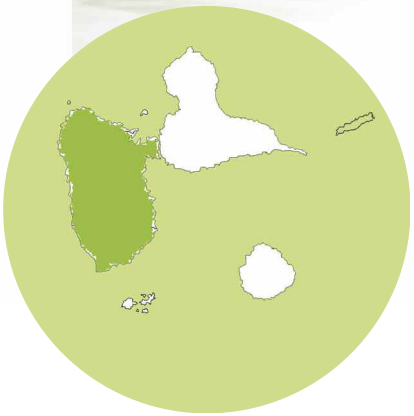

Common bamboo

(*Bambusa vulgaris*)

Experimental work site for bamboo management in the central zone of the Guadeloupe national park

Guadeloupe national park

■ The Guadeloupe national park is a public organisation operating under the supervision of the Ecology ministry. The park is the seventh French national park and the first in a tropical environment. It was created by interministerial decree on 20 February 1989 to protect the central and southern sections of the mountainous region on the island of Basse-Terre.

■ The central zone of the park covers a total of 219 square kilometres (km²) and the peripheral zone covers another 819 km², in 16 towns. The park also includes an adjacent marine area spanning 1 308 km², which is essentially the maritime equivalent of the peripheral zone, where the park can launch projects with maritime stakeholders (fishers, pleasure boaters, etc.).

■ Contact: Hervé Magnin - Patrimonial department - herve.magnin@guadeloupe-parcnational.fr

French national forestry agency (ONF)

■ The French national forestry agency (ONF) is a public organisation in charge of managing public forests. It is supervised by the Agriculture and Ecology ministries.

■ In the Guadeloupe archipelago, ONF manages 378 km² of public forests, including forests belonging jointly to the French State and the department, other forests belonging exclusively to the department, State forests and sites belonging to the Seaside and Lake Conservation Trust, spread from the volcanic highlands of Basse-Terre to the sheer cliffs of Grande-Terre and the southern islands. In all these areas, the main objectives are to preserve the environment and welcome the public.

■ Contact: Marc Gayot, Biodiversity department - marc.gayot@onf.fr

Intervention site

■ The bamboo management site was located along the Traversée Road (D 23), which as its name suggests, crosses the island of Basse-Terre via the wooded, mountainous section.

■ Six sites along a 5-kilometre stretch were selected for their high impact on the landscape, their relative accessibility and the diversity of the sites (bamboo stands at the top of a slope, at the bottom of a slope, along a river, etc.). The objective was to experiment with techniques to eliminate the bamboo in the different situations.

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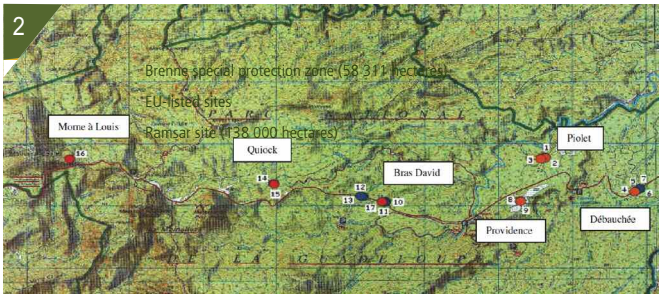

1. Map of the Guadeloupe national park. Source: Guadeloupe national park.
2. Map showing the sites.

Disturbances and issues involved

■ Common bamboo (*Bambusa vulgaris*) was planted along the Traversée Road while the road was being constructed in 1960 and in a number of mountainous areas on Basse-Terre to stabilise the terrain and enhance the landscape.

■ Bamboo roots tend, however, to grow horizontally and the weight of the plants in fact destabilised the waterlogged terrain. The stalks growing up over the road slow its drying, clutter the road with debris and reduce visibility, thus increasing the risk of accident. The result is high maintenance costs along the road.

Interventions

■ Objective of the interventions

■ The objective was to test a method of permanently eliminating the bamboo that is compatible with the constraints of a national park, i.e. no herbicides and no burning. The purpose of eliminating the bamboo was to enable recolonisation of the sites by native species.

■ The experiment served as a test run to determine the average costs of management work depending on the different work conditions. The data was required to estimate the cost of larger projects and their feasibility in the central zone of the park.

■ The test was proposed by the Guadeloupe national park in response to a call for projects by the Ecology ministry as part of the national biodiversity strategy for 2011-2020 called the "Efforts against land and marine invasive alien species in the overseas territories" policy. In managing the project, the park requested the assistance of two other organisations:

- the French national forestry agency (ONF) which was charged with effectively running the work sites;
- the Guadeloupe departmental roads service which managed automobile traffic on the road during work in the immediate vicinity.

■ Preliminary mapping

■ The sectors colonised by the bamboo were precisely mapped. Between 100 and 120 stands of bamboo with an average of 80 stalks each were found along a 15-kilometre section of the Traversée Road. Among that number, 17 stands representing the various situations (slopes, accessibility, proximity to the road, along a river, etc.) were selected.

■ A degree of operational difficulty (low, medium, high) was assigned to each stand. The degree of difficulty was estimated on the basis of the slope (steep enough in some cases to require harnesses and ropes) and the accessibility (stalk transport by hand), given that it was prohibited to create tracks or roads.

■ The priority sectors for work were then defined on the basis of two criteria:

- the visual impact on the dense rainforest, notably in the highly visited tourist areas;
- risks for the safety of the population, notably in areas along the road.

■ Ten stands were selected for the experiment. The stands were first inspected to check for the presence of epiphyte orchids (specimens of the *Epidendrum* genus) that would have been impacted by the management work.

■ The work took place over a period of four weeks, from 28 May to 21 June 2013. ONF and the park were on hand each day to monitor the work. The work consisted of two steps:

- cutting the stalks with a chainsaw and removal of the branches. Depending on the local conditions, the stalks were carried out by the men, stored on site for later use or ground on site if they could not be used;
- tarping the stumps that had been cut off at ground level. The tarps covered each stand plus a border area 1.5 metres around the stand.

■ Equipment used included:

- a chainsaw to cut the stalks and remove the branches, plus the necessary personal protective equipment;
- machetes to clear the area for debranching;
- a grinder to reduce all the branches and the stalks not carried out;

3. A stand of bamboo before being cut.
4. Cutting the stalks.
5. Removing the branches using a chainsaw.
6. Grinding the branches along the road.

- opaque, waterproof, non-woven tarps, weighing at least 140 grams per square metre;
- metal stakes and nylon cord to secure the tarps;
- a tipping trailer to store and transport the removed plant material.

■ Removal and treatment of the cut plants

■ It was decided to make the best possible use of the cut plants given that bamboo is a valuable resource for many uses (construction, crafts, agriculture). Depending on the situation at each site, the stalks were either stored on site or carried out by the workers. Storage systems were constructed on the sites where the distance to the road made removal difficult. The stalks were stored above ground level to avoid any sprouting of roots and renewed growth of the cut stalks.

■ The stalks carried out and the ground material were provided free of cost to companies, non-profits and private citizens. The transfer was organised near the work site when secure access was available, thus avoiding transport.

■ Monitoring the tarps

■ The tarps were inspected once per month during the first four months following the work, then once per quarter over a period of one year. The purpose of the monitoring was to detect any regrowth of the bamboo through the tarp or along the edges. Any observed shoots were cut during the visits.

■ Monitoring revealed that woven tarps eventually let new shoots through and are not suitable for this purpose. Certain other types of tarps are UV-sensitive and wear very quickly in a tropical climate. They cannot withstand the pressure exerted by the plants.

7. A waterproof tarp secured to the ground using metal stakes and nylon cord.
8. Raised storage system.
9. Green stalks available for reuse.

Results and costs

■ Results

■ The ten selected stands were handled by two companies that responded to the call for tenders. Cutting, removal of the branches and tarping were carried out on all stalks on the sites. A total of 977 stalks were processed during 400 hours of work.

■ In February 2015, two shoots were noted in a stand on the Piolet site (stand 3) and the Morne à Louis site (stand 16). Shoots were also discovered on the Piolet storage site. They were removed using a machete. No other stands produced shoots and the tarps were removed in 2015.

Site		Morne à Louis	Piolet			Quiock	Débauchée		Providence	Bras David		TOTAL
Stand number		16	1	2	3	14	4	5	9	11	17	
Number of stalks processed		150	80	150	120	120	70	100	70	40	77	977
Man-hours per task	Cutting	8	4	6	6	16	10	8	6	4	4	72
	Branch removal	8	4	6	6	24	10	10	12.5	5	5	90.5
	Transport		10	6	12							28
	Grinding	2	1	2	2		15	15	5	10	15	67
	Stump preparation	6	3	3	3	8	8	10	3	8	8	60
	Tarping	2	2	2	2	7.5	7.5	5	5	7.5	10	50.5
	Building storage systems		2	4	4	22.5						32.5
Total man-hours		26	26	29	35	78	50.5	48	31.5	34.5	42	400.5

Table 1. Summary of tasks and man-hours.

By 2016, the stands had been completely eradicated. However, the Morne à Louis stand is still tarped because the first tarp used was of very poor quality and had to be replaced during the year.

Assessment of bamboo use

The total number of equivalent 8-metre stalks was calculated based on the lengths actually cut and the number of cubic metres of ground material (one cubic metre = five stalks). The total amount of material given away represented the equivalent of 1 100 stalks measuring eight metres each. The transfers to the private entities were organised by the Guadeloupe national park (46 transfer documents signed).

Virtually all the cut vegetation was transferred with the exception of a small number of stalks and branches that were left stored on the sites of Piolet and Quiock, due to the transportation difficulties. The vegetation was transferred to gardening companies and to farmers (mulch), to the CIRAD (for experiments on mulching in pineapple plantations), to craftsmen (furniture) and to a boat builder (booms for traditional sailboats).

Human and financial aspects

Excluding the cost of the work by the park personnel, the total budget for the project amounted to 52 703.70 euros, of which 40 000 euros were provided by the Ecology ministry and 12 703.70 euros by the Guadeloupe national park from its own budget.

	Company A	Company B
Total cost	9 821 €	30 081 €
Number of stands processed	4	6
Cost per stand	2 455 €	5 014 €
Total number of stalks cut	500	477
Cost per stalk	20 €	63 €
Number of man-hours	116	284.5

Table of intervention costs (2013).

10. A stand after the work.
11. Stalks stocked along the road.

Information on the project

A press campaign (press release and a report on Guadeloupe 1 radio) was launched by the Guadeloupe national park to inform the population on the project and to alert companies, non-profits and private citizens concerning the availability of the bamboo stalks on the sites at no cost.

A 25-minute film, titled “Bamboo, a friend we can do without”, was directed by Patrick Sardi (Lot’Bô Films).

Outlook

■ Given the high cost of this type of project, the park and ONF intend to set up projects under their management, but executed by the companies and private citizens interested in obtaining the plant products. The pilot sites for the project will be selected along the Traversée Road and the road to the Carbet waterfall. The Guadeloupe departmental council, in charge of road maintenance, would like to permanently eliminate the bamboo stands along the two roads.

■ In 2016 along the Traversée Road, the department financed the work on eight stands in the central zone of the park that were deemed highly troublesome. The Guadeloupe national park funded the purchase and the installation of the tarps for the eight stands.

Authors: Emmanuelle Sarat, IUCN French committee, Thibaut Foch, ONF, Marc Gayot, ONF, Guy Van Laere, Guadeloupe national park. February 2017.

For more information

■ Internet site of the Guadeloupe national park: http://www.guadeloupe-parcnational.fr/

■ Internet site of ONF Guadeloupe: http://www.onf.fr/guadeloupe/@@index.html

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