundings of the property, including the entire buffer zone, are formally located within a national park. In this sense, there is a strong legal basis to extend conservation and management beyond the boundaries of the property. Much of the national park outside of the property, however, is heavily and visibly affected by deforestation, forest degradation, erosion, past and current agricultural activity and alien invasive plant species. The legal protection of the immediate surroundings of the property therefore does not translate into an effective conservation and management regime. The nomination dossier (Jamaican Government, 2014) mentions that overall planning in all three Parishes (administrative units) to which the national park belongs refer to conservation objectives and as such are in principle supportive. A broader planning framework bringing together the three Parishes does not appear to exist though. In terms of thematic planning schemes, a national Master Plan for Protected Areas and national level tourism planning deserve to be mentioned (JCDT, 2011).

► Management system

Some Concern

The management system of Jamaica's only national park is noteworthy in that the government has delegated management authority to a national NGO, the Jamaica Conservation and Development Trust (JCDT). Key guidance is provided in management plans since the national park was established in

1993. JCDT is the key actor as regards operational management and the elaboration of management plans. JCDT's work focuses on the national park and institutionally is guided by its own strategic planning and the following mission statement: "to promote environmental conservation and sustainable development, with particular emphasis on the BJCMNP for the benefit of Jamaica and our people." As an innovative governance arrangement, the property and the larger national park are promising examples of taking advantage of the dedication and expertise of highly committed and fully qualified members of civil society. At the same time, it can also be interpreted as a certain evasion of governmental responsibility, as the governmental support to JCDT appears very limited, in particular financially. This creates a heavy reliance on successful fund-raising efforts by one non-governmental actor, which may imply a certain vulnerability in the longer term.

► Management effectiveness

Some Concern

The management by JCDT is highly dedicated and there is effective communication, coordination and cooperation with the multiple governmental institutions involved, domestic and foreign research institutions and local stakeholders and rightsholders. Chai et al. (2009) noted deforestation after the establishment of the national park. The evaluation by both Advisory Bodies noted concerns about staffing and funding levels which can reasonably be interpreted as bottlenecks to management effectiveness (ICOMOS, 2015; IUCN, 2015). The World Heritage nomination and inscription helped to further raise the profile of the site and it is hoped that this will translate into a consolidation of support as a basis for improving management effectiveness. From the strict perspective of the relatively small property, the concerns about management effectiveness are limited, as the area inscribed as a mixed World Heritage property coincides with rugged mountainous terrain that is mostly difficult to access and does not lend itself for conversion to land uses other than forest. When the entire national park is taken into account, it is undeniable that much of the land in the lower elevations is degraded and impacted by a variety of ongoing threats.

► Implementation of Committee decisions and recommendations

Data Deficient

Given the very recent inscription in 2015 there is a short history of interaction with the World Heritage Committee. The deferral of an earlier nomination in 2011 deserves to be mentioned. In its decision 35 COM 8B.16 (Paris, 2011), the Committee provided guidance for further considerations in subsequent nomination efforts. Much of this guidance was considered in the de facto process which eventually led to the inscription of the mixed property in 2015. The inscription decision 39 COM 8B.7 (Bonn, 2015) "encouraged" the State Party to increase its budget for the property to ensure effective protection and management. At this stage, it remains to be seen whether this encouragement will be followed up upon in the medium and longer term. The inscription decision further requested the State Party to "integrate into the interpretation and presentation programme of the property the “satellite sites” related to Maroon tangible and intangible heritage and located outside the property and its buffer zone as well as the heritage of the wider Jamaican Maroonage phenomenon." In light of the visible deforestation in the buffer zone of the property, the Committee also requested the State Party to "strengthen measures to combat the threat of small-scale and commercial agricultural encroachments impacting on the property". In both cases it is clear that the management response to such far-reaching requests cannot be assessed at this point in time.

► Boundaries

Some Concern

It is somewhat unusual that the property is located within a national park but that only selected areas of that nationally protected area were considered worthy of World Heritage status. This is conceivable in light of major integrity concerns across large parts of the lower elevations of the national park. It can be argued that this setting creates the opportunity to manage (and restore) the buffer zone of the World Heritage property with the legal backing that comes with national park status. At the same time, the situation indicates implementation challenges, as the conservation status of large parts of the national park are hardly compatible with its legal status.

► Sustainable finance

Serious Concern

As stated, the management responsibility assumed by JCDT encompasses

the need for fundraising. While JCDT has been successful in securing financial support from diverse sources, the long term reliability is far from certain. In line with the ICOMOS and IUCN evaluations (ICOMOS, 2015; IUCN, 2015), the Committee decision at the time of inscription (39 COM 8B.7, Bonn, 2015) noted under-funding and explicitly encouraged the State Party to step up its budget allocations as a basis for effective management in the long term. The Committee made reference to "current estimates" suggesting a need to double the budget and resources. This is interpreted as a justification to assess a serious concern.

► Staff training and development

Some Concern

Related to the previous point on financing, one limiting factor is the budget. While this can to a certain degree be buffered through the strong personal commitment of NGO staff, it is clear that additional governmental funding would help to address needs to further develop capacities. The needs are clearly identified and specified in the latest management plan (JCDT, 2011). As an institution, JDCT has managed to secure staff training, often in cooperation with external partners and supporters. The involvement of several governmental and academic Jamaican partners contributes to a wide range of expertise being available to inform decisions, thereby also contributing to capacity development on the job.

► Sustainable use

Serious Concern

Natural resource use for food, medicine and shelter was the very basis for the survival of the Maroon which the mixed property honours and celebrates. Use of a wide range of plant and animal species from land and water for wood, construction material, medicine etc. continues to be a reality, including for cultural purposes (Jamaican Government, 2014). In a rural setting with considerable poverty, this is unlikely to change. The management challenge is to prevent excess, such as illegal use of rare species facing extinction or the use of toxic chemicals as a method to harvest freshwater species. Granting defined local user rights based on agreements and accompanied by monitoring are likely to be the most promising management framework, including as an incentive to control

external users. Given that the much of the land within property enjoys a high degree of natural protection due to the ruggedness of the terrain and dense vegetation, the pressure on wild biodiversity is less pronounced than in the buffer zone. Nevertheless, the potentially devastating impacts of extraction on rare species is a serious concern and the monitoring, law enforcement and the overall effectiveness of management responses in this regard appear limited.

► Education and interpretation programs

Mostly Effective

The well managed visitor centre at Holywell and modest infrastructure and signposts at key trails are noteworthy. It is clear that more could be done to draw attention to the significance and to tell the story of the Maroon and their relationship with the Blue and John Crow Mountains and also the adjacent Port Royal Mountains. This holds true both for school curricula and informal education and for education of domestic and international visitors.

► Tourism and visitation management

Some Concern

Limited advantage is currently taking of tourism and recreation. The major hub is Holywell, a recreational area used mostly by residents of nearby Kingston. While hiking is in its infancy as a domestic leisure activity, an increasing number of domestic and foreign visitor make use of the attractive trail network. Forms of tourism adapted to the culturally and ecologically sensitive setting are encouraged, also as a means to educate visitors and to gain supporters. There are promising efforts to this effect

► Monitoring

Some Concern

Of the many forms of monitoring, the monitoring of the use of natural resources (wild biodiversity) comes to mind as a priority need. As it is difficult to envisage any workable mechanisms to prevent resource use in remote areas, the most promising avenue appears to be joint monitoring involving user communities.

► Research

Mostly Effective

There is excellent, albeit selective research on forest ecology and many individual species. Several decades of systematic data collection permit a rare glimpse into the montane forests of the Insular Caribbean which have been lost in their great majority since European arrival. The property and its buffer zone have been and continue to be the training ground and site of field research of numerous Jamaicans who have grown into strong members of the governmental, non-governmental and academic environmental community. There is regular exchange with renowned foreign research institutions. The World Heritage nomination provided a useful opportunity to take stock of the wealth of information generated over many decades.

Overall assessment of protection and management

Some Concern

When strictly referring to the property, protection and management are effective overall. This is on the hand a function of the inhospitable terrain and vegetation. On the other hand, JCDT and its partners deserve credit for many years of hard work under often adverse circumstances.

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

Serious Concern

Despite laudable efforts, it must not be forgotten that the property itself to a large extent owes its good state of conservation to the remote location and rugged terrain coupled with dense vegetation. The surroundings of the property, including but not limited to the lower elevations of the national park, which serve as the property's buffer zone, are visibly degraded. It can be argued that the establishment of the national park in 1993 has prevented even more severe degradation. At the same time, degradation could not decisively be halted or reversed. Therefore, the effectiveness is protection efforts is limited. The property itself would benefit from further investment in participatory monitoring and law enforcement. In the buffer zone, there is

major potential for restoration.

▶ **Best practice examples**

The more than four decades of systematic efforts to forest ecology NGO

State and trend of values

Assessing the current state and trend of values

World Heritage values

▶ **Important centre of Caribbean plant endemism**

Low Concern
Trend:Deteriorating

As long as there will be no new hiking trails facilitating access to high altitude plant habitats, the extraordinary and rare montane forests and the small patches of treeless summit savannas will continue to benefit from the high degree of natural protection. Plants in the lower elevations, including easily accessible parts of the property and the entire buffer zone, have been suffering from multiple direct and indirect human impacts and continue to do so.

▶ **Significant populations of globally (critically) endangered plant and vertebrate species**

Low Concern
Trend:Data Deficient

Telling from the available data, it would appear that several plant species in the highest elevations are under no immediate threat. In those cases, especially as regards the local endemics, the small range is a natural condition which inevitably comes with an increased vulnerability. Rareness in those cases is not necessarily human-induced. The various critically endangered frog species are extremely vulnerable. In the case of the Arntully Robber Frog (Eleutherodactylus orcutti), for example, there is concern that the species may in fact be extinct. The combination of shrinking habitat, competition with and predation by alien invasive species and extraction for

food or trade makes a wide range of species vulnerable. There are also data gaps which make it difficult to comment on the exact status and trends with a high degree of certainty, for example for most of the avifauna.

Summary of the Values

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

Low Concern

Trend: Deteriorating

The establishment of the national park and the perseverance and dedication of many supporters are very encouraging. The property and the larger national park have a high profile. The conceivable decision to selectively nominate only the highest elevations of the national park according to their integrity means that the property per se is in a comparatively good state of conservation. This approach, however, should not disguise that the national park includes large areas of deforested or otherwise visibly degraded land. Even though the property continues to boast impressive and globally important conservation values, these are very vulnerable. The laudable management efforts significantly contribute to addressing the many threats but they fall short of reversing the overall trend of deterioration.

► Assessment of the current state and trend of other important biodiversity values

Low Concern

Trend: Deteriorating

The assessment of other important biodiversity values is of low concern overall, but the trend for some of these values is deteriorating. Additionally, for some values there is insufficient data available to determine state and trend status. For the rare and relatively intact forest and other vegetation values, the extension of some rare forest types in the high elevations is naturally restricted. It is therefore important to distinguish between the extreme reduction of overall forest cover and the status of individual forest types. Some of the latter continue to occur in their small but original extent. The same holds true for summit savannas. With the exception of summits accessible by trail, which poses severe threats to fragile treeless vegetation,

the summit savannas benefit from their inaccessibility. For the mosaic of diverse forest types values, it is a historic fact that the current forest cover of Jamaica constitutes a very small leftover of the situation prior to European colonization and resource extraction. The remaining forests in a good state of conservation in essence owe their existence to remoteness and inaccessibility. As the property boundaries explicitly exclude visibly degraded lands, the forests within the property are in a comparatively good state of conservation. Nevertheless, in light of the historic destruction of the much larger mosaic of forest types, the ongoing high vulnerability and overall mounting pressure, there are severe concerns about the future of the montane forests. For the critical habitat for the Giant Swallowtail Butterfly, it is known that the species is rare and affected by illegal extraction and trade (JCDT, 2011). The information on the status appears anecdotal. This assessment therefore concludes that the data does not permit a definitive assessment. For the recognized importance for migratory birds values, the literature leaves no doubt about the importance of Jamaica and specifically the mountainous East of the island for many migratory birds. The situation and trends in the property are insufficiently known. Therefore, a definitive statement cannot be offered. For the noteworthy endemic freshwater fauna values, the headwaters of the many small creeks within the property are in a good state of conservation. The easier the access to freshwater the more intense is the use of the many edible species. There is concern about overuse of some species and about destructive harvesting practices using chemicals. In the lower elevations of the buffer zone and the surroundings, water contamination has been identified as a conservation and health concern (JCDT, 2011). For the highly diverse and largely endemic terrestrial invertebrate fauna values, strictly referring to the property, there is reason for cautious optimism as the invertebrates restricted to higher elevations have good conservation prospects. The situation in the lower elevations differs and there is concern that habitat loss and conversion and chemicals used in agriculture pose severe threats.

Additional information

Benefits

Understanding Benefits

- **Food, Legal subsistence hunting of wild game, Collection of wild plants and mushrooms, Fishing areas and conservation of fish stocks, Traditional agriculture, Livestock grazing areas**

  Hunting and harvesting of wild biodiversity for food and medicine plays an important role locally and so does harvesting of a wide range of freshwater organisms. It must be stressed once more that while all of the above activities occur in the property, the bulk of it takes place in the easily accessible and less rugged buffer zone. Local communities have a high degree of resource dependence. Communities outside may benefit from using some of the natural resources as food.

- **Water, Access to drinking water, Commercial wells**

  The still forested higher elevations of the various mountain ranges of Eastern Jamaica are textbook examples of the ecosystem service of water provision and regulation. Beneficiaries include downstream users, including the residents of Jamaica's capital of Kingston and agricultural users, including in the renowned coffee plantations. The nomination dossier states that about 40% of Jamaica's population depend on the water of the national park.

- **Cultural and spiritual values, Cultural identity and sense of belonging, History and tradition, Sacred or symbolic plants or animals, Sacred natural sites or landscapes, Wilderness and iconic features**

  As reflected in the explicit mixed approach, the property is a prime example of a cultural values attached to a natural environment. The physical location is inseparable from the history and tradition of the Maroon and Jamaica more broadly and the identify of Jamaicans. The contemporary Maroon have a strong sense of belonging to the place that enabled their survival and eventual freedom

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Health and recreation, Collection of medicinal resources for local use, Outdoor recreation and tourism, Natural beauty and scenery

The local communities and in particular the Maroon continue to use wild biodiversity for medicinal purposes. Nature-based tourism and recreation is limited but there are international visitors and an increasing number of domestic visitors engaged in hiking etc. The Holywell area is a well-established recreational area used by visitors and residents of nearby Kingston alike. It is not known to what degree the potential of wild resources and/or traditional knowledge for commercial pharmaceutical purposes may have been realized

► **Knowledge, Importance for research, Contribution to education**

The forests and other rare and comparatively intact ecosystems of the property provide one of the few opportunities across the Insular Caribbean to understand the ecology of systems which have disappeared or which have been radically altered throughout most of the Caribbean since European arrival. The vicinity to the capital provides a major educational opportunity.

► **Environmental services, Carbon sequestration, Soil stabilisation, Coastal protection, Flood prevention, Water provision (importance for water quantity and quality), Pollination**

The above services are all conceivable and widely acknowledged. Given the relatively humble spatial scale, the importance is highest at the local level. While it can be argued that the site provides important services at the national level, the above services are not significant at an international level.

► **Materials, Collection of timber, e.g. fuelwood, Sustainable extraction of materials (e.g. coral, shells, resin, rubber, grass, rattan, etc)**

Commercial timber extraction is not permitted, the only forestry activities are the unfortunate planting of exotic pine species. In a setting of rural poverty, a large number of products are used as materials, including fuelwood.

► **Contribution to local economy, Direct employment, Tourism-related income**

There are limited direct employment opportunities generated by the property

and the larger national park. There are promising local tourism offers which create jobs and income. Overall, the realization of the potential appears limited.

Summary of benefits

Among a wealth of benefits, the global conservation importance of rare and irreplaceable habitats and species and the cultural meaning for the Maroon and Jamaicans more broadly, stand out. Furthermore, the forested higher elevations secure many crucial environmental services, such as providing and regulating water, erosion control and pollination. Locally, the property and the larger national park continue to be of utmost importance in local livelihood systems.

Projects

Compilation of active conservation projects

№	Organization/ individuals	Project duration	Brief description of Active Projects
1	National Environment and Planning Agency (NEPA)		There are longstanding efforts to establish a national network or system of protected areas.
2			
3	Jamaica Conservation & Development Trust (JCDT)		JCDT, which is in charge of the property's operational management, is engaged in a number of partnerships and projects supported by various domestic, bilateral and international sources.

Compilation of potential site needs

№	Site need title	Brief description of potential site needs	Support needed for following years
1	JCDT in partnership with the Government of Jamaica	light of increasing interest in the culture - nature nexus under the World Heritage Convention, the recently inscribed mixed property supporting by a living culture lends itself to further analysis of the reality of and options for integrated approaches.	
2	JCDT in partnership with the Government of Jamaica and possibly additional partners	As noted in the nomination dossier and the management plan (Jamaican Government, 2014), the highest elevations of the Blue Mountains, John Crow Mountains and the nearby Port Royal Mountains used to be connected through vast and uninterrupted forests. Today, these still exceptionally valuable forests are reduced to islands in a massively modified landscape, including within the national park. Forest restoration in the lower elevations would not only re-establish areas of potentially high conservation values, but would generate and secure ecosystem services, buffer the property and help restore the landscape connectivity.	

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