

## Conservation Issues in the Cockpit Country, Jamaica

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### Abstract

The Jamaican Cockpit Country is one of the most spectacular karst landscapes in the World, and is the premier "type-example" of the cockpit style of polygonal karst. Despite this and the area's hydrological and biological significance, effective conservation of the Cockpit Country is minimal and laissez-faire. While much of the Cockpit Country was designated as a Forest Reserve in 1950, enforcement of this legislation has been erratic, and human encroachment has been limited only by the remoteness and the difficulty of access to the karst. Karst areas surrounding the Cockpit Country are exploited for bauxite mining, agriculture and other purposes; logging and agricultural activities have extended into the Forest Reserve. Although previous studies have stressed the importance of effective conservation in the Cockpit Country, and the area has long been mooted as a national park, government attitudes towards conservation have been inconsistent. Recently, it has been suggested that the Cockpit Country should be nominated as a U.N. Natural World Heritage Site, and organizations including the World Bank and national NGOs have become involved in developing potential conservation strategies. Designation as a Heritage Site is hampered by the lack of appropriate government legislation and by the unresolved issue of land tenure of the resident Maroon community. Such designation may not ultimately be in the best interests of conservation if it draws public attention to the area before adequate protection measures are in place.

### Introduction

The Cockpit Country, centered on Trelawny Parish, Jamaica, represents the type example of the cockpit style of polygonal karst (Figure 1). The 600km<sup>2</sup> area is a significant habitat for many endemic species and its future conservation is a matter of increasing concern both in Jamaica and internationally. Although much of the karst remains forested, some 10,000 people live in the immediate vicinity, and agricultural, domestic and industrial pressures are mounting. There have been several previous discussions of the status of existing conservation measures (EYRE, 1995; SMITH, 1995; BARKER & MILLER, 1995; MILLER, 1998) but no coherent strategy has yet been implemented and the area retains its largely ineffective 1950 designation as a Forest Reserve, which permits multiple uses of the forest. In 1994, the Jamaican Conservation and Development Trust recommended the Cockpit Country as a national park, but this has yet to be accomplished despite the support of national and international organizations as disparate as BirdLife Jamaica and the World Bank.

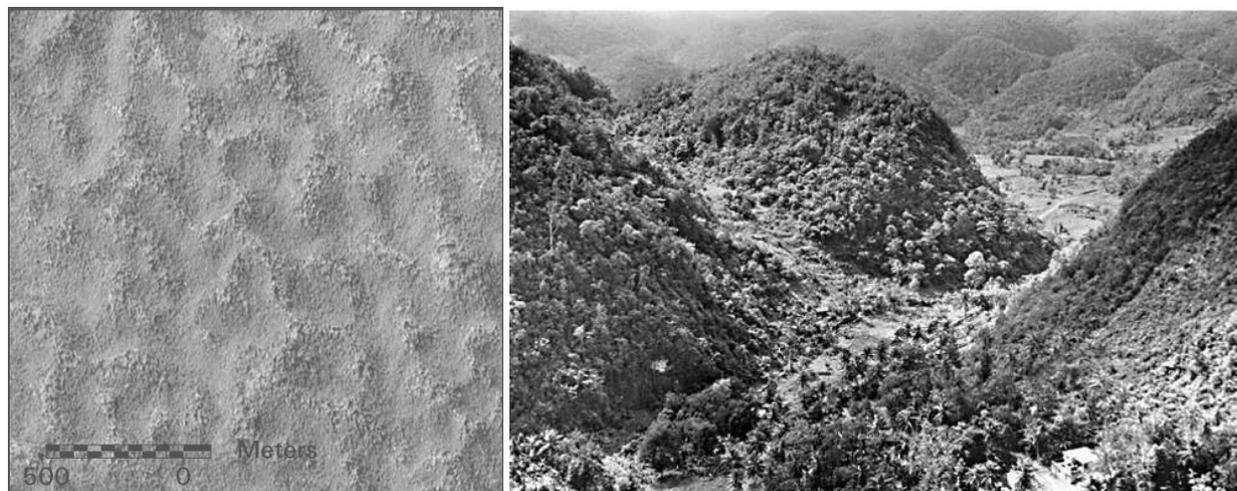


Fig. 1. IKONOS image in the near infrared band taken just south of Windsor (left) and an aerial view of a portion of the Cockpit Country (right). Notice the house in the lower right hand corner for scale.

## The Cockpit Country Landscape

The Cockpit Country is developed in the White Limestone Group of Eocene to Miocene carbonates. The cockpits are steep-sided, enclosed depressions surrounded by residual hills or ridges (SWEETING, 1958; AUB, 1969; SMITH *et al.*, 1972; MILLER, 1998). The convex floors generally have a regolith or soil cover and some contain relict, debris-choked vertical shafts. Drainage is centripetal, although dominantly vertical (DAY, 1979). Some cockpits are elongated, reflecting structural influences or inheritance from abandoned surface drainage courses. The residual hills and ridges are notched by saddles and separated by corridors. Drainage is largely autogenic and northward, although there are some allogenic inputs on the southern periphery. Underground drainage emerges at springs, which support rivers draining to the north coast (DAY, 1985). Caves are numerous and are hydrologically active during wet seasons (FINCHAM, 1997).

The tropical wet climate varies both spatially and temporally. Rainfall increases from the periphery to the interior and also with higher elevation. May, September, and October account for 46% of the annual precipitation, which ranges between 1700 and 3800mm (BARKER & MILLER, 1995). Temperature and humidity vary too, with a wide array of microclimates, especially where the forest cover has been removed (BARKER & MILLER, 1995).

Most soils are thin and patchy except in depression bases, where they may be over 1m thick. Derived essentially from weathering of the limestone, they are mostly yellow or red brown clays, and some are bauxitic.

Undisturbed vegetation in the interior is classified as wet limestone forest, in which there is considerable topographic variability and floristic diversity (PROCTOR, 1986; KELLY *et al.*, 1988) and BINNEY *et al.* (1991:68) emphasizes that "...no two hills are exactly alike in their vegetation." The Cockpit Country boasts the highest rate of West Indian plant endemism per unit area, and the karst is the only remaining refuge for many threatened species. There are at least 100 endemic plant species (PROCTOR, 1986) and more fern species, relative to the area, than in any other rain forest in the tropics (EYRE, 1995).

Threatened fauna also depend on the Cockpit Country karst for their survival. In addition to significant bat populations, several species of herpetofauna are restricted to the area, including two species of Eleutherodactylus frogs (CROMBIE 1977, 1986) and one galliwasp (*Celestus fowleri*) (SCHWARTZ 1971). There is a distinctive and significant avifauna (FAIRBAIRN, 1986) including all but one of Jamaica's 28 endemic bird species (RAFFAELE *et al.*, 1998). The Cockpit Country is the stronghold for many of the island's vulnerable species such as Black-billed Parrots (*Amazona agilis*) and Yellow-billed Parrots (*A. collaria*), the Jamaican boa (*Epicrates subflavus*), and the Giant Swallowtail butterfly (*Pterourus homerus*) (WINDSOR RESEARCH CENTRE, 2000).

## Anthropogenic Influences

Its historical inaccessibility and lack of surface water has limited large-scale clearing and permanent dwellings within the Cockpit Country. Human alterations, however, are evident in an extensive trail system and clearing of cockpits for agriculture. In the 1700s, the Maroons used the area as a refuge and base for military campaigns against the British army. Treaties ending the Maroon Wars gave the Maroons a degree of autonomy, and resulted in permanent settlements such as Accompong, which are still Maroon strongholds. Relationships between the Jamaican government and the Maroons have not always been harmonious, and the Maroons maintain a recognized claim to much of the Cockpit Country (JAMAICAN CONSERVATION & DEVELOPMENT TRUST, 1994).

Colonial logging focused on hardwood species, principally mahogany and, in this context, the Cockpit Country was declared a forest reserve in 1950. Peripheral forests were cleared for sugar plantations and other agricultural endeavors, and there was a post-independence marginal settlement by people displaced by bauxite mining. The peripheral population currently numbers about 10,000, including the populations of Accompong, Maroon Town, Troy, Quickstep, and Windsor.

## Contemporary Conservation Issues

The forested area of the Cockpit Country decreased by 15.9% between 1981 and 1987, a deforestation rate of 2.8% per annum leaving intact only 446km<sup>2</sup> of contiguous forest (EYRE, 1989). Small-scale agriculture is the primary contributor, with cockpits, glades and other accessible sites planted with yams, corn, dasheen, banana, plantain and sugar cane, and cattle and goats pastured locally (BARKER & MILLER, 1995).



Unauthorized logging occurs too, and saplings of certain species are in demand particularly to support yam vines (BARKER & MILLER, 1995; MILLER, 1998). Enforcement of the 1950 Forest Preservation Act is minimal (WCMC, 1992). Peripheral karstlands have been devastated by bauxite mining, and are heavily used for agriculture.

Improved accessibility via roads and trails poses a major threat to the integrity of the Cockpit Country (BARKER & MILLER, 1995), and this would be a serious adverse impact of the creation of a national park and the subsequent ingress of visitors. Not only does the creation of trails lead to increased soil erosion (WALLIN & HARDIN, 1996) and drying of microclimates, but it also facilitates the spread of non-native invasive species. Bauxite mining also remains a potential threat, particularly as reserves become exhausted elsewhere in the karst.

### Karstland Conservation in Jamaica

By Caribbean standards, designation of karstlands in Jamaica as protected areas is negligible, with only 524km<sup>2</sup>, seven percent of the total karst, so designated (KUENY & DAY, 1998; KUENY, 2000). The Montego Bay Marine Park was the first national park in Jamaica (1992) and, in 1997, six forest reserves, including 223km<sup>2</sup> of the Cockpit Country, were added to the WCMC list of protected areas, although these provide no real protection for the karst (EYRE, 1995; BARKER & MILLER, 1995; BARKER, 1998). Some karst is protected within the 780 km<sup>2</sup> Blue and John Crow National Mountains Park, although this is not included in the 1997 UN List of Protected Areas (WCMC, 1997).

The Cockpit Country has been under consideration for designation as a national park for more than 20 years (EYRE, 1990; SMITH, 1995), but declaration has been prevented by several difficulties. Conflicting land use potentials remain problematic, with future wholesale logging and bauxite mining not having been discounted. Differing tourism scenarios also exist, with various potentials for both income generation and environmental degradation. Economic considerations continue to receive undue emphasis, and agreement with the Maroons has not been reached.

In 1989, a Protected Areas Resource Conservation (PARC) project was instituted by the Jamaican government as a preliminary formal step towards establishing a national parks system in Jamaica (NRCA, 1995; SMITH, 1995). The Planning Institute of Jamaica is charged with operating the PARC, and the Jamaica Conservation Development Trust (JCDDT), an NGO, operates the national parks under a delegation agreement with the Natural Resources Conservation Authority (NRCA), which oversees policy for the national parks (SMITH, 1995). Funding for PARC is through the US Agency for International Development, with technical assistance from the Nature Conservancy.

BirdLife Jamaica (BLJ) is working with local residents and overseas scientists to study the endemic Black-billed and Yellow-billed parrots in the Cockpit Country. Habitat loss and degradation are the greatest threats, followed by illegal collecting for the pet trade. In 2001, BLJ will be implementing an Important Bird Areas (IBA) Programme, in collaboration with international efforts lead by BirdLife International, to develop long-term monitoring projects in critical habitats such as the Cockpit Country.. The Windsor Research Centre is also involved in local conservation efforts (WRC, 2000) and the JCDDT (with WRC) is investigating a conservation strategy for Windsor Great Cave.

In 1999, responding to mounting environmental pressures, the World Bank proposed a Cockpit Country Conservation Project (CCCP) in an effort to "...develop a sustainable funding strategy within the framework of the existing Jamaica National Parks Trust Fund to help finance long-term management of the Cockpit Country Protected Area" (WORLD BANK, 1999: 2). The project will address conservation issues through: (1) implementing resource management systems to conserve biodiversity, (2) improving forest management practices to improve forest quality and promote sustainable uses of forest resources, (3) improving land management practices in the buffer zone to prevent soil erosion and reduce river sediment levels, and (4) promoting sustainable use of resources by local residents.

The costs of the CCCP are estimated to be US\$6million, to be funded by the World Bank, the Jamaican and foreign governments and participating NGOs. Community involvement at all levels is considered paramount, but the proposal provides no clear framework for the role of the local Maroon communities. The proposal remains under consideration.

EYRE (1995) contends that the Cockpit Country would be a strong candidate for designation as a UNESCO World Heritage Site, although he acknowledges that this would not be without difficulty. Problems include the following: (1) The current protected area status is inadequate, both in terms of demarcation and

enforcement, (2) Natural resource inventories need yet to be completed, (3) National government commitment is unconfirmed, (4) Land tenure issues remain unresolved, in particular the claims of the Maroon community, (5) The role and impacts of tourism have yet to be adequately addressed.

## Conclusion

Presently, conservation of the internationally recognized Cockpit Country karst is accomplished largely by virtue of inaccessibility and benign neglect, with the only official protective mechanism being the 1950 designation as a forest reserve. Enforcement of existing regulations is minimal and of limited efficacy. Economic and staffing restrictions are compounded by the lack of institutional commitment. At the same time, there are increasing pressures from diverse development interests.

There have been several well-intentioned proposals to change this situation through various legislative mechanisms, but these have not been implemented, nor is it certain that they ever will be. Moreover, it is unclear whether such recommendations are necessarily in the best interests of conservation and protection. Creation of a Cockpit Country National Park will not in itself promote more effective and ecologically sensitive management, although it would appear to be a necessary prerequisite to designation as an UNESCO World Heritage site. The Jamaican government needs to play a central and transparent role here, since nothing substantive can be accomplished without a clear affirmation of government commitment to environmental protection. The interests of other stakeholders, such as the Maroons, NGOs, residents and the various parish councils and commercial interests need to be addressed within the context of a consistent conservation vision.

## Acknowledgements

S. Chenoweth, M. Day and J. Kueny acknowledge the financial support of the Center for Latin American and Caribbean Studies at the University of Wisconsin-Milwaukee. We are grateful to the people of Windsor, Coxheath and Sherwood Content for their support and hospitality.

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