

Widely resented yet neglected: latent environmental problems.

The case of an invasive alien vine on Saba and Statia

December 2019

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What did I research?

Read the [full dissertation](#)

Go to a specific chapter to read about stakeholder perspectives [[chapter 3](#)], the governance configuration of the islands and The Netherlands [[chapter 2](#)], community inertia [[chapter 4](#)], or action and conflict regarding 13 invasive alien species in The Netherlands [[chapter 5](#)].

What do I recommend?

How can Coralita best be dealt with on Saba and Statia? I outline my take on the why, who and what of Coralita management on the next pages. Or watch the videos with recommendations for [Saba](#) and [Statia](#).

Similar recommendations were made to the island governments of Saba and St. Eustatius, and the respective nature management organisations. Have a look at the presentations given 25th of October 2018 on [Saba](#), and the 30th of October 2018 on [St. Eustatius](#).

What did others research?

• Pim Arendsen mapped [erosion processes](#) on Saba

• Jesse Opdam built on Pim's work, to map [erosion risks](#) on Saba and make recommendations per area

• Luke Sweeney gauged the [impact](#) of Coralita by comparing it to native vegetation on Saba

• Judit Planas i Puig experimented with [shade](#) to hamper the growth of Coralita

Want to know more?

Here are some interesting materials:

- Elizabeth Haber and I are also known as the Coralita Girls, and our [Facebook page](#) is a good place to catch up on the latest activities
- Watch this [Sea&Learn](#) video from 2016 where Elizabeth and I explain the basics of Coralita
- In this [Faces of Science](#) video from 2017, I explain in Dutch what my research entails
- In [this](#) interview on Statia's LVV radio I explain our findings so far. 24 January 2017
- In [this](#) interview on Dutch Radio 1 Focus, I explain the basics of Coralita. 29 August 2018
- As [Face of Science](#) of the KNAW, I blogged in Dutch about my research
- On the [Sustainability blog](#) of Copernicus Institute, I blogged about my research in English
- The St. Maarten Daily Herald wrote about our research [7 November 2018](#) and 19 October 2015
- In DCNA BioNews 20-2015 and 21-2019 updates on the research were published



RECOMMENDATIONS REGARDING CORALITA MANAGEMENT FOR SABA AND STATIA

One vine at a time

Which insights for Saba and Statia did this research accrue, and what would be recommendable for dealing with Coralita on both islands? My recommendations are structured along the why, who, and what of Coralita management, and end with a few spatially specific recommendations.

Why care about Coralita?

This dissertation put a lot of effort into understanding and attempting to lift inertia regarding Coralita – why? Because the vine is unwanted on large parts of Saba and Statia; because it threatens values of the landscape that are important to Sabans and Statians, and because invasive alien species are an infamous hazard. Figure 1 below shows all the areas where people do not want Coralita (in pink). This covers a large part of both islands, and both in nature areas and villages. Reasons why people dislike the vine are elicited in chapter 3 of the dissertation, by asking about hypothetical impacts of Coralita. For both islands, three perspectives on the value of nature held by inhabitants were identified. Whether people look at nature mainly as a resource to use, or something that should be preserved for future generations – Coralita is worrisome to all. It should also be stressed that invasive alien species are regarded as one of the biggest threats to biodiversity by scientists, IUCN and the UN alike (Pejchar and Mooney 2009, IUCN 2018, Díaz et al. 2019). The nature on Saba and Statia is very beautiful and unique, and the damage Coralita can potentially do is enormous.

When starting management of Coralita, first deciding on why it needs to be managed is crucial. Whether the aim is to preserve nature or to prevent erosion has repercussions for the stakeholders involved and the areas focused on. The perspectives elicited in chapter 3 offer a good starting point to continue the discussion on priorities for Coralita management, especially in combination with the unwantedness maps shown above: who wants to contain it where and why? Once the priorities have been set, the involvement of relevant actors can start.

Who should be involved?

Who to involve can be decided on in two ways. One, by looking at the current use of an area. For residential areas, the home owners are of course central to the efforts. During a stakeholder meeting on Statia in November 2018, one participant suggested to group local residents into neighborhood taskforces, that would be in charge of dealing with Coralita in that neighborhood. The taskforce could set-up projects akin to PAR-L as

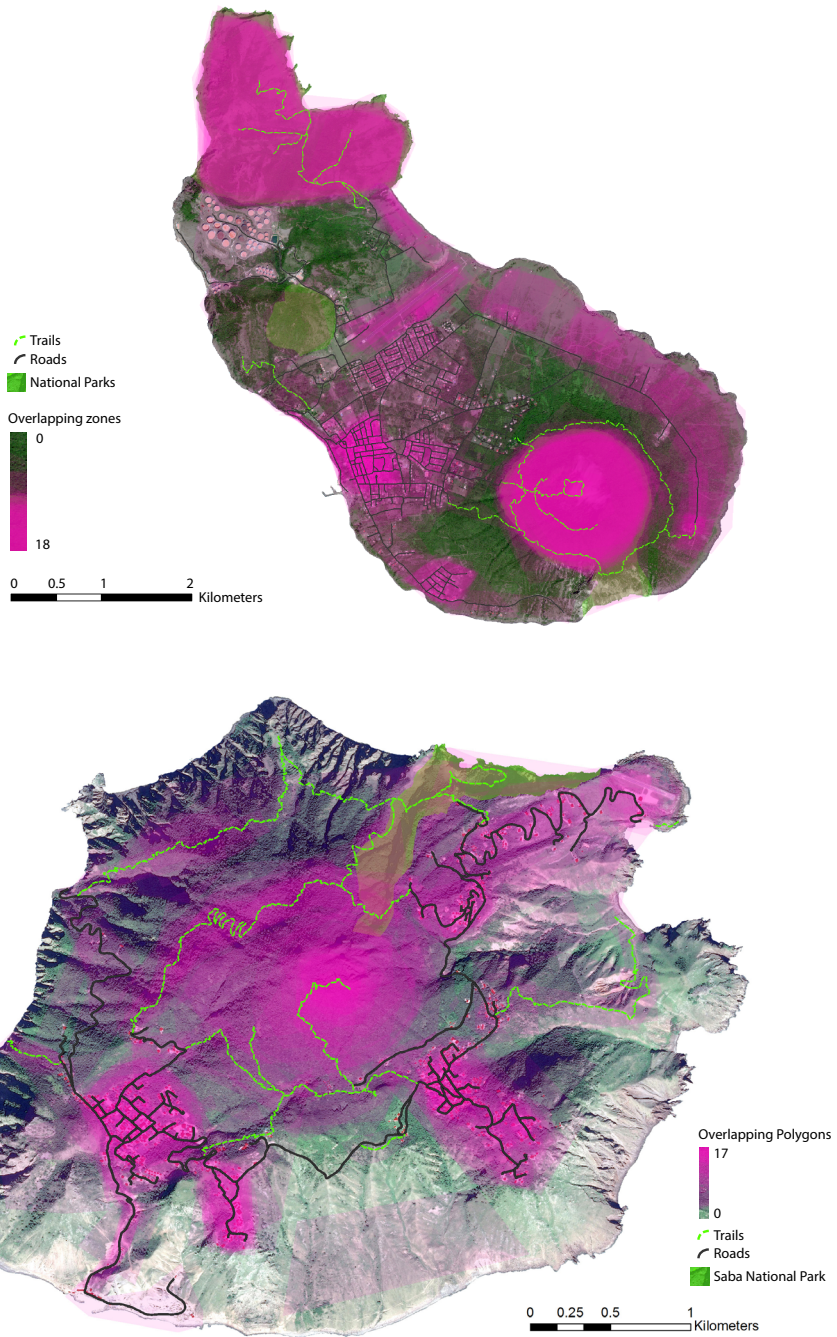


Figure 1. Below, areas where Coralita is unwanted on Saba, according to 50 Saban participants. Above, areas where Coralita is unwanted on Statia, according to 46 Statian participants. The brighter the pink, the more people selected that area. Data collected October 2016 – March 2017, processed by Elizabeth Haber.

discussed in chapter 4, in which a Coralita-covered area was redesigned by the neighborhood. Second, who to involve can be decided based on the three perspectives on the value of nature per island elicited in chapter 3. For Statia, supporting cycles, the utility value of nature and biodiversity are themes that the different stakeholders worry about. Coralita's link with the former two topics is yet unknown, so requires further research. The smothering character of the vine does pose a clear threat to biodiversity, so a possible PAR-L project would be to prevent its spread to a specific area with high biodiversity value. On Saba, agriculture, biodiversity and aesthetics have the stakeholders concerned, so projects that focus on enhancing agriculture, on keeping the "unspoiled Queen" unspoiled and on protecting biodiversity, would get people involved.

Both islands have plenty of social capital to build on, for example the trail cleaning volunteers on Saba, and the "Statia at heart" group on Statia. Other ideas discussed with local government were to have school classes adopt a certain area or tree that they are assigned to keep free from Coralita. During fieldwork, a few clean-up events were organized by Elizabeth Haber and the author, which were participated in by locals. However, both these events and the PAR-L project of chapter 4 elicited the importance of an active project leader. The PAR-L participants all indicated that, despite their commitment and intentions, without the efforts of the project initiator, the project would not have reached very far. And no additional clean-up events were held, despite several people expressing their intention to do so.

Strong leadership to make sure activities remain on track is often mentioned in literature (e.g., Graham and Rogers 2017). This person should also be in charge of ensuring faith and trust between everyone involved. Crucial to successful management of invasive alien species is trust between everyone involved, and faith that the project can be successful. Faith of the community in the nature organization's expertise; of the latter in the former's willingness to cooperate; and of both in the government's resource-wise commitment is crucial for any invasive alien species strategy to work. Each island should thus have one person or organization heading a Coralita program, ensuring cooperation of all relevant actors.

What should action regarding Coralita entail?

The single most effective way to curtail Coralita's spread, is to use land. This clearly shows from its presence on former farming grounds, abandoned building sites or in other ways disturbed areas. When land is used for agriculture, gardening, or covered by native vegetation, Coralita has much less of a chance to take over. Moreover, it appeared much easier to get people to act when diverting attention from Coralita towards agriculture, as described in chapter 4. The ongoing efforts to increase agriculture on Saba and Statia could thus be dovetailed with efforts to contain Coralita.

In any project developed, pragmatism and feasibility should be core design principles, given the limited resources on Saba and Statia. Moreover, a weariness regarding paper policy plans was frequently professed by locals, interviewees and governmental actors alike during fieldwork. This is nicely exemplified by Mulder (Mulder 2016), when quoting the Saban harbor master on his dislike for following protocol: "(...) You either work with local people, or you work without local people. Local people don't wait for no *overleg* [consultation]; they try to get things done." (Mulder 2016, 15). The aim should thus be to minimize the *overleg* and maximize the getting things done.

As a side note, should large resources become available for IAS management on Saba and Statia, elaborate guidelines for developing an island-wide invasive alien species strategy exist, for example the one developed by IUCN (2018). Conducting a risk assessment such as proposed by Koch et al. (2016), an assessment of (dis)services delivered by Coralita and the community's attitudes towards those as outlined by Lewis et al. (2019), and developing a stakeholder involvement strategy as suggested by Novoa et al. (2018) would surely result in a very thorough foundation for action. But these programs are all very lofty in their comprehensiveness, the resources and skills they require to be implemented and the full compliance they require in order to be effective. Therefore, more realistic suggestions for action are outlined in the next section: promoting community action, testing management methods, and designing an island-wide approach to Coralita.

Promoting community action to adjust daily practices

Earlier, some ideas for involving locals were mentioned, such as clean-up events and adopt-a-tree programs. An idea raised by stakeholders on Statia, was to establish a Coralita team per neighborhood. This team could contain Coralita in public areas, and assist inhabitants in combating the vine in their yards. Such approaches work well for prevention and to clear small areas. But how to deal with the larger stretches of land covered in Coralita?

As mentioned earlier, using land is the most effective and cheapest way to contain Coralita. In chapter 3 of the dissertation, the large amount of unused land is explained through the decline of agriculture, free-roaming goats and complex land titles. Breaking through these dynamics requires working with land owners throughout the community. More specifically, when stimulating gardening efforts on unused land, arrangements for water and fencing are required. Assistance to private land owners in initiating land-use projects and arranging the required resources has the largest potential to contain Coralita. The project conducted in chapter 4 could serve as inspiration for that: a piece of land covered in Coralita was made available by the owner, and a group of locals designed a better use for it. Since the land was intended for communal use afterwards, people got enthusiastic about plans such as a fruit orchard or a petting zoo. Putting

effort into Coralita removal is much less of a deterrent when the final aim is to create something attractive and available to everyone. Next to that, showing that Coralita can be contained and how much nicer an area becomes, works as a motivation for people. Repeating this kind of projects in which Coralita removal is a corollary of enhancing agriculture, tourism, or another theme that directly impacts people, is recommended. This can be applied both on communal areas, but also as an approach to individual land owners. A core team of Coralita enthusiasts, who approach land owners, gather participants and offer support in arranging the required resources should head such a project; this could also be the earlier mentioned neighborhood taskforce. But how to remove Coralita from project areas?

Test area for management methods

The one thing that is clear about Coralita removal, is that the earlier, the better. A young sprout of the vine can still be easily removed, whereas if it is allowed to mature, the roots and tubers will grow deeply and firmly into the ground. Thus, immediately pulling it up, or repetitive mowing is best. Once the vine has already settled, little is known about the best management methods.

Throughout fieldwork this knowledge gap kept being mentioned by locals as demotivating them to undertake action. The effectiveness of methods such as mowing or digging have not been tested consistently, and not knowing for certain it will have effect, people do not feel the large effort removal takes is worthwhile. Local approaches include RoundUp and even pouring diesel on the plant, which is highly detrimental to the soil, and can have far-reaching effects through run-off. Therefore, a very important project would be to systematically and well visibly to the local community, test different methods. For each method, the resources (time, skills, material, finances) required, and the results (change in cover, time before the vine returns) should be kept track of. To properly test these methods, a project period of about 5 years would be needed, with continuous close-up monitoring. When doing this on a plot somewhere easily accessible to locals, proper outreach activities can be organized to enhance the uptake of the experiments' results. Management methods that should be tested, are:

- The planting of Vertiver grass or Elephant grass, which is especially held in high regard by one of the terrestrial rangers of Saba. The risk of this approach is of course for these grasses to become invasive as well, like happened with *Spartina anglica* in the Wadden Sea (Nehring and Hesse 2008), which should definitely be addressed in such research. A succession-approach of mowing Coralita, and planting native species simultaneously with the grass to hamper regrowth, could be tested. Does the grass indeed hamper regrowth, does it behave invasively itself and how long will it be needed before native species can take over?

- Fencing in goats and pigs on a Coralita area. Goats sporadically nibble on the vine, but it is clearly not their preferred source of food, which is why in chapter 4 the practice of free roaming goats is identified as exacerbating the Coralita issue. Yet, fencing them in might change this, and some experiments in which the animals' wellbeing would be safeguarded are definitely recommended. Pigs are known to dig up the tubers that make the vine so persistent, but the question is how thorough they are and for how long an area remains clean. Well-designed, long term tests in which both the degree and the duration of the clearance are researched could result in an approach that takes little effort, and in the case of the goats, that solves two problems at once.
- Using shade to hamper Coralita growth, building on the student project done on Saba (Planas i Puig 2018). This could be done with tarp or through natural shade cast by trees or shrubs, which is known to work. But here too, the degree of eradication achieved and the duration thereof is not known, nor how shaded it needs to be for these effects to occur.

Island-wide approach

Coralita spreads both by growing, and by seeds or branches being dispersed by the wind. Therefore, all of Saba and Statia is vulnerable to Coralita, and at the same time key to containing it. If one area is neglected or one land owner denies cooperation, the rest of the island experiences the consequences. Thus, aligning Coralita management across the whole island is crucial. Therefore, three things are important:

- 1) Assigning budget, responsibilities and mandates. Chapter 2 discussed how the somewhat obfuscated division of mandates and responsibilities, compounded by a lack of corresponding budgets as perceived by the islands, add to policy inertia. To arrange the leadership necessary for all the elements mentioned above, a clear division of responsibilities is crucial. A new Caribbean nature policy plan is supposed to be established for 2020-2025 (Ministerie van BZK 2019), and this time the concomitant island-level policy plans should be realized. These plans should assign responsibilities, mandates and budget to island-based institutions for specific areas or measures regarding Coralita, such as the ones mentioned above. More specifically, Coralita should be included in trail management, and budget made available for that. Also, reference was made several times to a neighborhood taskforce, heading projects to clear Coralita in the neighborhood, and to assist land owners in managing Coralita on their land. Resources to assist with fences and water should be made available for that purpose.
- 2) Knowing where Coralita is present. Elizabeth Haber is working with satellite imagery for establishing Coralita's presence, but it has proved less suitable for frequent monitoring purposes. Drones may be able to capture useful images. Monitoring Coralita's

spread twice a years should be sufficient to assess whether it is spreading, and to indicate areas to focus additional management measures on.

- 3) Deciding on Coralita management goals per area. Ideally, Coralita would be fully eradicated from the islands, but this is very costly and hard to attain. Therefore, priorities should be set (see dissertation section 7.1) and focus areas selected accordingly. For example, to preserve native and endemic species, on Saba everything above 500 meters should be declared Coralita-free, and a five meter buffer zone established along the trails. On Statia, the Quill, Boven and White wall could be assigned as Coralita-free areas, meaning that the vine will be removed as soon as it is spotted there. Area selection could be based on the value of that area, for example by establishing that Coralita should be kept out of all areas with a touristic value. Alternatively, a potential impact of the vine and the areas that are vulnerable to these impacts could be focused on. For example, erosion risks were mapped for both islands, and based on that, recommendations can be made regarding where to remove Coralita and where to leave it. In dissertation section 7.4, several specific recommendations on where to undertake what regarding Coralita are presented. These were also made to stakeholders on Saba and Statia during October and November 2018.

Spatially explicit recommendations: priority areas

In October 2018, Elizabeth Haber, Jetske Vaas and Martin Wassen met with stakeholders on both islands to relay research findings and make recommendations for management. The 25th of October, they met on Saba with the Island Governor, members of the Island Council, and rangers of Saba Conservation Foundation. The 30th of October, they met on Statia with the Deputy Government Commissioner, Stenapa and LVV. The recommendations made then are included below.

Priority areas for Statia

Bare areas are ideal for Coralita to spread, such as along the Slave path and the trailhead at Upper round hill (see Figure 2 below). Planting native vegetation there will give Coralita less of a chance to take over.

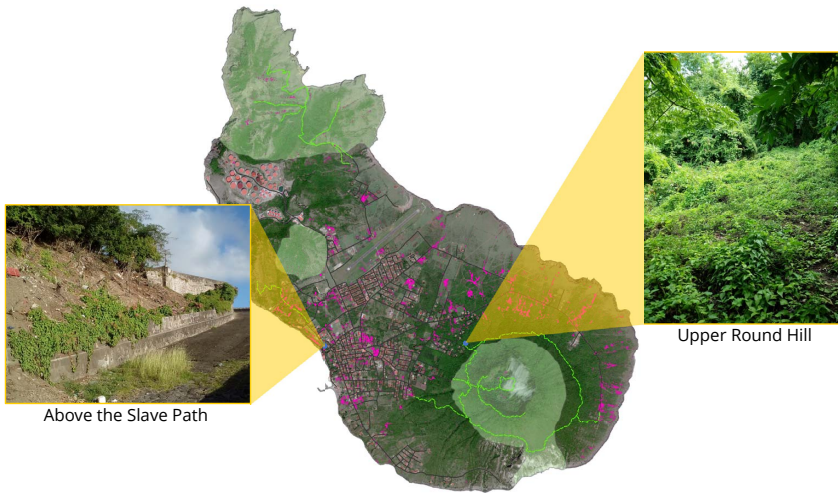


Figure 2. Recommended restoration and reforestation areas on Statia. The national parks are highlighted in green, and the pink areas depict where Coralita is present according to Elizabeth Haber’s model (2018).

There are some spots where Coralita is creeping up the Quill, such as the trail head at Rosemary lane, the road to the Radio tower, and at the trail head of Upper Round Hill (see Figure 3). For these areas, reforestation and removal of the vine should be combined, to keep it from spreading higher up the Quill. To that end, Coralita should be part of trail management, so it can be spotted and removed as soon as possible, which is the easiest and cheapest way to keep it in check.

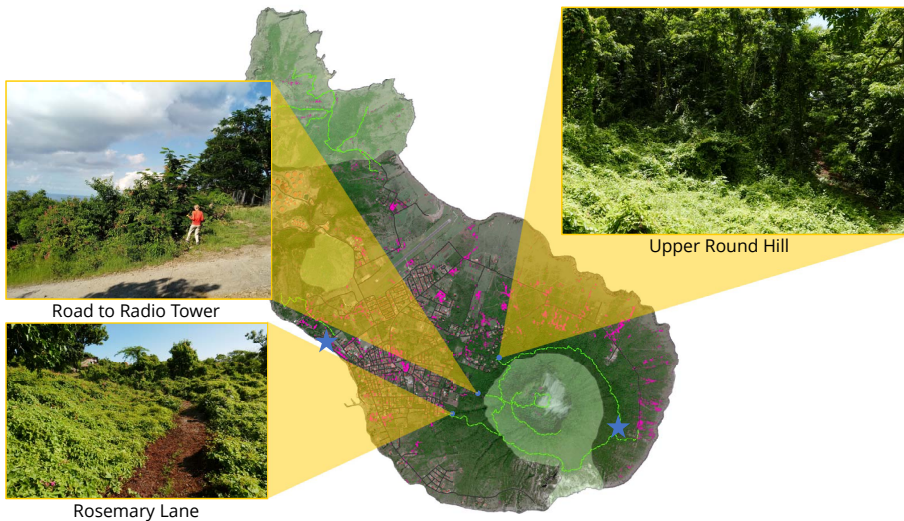


Figure 3. Recommended removal and reforestation areas on Statia. The national parks are highlighted in green, and the pink areas depict where Coralita is present according to Elizabeth Haber’s model (2018).

There are some areas where Coralita should be monitored closely, namely Fort de Windt and Boven (see Figure 4). At White wall there are some small specks of Coralita, and the gullies could be channels for the vine to spread. In the Venus Bay gully, it does not seem to be present yet, but here too the gully could be a moist place for the vine to settle.

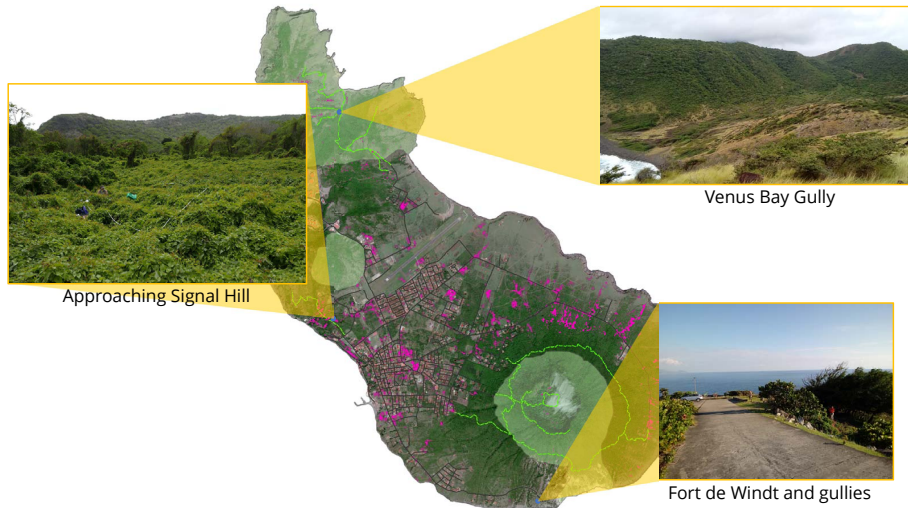


Figure 4. Recommended monitoring areas on St. Maarten. The national parks are highlighted in green, and the pink areas depict where Coralita is present according to Elizabeth Haber's model (2018).

Erosion was spoken about as well, which is a major concern for the St. Maarten cliffs. Trees and shrubs have a much more elaborate root system than Coralita, and therefore are better at containing erosion than Coralita. However, compared to nothing, Coralita at least hampers heavy rains from washing away the top soil. Coralita should thus be prevented from spreading to cliffs that currently have native vegetation, which makes the large stretch of Coralita below Signal Hill worrisome. The stakeholders met with on the 30th of October all agreed that a buffer zone, free from Coralita, is needed below Signal Hill, to keep it from spreading into the park. The cliffs of Corre Corre Bay are covered with Sea grape, which is a very good erosion preventing and native species. And it happens to produce grapes that birds and people alike can enjoy. Therefore, Sea grape should be planted above and on cliffs, to prevent erosion.

Priority areas for Saba

Coralita is gradually growing higher up onto Mt. Scenery, where it can do real damage to the native and unique nature. To prevent this from happening, the small specks of Coralita from the upper part of the Crispeen trail and next to Mr. Barnes' sheep pen

should be cleared (see Figure 5). The amount of Coralita there is still small, so it might still be feasible to dig it up. Otherwise, it could be mowed every 2 months.

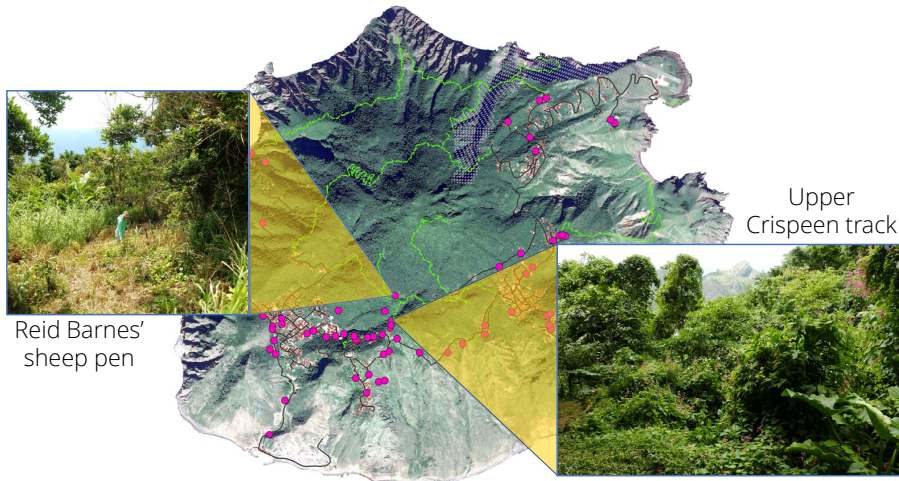


Figure 5. Recommended immediate removal areas on Saba. The pink dots are where Elizabeth Haber has found Coralita, between 2015 and 2018.

There are some areas where Coralita is threatening to exacerbate erosion by climbing into trees, such as the Flamboyant trees in the Harbor gut and the Mahogany trees on Middle island, but also along the road in Gile's quarter and along the Dancing place trail (see Figure 6). Trees and shrubs have a much more elaborate root system than Coralita, and therefore are better at containing erosion than Coralita. However, compared to nothing, Coralita at least hampers heavy rains from washing away the top soil. Coralita should thus be prevented from spreading to cliffs that currently have native vegetation, such as Sea grape. This is a very good erosion preventing and native species, which happens to produce grapes that birds and people alike can enjoy. Therefore, Sea grape should be planted above and on cliffs, to prevent erosion.

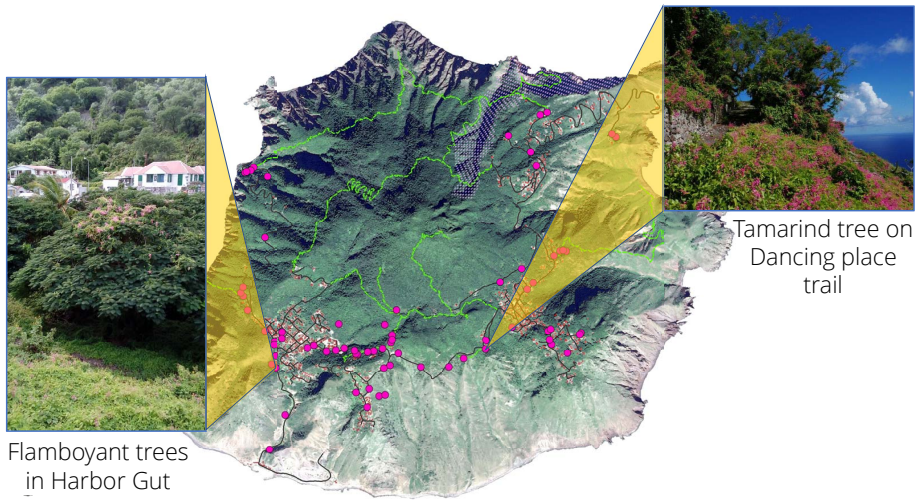


Figure 6. Examples of erosion risk areas on Saba. The pink dots are where Elizabeth Haber has found Coralita, between 2015 and 2018.

At the outskirts of current Coralita presence, containment and monitoring is called for. For example the presence above Dinda’s supermarket (Hell’s gate), along the mountain road, along the Well’s Bay road and at Mary’s point trail head (see Figure 7). From these locations, Coralita can easily creep up into valuable nature areas. Therefore, the borders of the spots should be mowed frequently, and further spreading checked for.

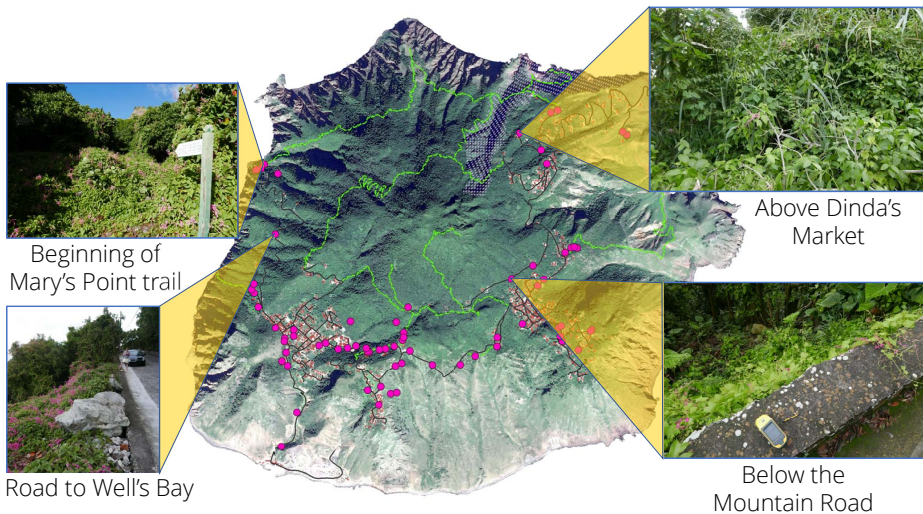


Figure 7. Recommended containment and monitoring areas on Saba. The pink dots are where Elizabeth Haber has found Coralita, between 2015 and 2018.

Regular check-ups and clearances should be done for all the trails. After all, early removal is easiest and cheapest. To that end, Coralita should be part of trail management.

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