
ENVIRONMENTAL EDUCATION ACTIVITIES IN SÃO TOMÉ ISLAND, SÃO TOMÉ AND PRÍNCIPE

FIELD REPORT

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SUMMARY

The island of São Tomé, on the west coast of central Africa, is rich in endemic biodiversity but has received little attention in terms of biodiversity conservation. This is reflected in a lack of investment in environmental education and consequent low levels of knowledge on sustainability and on natural resource management. To address this gap we conducted a project to disseminate information about biodiversity conservation and sustainability, and also to identify knowledge gaps in two important stakeholder groups, communities surrounding the Obô Natural Park and school children. The project took place during the months of October and November 2012, directly reaching 13 local communities and six schools, from kindergartens to high schools. The results show that local communities still largely ignore the existence of the Obô Natural Park but are generally aware of the problems surrounding natural resources management. People from local communities have a considerable knowledge of the species around them, although they usually do not know that these can only be found in São Tomé. In relation to schools, and bearing in mind the large age interval encompassed in this project, there is an overall better awareness of the existence of a Natural Park and the endemic species, which is possibly linked to the recent introduction of environmental education in the national curriculum. Most students, and especially those living closest to the Obô, recognise a large number of species. The younger students usually are not aware that a number of these only exist in São Tomé. Given the scarcity of financial resources in São Tomé and Príncipe, it is likely that foreign actors will play a significant role in ensuring biodiversity conservation. However, conservation will only be successful if Santomean stakeholders are engaged. In this report we describe and comment on our experience in the complex social context of São Tomé and Príncipe, providing clues on how to improve awareness and engagement in future conservation projects,

1. INTRODUCTION

Islands have long been recognized as the home of many unique species, featuring prominently in a number of lists of the world's most valuable areas for biodiversity conservation (Kier et al. 2009). São Tomé is an example of this importance, being home to a wealth of endemic and threatened species spanning diverse taxonomic groups, such as terrestrial molluscs, orchids and birds (Jones 1994), with new species being discovered every year (e.g. Garcia et al. 2012; Rocha et al. 2012). However, in contrast with other African offshore islands such as Mauritius or the Seychelles, the island of São Tomé has received little attention (Holmes et al. 2012) and remains largely unstudied (Dallimer et al. 2009).

This lack of investment in biodiversity conservation in São Tomé, mirrors the lack of interest in environmental and conservation education. Most of the researchers that come to the island to work on biodiversity make little effort to disseminate their findings to non-specialists. An exception being the California Academy of Sciences, which started the first large scale conservation education effort in 2011, as part of a long term commitment to raising awareness about biodiversity in São Tomé and Príncipe (Drewes 2012). With this in mind, R.F. de Lima, who completed his PhD on "Land-use management and the conservation of endemic species in the island of São Tomé" in 2012, secured funding from The Rufford Small Grants Foundation to raise environmental awareness in the island. The aim of this initiative was to disseminate the results of de Lima's research, while raising awareness of the uniqueness and importance of the biodiversity of São Tomé, and understanding the knowledge and attitudes of key stakeholders towards biodiversity, sustainability and natural resources management. To achieve these aims the activities targeted (i) students at different school levels, especially from those schools not previously visited by the California Academy of Sciences, which would be reached through schools visits, (ii) rural communities around the Obô Natural Park (ONP), which would be reached through community meetings, (iii) government, industry and ONG stakeholders, which would be engaged through public debates, and (iv) all non-specialists, which would be reached through mass media such as television. This report focuses on the experience gained with the first two target groups.

Given the range of expertise required for the project and its limited time frame, D. Veríssimo, a Portuguese conservationist who specializes in social marketing, environmental education and behaviour change, was contacted to help in this effort, namely with the activities to be carried out in schools and rural communities. The team was completed by Gabriel dos Santos Oquiongo and Leonel Viegas, two Santomeans residing in small rural communities, and who contributed with their communication skills and sound knowledge of São Tomé's biodiversity and society.

The aim of this report is to provide information on the implementation, outcomes and limitations of the environmental education activities targeting the school students and rural communities, as to ensure that the lessons learnt can be shared and inform future work around the human dimensions of biodiversity conservation in São Tomé.

2. STUDY AREA

2.1. LOCATION

The oceanic island of São Tomé (00°25'N–00°01'S, 06°28'E–06°45'E) is located on the equator, 255 km west of Gabon, in the African mainland. The island has an area of 857 km² (47 km x 28 km) being the second largest in the Gulf of Guinea, after Bioko.

2.2. CLIMATE

The climate of São Tomé is oceanic equatorial, dividing the year into rainy (September to May) and dry seasons (June to September) (Jones & Tye 2006). The annual average temperatures range between 22°C and 33°C in coastal areas, but diminish with altitude such that above 1,000 m, the minima are around 7°C (Christy 2001). The central mountainous part of the island acts as a barrier to the prevailing southwesterly wind. This causes heavy rainfall in the south-west and south, with average annual averages of 7 000 mm and a marked rain shadow, with average annual rainfall of less than 500 mm in the north and north-east (Christy 2001).

2.3. HISTORY

The island of São Tomé was discovered by Portuguese navigators at the end of 1470. São Tomé soon became a major sugar production center, which led to the clearing of large tracts of lowland forest (Peet & Atkinson 1994). By the 1540s, São Tomé was the largest exporter of sugar in the world. However, it was not before the introduction of coffee, in 1822, that forest clearance took place at higher altitudes, as this crop is best grown in these areas (Peet & Atkinson 1994). Soon afterwards, cocoa was also introduced and became São Tomé's major export in the 1880s. Between 1908 and 1919, São Tomé was the largest cocoa producer in the world (Peet & Atkinson 1994). This 'scramble for land' cleared approximately 70% of São Tomé's forest and left a very small area of forest remaining. This situation would, however, be reversed in the mid-1970's thanks to both a crash in cocoa prices and the arrival of independence in 1975, when the islands of São Tomé and Príncipe constituted the Democratic Republic of São Tomé and Príncipe. At this time, many plantations reverted to secondary forest, increasing the country's overall forest cover. In 1989, around 90% of the country was covered by forested land-uses, with old-growth forest, secondary forest and shade plantation covering similar proportions of its terrestrial area (Jones 1991). Today, São Tomé and Príncipe is a developing country with an economy largely dependent on rural activities, and although the country's social indicators have improved in the last decade, it still ranked only 144 out of 187 in the 2011 Human Development Index (UNDP 2011).

2.4. CONSERVATION

Currently, about 85% of São Tomé's old-growth rainforest falls within the island's only protected area, the Obô Natural Park (ONP), which covers 244 km² of the island. However, resources are limited and there is little conservation management on the ground (Dallimer et al. 2009). Hence, the ONP is subject to pressures associated with unprotected areas, such as illegal hunting and deforestation, and the benefits of the Natural Park to the local population have so far been negligible.

3. PROJECT ACTIVITIES

The project plan was prepared in a series of in person and online meetings between D. Veríssimo and R.F. de Lima, to ensure that the activities matched the demographic and socio-economic characteristics of the two target stakeholder groups: the children of school-going age and the residents of rural communities around the ONP. These activities were also planned with the consultation of Mariana Carvalho, the author of a small book on environmental awareness for primary school teachers in STP, and Dr. Bob Drewes and Dr. Velma Schnoll, from the California Academy of Sciences. As the activities were implemented, minor adjustments were made to improve the reach and impact of the content. In terms of implementation on the ground, activities in schools were coordinated with the headmasters of the schools and kindergartens through phone calls and personal meetings. In the case of the Monte Café Primary school, it was deemed necessary to meet the National Director for Primary Education to receive permission to work in the school. Community activities were coordinated with the leader of each community, through a preliminary visit by G.S. Oquiongo and L. Viegas followed by phone calls. At the end of all activities, each participant was offered a set of two postcards and the teacher or community leader received two A3 posters, both depicting endemic species of São Tomé and Príncipe (reprinted with the permission of the California Academy of Sciences).

PRIMARY SCHOOLS AND KINDERGARTENS

For kindergartens and primary schools we shortened the content of the activity to account for the reduced attention span of younger participants. Being so, the activity focused on the more general information relating to biodiversity in São Tomé and we choose to carry out the activities in a workshop format with an approximate duration of 50 minutes. The workshop consisted of the following activities (listed in the same order as they were undertaken):

- A presentation on the biodiversity of São Tomé and Príncipe and its uniqueness, focusing on the ONP (5 minutes);
- The game “Web of Life”, aiming to build awareness of the vital connections amongst plants, animals, the environment and people (10 minutes);
- Telling of a story around bird hunting and the use of slingshots by children. The plot involved a number of both introduced and Santomean species, namely the Yellow-billed Kite *Milvus migrans*, the São Tomé Sunbird *Anabathmis newtoni*, the Emerald Cuckoo *Chrysococcyx cupreus insularum*, the Santomean freshwater crab (an unidentified species, which is most likely an undescribed endemic), the São Tomé Caecilian *Schistometopum thomense*, the São Tomé Giant Treefrog *Hyperolius thomensis* and the Mona monkey *Cercopithecus mona* (10 minutes);
- Drawing and painting exercise where each child selects his or hers favourite character from the previous story (20 minutes).

HIGH SCHOOLS

In High Schools, we delivered an interactive presentation using a video-projector. This activity included questions being directed to the audience during the presentation and some time for questions from the audience at the end of the presentation. Depending on time made available this presentation could last between 40 and 60 minutes. In the extended version of the presentation, we would include the games used in the community presentations (see below) and occasionally also an 8 minutes video on the endemic species of STP.

RURAL COMMUNITIES

In terms of the structure of the activities for residents of rural communities around the ONP, we choose to carry out the activities in a workshop format, with an approximate duration of 90 minutes. The workshop combined short presentations, presented using a video-projector, with interactive games on topic related to environment and sustainability. A summary of the activities undertaken is below, in the same order as they were conducted:

- An initial presentation on the biodiversity of São Tomé and Príncipe and its uniqueness, with a focus on the ONP (15 minutes);
- The game “Web of Life”, aiming to build awareness of the vital connections amongst plants, animals, the environment and people (15 minutes);
- A second presentation focusing on the results of R.F. de Lima’s PhD research on the impacts of land-use on the endemic species (10 minutes);
- A game on natural resources management, with the objective of discuss the importance and difficulties associated with natural resource management (15 minutes);
- Presentation of a case study on the impact of land-use change on timber availability in São Tomé (10 minutes);
- Debate on the sustainable management of local natural resources and current barriers to sustainability (duration depended on the involvement of participants, varying usually between 15 and 45 minutes)

All workshop participants were offered a snack, organized within the community. In STP, these snacks are expected as a compensation for time allocated to activities organized by outsiders.

4. PROJECT IMPLEMENTATION

Project implementation took place during the months of October and November 2012. We detail below the outcomes of each of the different activities.

4.1. PRIMARY SCHOOLS AND KINDERGARTENS

4.1.1. MONTE CAFÉ PRIMARY SCHOOL

- In this school, located in the Monte Café community (Mé Zóchi district), we had sessions with all 9 classes, from first to fourth grade, and school teachers, comprising approximately 340 students and 10 teachers.
- Our first session targeted a second grade class of 37 students. The students did not know about the ONP or the existence of endemic species, but could identify many endemic bird species easily, with the exception of the Dwarf Olive Ibis *Bostrychia bocagei*. When asked to draw their preferred story character the majority choose the Yellow-billed Kite (n=8) or the São Tomé Sunbird (n=8), closely followed by the São Tomé Caecilian (n=7).
- Our second session was with a first grade class of 28 students. They did not know of the existence of the ONP or the existence of endemic species and had trouble recognising any of the endemic species with the exception of the Santomean Giant Land Snail *Archachatina bicarinata* and the São Tomé Sunbird. When asked to draw their favourite story character the overwhelming majority (n=17) choose the São Tomé Caecilian.
- Our third session had a mix of a first and a second grade classes, totalling 39 students. They did not know about the ONP or the existence of endemic species but were familiar with most species of endemic birds including São Tomé Sunbird, Giant Weaver *Ploceus grandis*, São Tomé Paradise Flycatcher *Terpsiphone atrochalybeia* and São Tomé Scops Owl *Otus hartlaubi*. When asked to draw their favourite story character the majority (n=10) choose the São Tomé Caecilian, followed closely by the Yellow-billed Kite (n=8) and the Mona monkey (n=8).
- Our fourth session was with a fourth grade class of 25 students. Only one student knew about ONP and no students knew about the existence of endemic species, although the students did recognise many of the endemic species of birds such as the São Tomé Sunbird, Giant Weaver, São Tomé Paradise Flycatcher, São Tomé Prinia *Prinia malleri*. When asked to draw their favourite story character the majority (n=9) choose the São Tomé Caecilian, followed by the Mona monkey (n=5).
- Our fifth session was also with a fourth grade class, with 35 students. After receiving a hint, most students knew about the ONP and could recognise a variety of endemic bird species such as the São Tomé Sunbird, São Tomé Prinia, Giant Weaver. When asked to draw their favourite story

character the majority (n=12) choose the São Tomé Caecilian, followed by the São Tomé Sunbird (n=7).

- Our sixth session was with a third grade class of 39 students. Students did not know about the ONP or the existence of endemic species, but knew a series of endemic bird species such as the São Tomé Sunbird, São Tomé Prinia, Giant Weaver, and even the Dwarf Olive Ibis. When asked to draw their favourite story character the São Tomé Caecilian (n=11) and the Mona monkey (n=11) were the most selected species.
- Our seventh session was with a second grade class of 37 students. Students did not know about the ONP or the existence of species endemic to São Tomé, but managed to identify many of endemic bird species such as the São Tomé Sunbird, São Tomé Prinia, Giant Weaver, but did not know the Dwarf Olive Ibis. When asked to draw their favourite story character the majority of the students designed multiple species. Of those that drew only one species (n=8) the majority drew the São Tomé Caecilian (n=5).
- Our eighth and last session in this school was a fourth grade class of 23 students. Students knew about the ONP but only after being prompted with information about it. They did not know about the existence of species endemic to São Tomé, despite recognising images of endemic bird species, such as the São Tomé Sunbird, São Tomé Prinia, Giant Weaver. They did not know the Dwarf Olive Ibis, most likely due to its restricted distribution on the south of the island. When asked to draw their favourite story character they chose the Yellow-billed Kite (n=10) followed by the São Tomé Caecilian (n=6) as the preferred species.

4.1.2. SÃO NICOLAU KINDERGARTEN

In this school, located in the community of São Nicolau (Mé Zóchi district), we had a single session comprising 12 children and three educators. The children were able to recognise the São Tomé Caecilian, Mona monkey and the Santomean freshwater crab. Given their young age, which varied from one to 5 years old, we did not investigate their knowledge of the ONP or of endemic species to São Tomé. We then asked them to draw any animal of their choice and colour the drawings.

4.1.3. SAUDADE KINDERGARTEN

In this school, located in the Saudade community (Mé Zóchi district), we had a single session comprising 28 children and three educators. The children were able to recognise the São Tomé Caecilian, Mona monkey, Yellow-billed Kite and Santomean freshwater crab, but could not name any endemic bird species. Given their young age which varied from one to 5 years old, we did not investigate their knowledge of the ONP or of endemic species to São Tomé. We then asked them to draw any animal of their choice and colour the drawings.

4.2. HIGH SCHOOLS

4.2.1. INSTITUTO DIOCESANO DE FORMAÇÃO (IDF)

In this private High school, located in the capital, we delivered two presentations to about 85 students belonging to four classes, from the 7th, 8th, 9th and 11th school years. A total of 6 school teachers also attended. The students knew about the existence of the ONP, with about a quarter of the students having already visited the park (the Lagoa Amélia in particular was mentioned). The students also knew about the existence of endemic species to São Tomé and could recognize many species by looking at their photographs, although they did not know the species that are difficult to find in immediate vicinities of the capital, such as the Giant Weaver or the Dwarf Olive Ibis. The older students had an accurate idea of the number of endemic bird species that live in STP and mentioned them as an important reason to protect the country's forests,.

4.2.2. MARIA MANUELA MARGARIDO HIGH SCHOOL

In this High school, located near the city of Trindade (Mé Zóchi district), we delivered an extended version of the presentation to about the impact of human activities on STP endemic species. This version included interactive games and the delivery of information about endemic species, the ONP and forest resource management. Until November 2012 a total of 129 students (8th and 9th grades) and 3 teachers had participated in the activity. Most students knew about the existence of the ONP, although sometimes were not exactly sure of its name or what it stood for. A few students had visited the park, namely the Lagoa Amélia region, after having visited the Bom Sucesso Botanical Garden (ONP headquarters – outside the Park boundaries). The students knew about the existence of species endemic to STP and about their importance for biodiversity conservation. They also knew the large majority of the endemic bird species in photos, with forest specialists being the least known species to São Tomé (although one student was able to identify even the Dwarf Olive Ibis).

In conversation with the school director, it was agreed that the presentations would be extended during the course of the current school year (finishing in July 2013) to make sure all classes would be able to participate. This activity is ongoing and the goal is to reach all the school's students and teachers (over 1500 people, according to the director).

4.2.3. LICEU NACIONAL (NATIONAL HIGH SCHOOL)

In this High school, located in the capital, we delivered an extended version of the presentation to about 30 environmental education and natural sciences teachers from São Tomé, accounting for largely all professionals in this area in the island. Our objective was to reinforce the importance of São Tomé's biodiversity and its conservation so that these teachers could then act as multipliers for this message and take it to the more than 2000

students they are teaching this year (8th graders), and hopefully to even more students in subsequent years.

4.3. RURAL COMMUNITIES

Our workshop was delivered to a total of 308 people from 13 rural communities, as detailed below:

4.3.1. MONTE CAFÉ (12TH OCT 2012)

The workshop was attended only by 25 people, despite having taken place in one of the largest communities surrounding the ONP (estimated at over 600 people in 2001). The participants recognized most endemic species and knew about the ONP. A few participants also knew about the existence of species endemic to São Tomé and could list some of them. Nevertheless, all were surprised by the comparison with the Cape Verde Archipelago, which being five times larger than São Tomé has five times less endemic bird species. Since this workshop was intended for a larger audience we did not perform the games or the discussion, although at the end there was a self-promoted small discussion, in which people acknowledge the interest of the theme and the importance to find ways to improve resource management in order to guarantee the persistence of these species and their habitats.

4.3.2. NOVA MOKA (16TH OCT 2012)

This session was attended by 18 people. Being the first workshop delivered, it was used as a pilot and at the end people were asked for suggestions to improve the activity. Attendants recognized most endemic species and were well aware of the existence of the ONP. Most also knew of the existence of species endemic to São Tomé, although they did not know which were endemic. The discussion was short, namely because there seemed to be a consensus around the existence of an unsustainable use of forest resources and about the difficulties of improving that situation. From the experience gained from this session, the presentation was altered, namely to make each section of the presentation shorter and clearer and to include an example of a forest resource in need of improved management, the timber. Subsequent discussions, focusing on a specific example of resource management rather than on a vague problem, usually elicited more participation.

4.3.3. S. NICOLAU (17TH OCT 2012)

The workshop was attended by 28 people. The participants recognized most endemics and knew about the ONP. They did not know about the existence of species endemic to São

Tomé. The discussion was more dynamic, namely after the topic of forest clearance for timber and charcoal was introduced. The community is surrounded by forest, but the attendants recognized that there was a shortage of timber for construction. They also recognized that the current rate of charcoal production and conversion of land to horticultural use was threatening the persistence of the forest, and that they would be keen on protecting the forest if that was an alternative. However, they claimed that there were no alternative means of subsistence at the moment, especially given the isolation of the community and the lack of employment elsewhere. Participants recognized that some of their activities were in fact illegal, but that the government had no right to enforce the law if it does not provide alternative sources of income. They also acknowledged that, in the future, the integrity of the ONP was likely to become compromised by the expansion of human activities.

4.3.4. ESPRAINHA (24TH OCT 2012)

The workshop was attended by approximately 25 people. The participants recognized many endemic species such as the Santomean Giant Land Snail, São Tome Giant Treefrog *Hyperolius thomensis*, São Tomé Green Pigeon *Treron sanctithomae*, São Tomé Prinia and São Tomé Sunbird. Participants did not know about the ONP and about the existence of species endemic to São Tomé. The discussion was short within the workshop itself having some participants voiced concerns about the importance given to natural resources while people were struggling in the community, a perspective that does not acknowledge how rural livelihoods are largely dependent on natural resources to exist. Nonetheless, outside the workshop setting, the participations engaged in a meaningful on local resource management, during which the participants voiced a mix of pride and concern about the number of children per household within the community; while a testimony of masculinity, a large family also obliges them to thinly spread existing resources. This situation furthermore impacts the children's ability to go to school as some are required to help their parents in the fields.

4.3.5. STA. GENI (24TH OCT 2012)

The activity was attended by around 20 people. The participants recognized many endemic species such as the Santomean Giant Land Snail, São Tomé Green Pigeon, São Tomé Prinia or São Tomé Sunbird. Participants did not know about the ONP and about the existence of species endemic to São Tomé.

4.3.6. ÁGUAS SAMPAIO (30TH OCT 2012)

The activity was attended by around 30 people. The community recognized many endemic species such as the Giant Land Snail, the Giant Treefrog, the São Tomé Speirops *Zosterops lugubris* or the Sunbird. Two participants knew about the ONP and but none knew about the existence of species endemic to São Tomé. This community had one of the most dynamic

discussions, involving both a diversity and a large number of participants, including women and young people. There seemed to be concern surrounding the ability of the community to manage forest resources. Each person was able to manage the resources they had on their plot, namely timber, which was the focus of discussion, but it seemed more difficult to control overexploitation of resources that did not have an owner, namely because these are often used by outsiders to the community and because there is little law enforcement. Furthermore, they also showed understanding for the situation of loggers, who were forced to take that activity due to a generalized lack of employment alternatives.

4.3.7. MT. CARMO (31ST OCT 2012)

The activity was attended by around 20 people. The participants could recognize many endemic species such as the Santomean Giant Land Snail, São Tome Giant Treefrog or São Tomé Sunbird. Participants did not know about the ONP or about the existence of species endemic to São Tomé. During the discussion it was mentioned the existence of tree logging in the forest near the community, but the lack of law enforcement and the inexistence of job alternatives was blamed for the situation. The community did not show willingness to get involved in dealing with this situation.

4.3.8. S. JOÃO (6TH NOV 2012)

The activity was attended by around 20 people. The community recognized many endemic species such as the Santomean Giant Land Snail, São Tomé Prinia, São Tomé Green Pigeon or São Tomé Sunbird. Participants did not know about the ONP and about the existence of species endemic to São Tomé. This group made for one of the most interesting discussions, where issues such as the lengthy bureaucracy and costs involved in the legalizing timber extracted from the forest was pointed out as drivers of illegal logging. The participants also spoke out about the impacts of corruption on law enforcement and highlighted some limitations of law enforcement agencies such as fuel, with agents often unable to travel to the location where the timber is located.

4.3.9. DONA AUGUSTA (6TH NOV 2012)

The activity was attended by around 15 people. The community recognized few endemic species, mostly those that are used for human consumption. Participants did not know about the ONP or about the existence of species endemic to São Tomé. This was the only case where it was impossible to use the video projector to do the presentation as there was no place within the community that was dark enough for its image to be visible. In this community the attendance was impacted, according to a community leader, by a workshop conducted only a few days before, where each participant was paid approximately 30 000 Santomean Dobras (about 1.25€/ 1£) to attend. Several community members, therefore, refused to attend

without any financial compensation. The low attendance coupled with a lack of interest on the topic stifled audience participation, and allowed for only a very basic and limited discussion of natural resource management and community based conservation.

4.3.10. CLAUDINO FARO (15TH NOV 2012)

The workshop was attended by 28 people. The participants recognized many of the endemic species, such as the Giant Land Snail, the Giant Treefrog, the Green Pigeon, the Prinia and the Sunbird. Participants were well aware of the existence of the ONP, but few knew about the existence of species endemic to São Tomé. There was also some concern about the lack of control over the exploitation of forest resources, namely it was given the example of timber logging. The forests in the surroundings of the community were being cut by outsiders, so the community asked the forest department to deal with the situation. After the forest department claimed to have no resources to solve the situation, the community asked permission to forbid loggers to use the road to transport timber and this action allegedly stopped cuts in the community's surroundings (although the loggers moved to another patch of forest nearby). This example showed that empowering the communities to protect forest resources might be a good solution to prevent overexploitation. The workshop participants also claimed that people within the community normally would not cut forest timber, because most people have plots where they grow their own timber. However, when questioned about the ability of the community to control overexploitation of resources by members of the community, the participants got engaged in a heated discussion, which seems to indicate that this option could create tensions within the community.

4.3.11. BERNARDO FARO (15TH NOV 2012)

The workshop was attended by 21 people. The participants recognized many of the endemic species, but again were not aware that they were endemic, or that STP had so many species that occurred nowhere else. They were aware of the existence of the ONP, although this had limited implications to their everyday life. People seemed sensitive to the importance of protecting the endemic species, which they were keen on listing, and were quick to blame the kids for hunting the endemic birds with slingshots and traps. However, the discussion around forest resource management was rather short due to the difficulty of focusing on the topic being discussed.

4.3.12. SÃO JOSÉ (21ST NOV 2012)

The workshop was attended by 16 people. The participants recognized some of the endemic species while only some people knew about the ONP. People were not aware of the existence of endemic species in São Tomé and had difficulties understanding their importance. The discussion was short, as people did not seem engaged by the topic. People from the

community admitted logging in forests nearby and did not seem too worried about the consequences of forest resource overexploitation, in part due to them still being plentiful in the proximities. It was however agreed that it would be good if there were initiatives to promote a better management of timber in agricultural plots, to reduce pressure on the forests and also to make the resources more accessible.

4.3.13. BEMPOSTA (22ND NOV 2012)

The workshop was attended by approximately 27 people. The participants recognized the endemic species in the photos, but did not know they were endemic. People were well aware of the existence of a protected area. There was a heated discussion around the topic of forest resource management, namely because it was recognized as a serious problem in the proximity of the community (where large quantities of timber have been logged recently, by outsiders and by people living in the community). However it was difficult to propose solutions to improve the use of forest resources: the government had effective enforcement, but delegating these functions to the community would be a source of conflicts. At the end people showed their appreciation for the initiative and were proud to know that STP forests were so unique.

5. LIMITATIONS AND RECOMENDATIONS

During the development of this project we found the following main limitations:

- Bureaucracy makes the process of organizing activities in school very morose. An example of this is the work conducted at Monte Café where R.F de Lima had to ask the school teachers, then the head of school, write him a letter asking for availability, schedule a visit to the National Director of Primary Teaching in the capital and meet with her to explain the activity, only after which permission for the work to go ahead was given. These delays should be taken into account as so far as possible in all future project planning.
- Unpredictability in the scheduling of activities in communities, due to the different cycles of crops, such as coffee. It is therefore vital to confirm all activities a couple days in advance. It is also key to identify an adequate venue in each community beforehand, to make sure that the delivery of the presentation is not compromised.
- Most of these communities do not have electricity or might require petrol, to make a generator work (and petrol is, more often than not, not available for purchase in the community). To make sure this would not be a limitation for our presentations, we used a portable mini-projector. We advise the use of similar technologies to captivate the public's interest. Due to their limited access to electronics, the use of such equipment is very welcomed by people in these rural communities.
- Although the G.S. Oquiongo and L. Viegas were key to ensure audience engagement in the discussions at the end of the workshops, in rural communities, it was evident that there is some reluctance to share personal opinions in public. This is especially noticeable in women. Future work could try to tackle this by either organising separate workshops or by including a woman in the moderating team.
- The weather, in particular heavy rains, can strongly influence school attendance and can quickly reduce the number of students available for an activity. As such, future research should avoid these days of lower attendance.
- The payment of workshop participants by other NGO's can establish a precedent and increase the costs of activities in rural communities. It's true that any of these activities have opportunity costs for the participants, and these costs need to be taken into account, but minimising rather than compensating them is likely to be the most sustainable long term strategy. In the course of our activities, we only offered a small snack to people attending the activities in the rural communities.

6. CONCLUSION

This work, although largely exploratory, has managed to highlight a number of interesting aspects:

- In relation to rural communities, many people were not aware of the existence of the ONP, even when living very close to the park. This is especially impressive given the ONP occupies almost a third of the small island of São Tomé and has great implications for environmental law enforcement and sustainable resource use.
- The dwellers of rural communities have an extensive knowledge of the species that live in the surrounding environment, although they do not know about them being endemic to São Tomé.
- The concept of sustainability is hard to grasp in rural communities, given the hardship that households face, which lead to very high discount rates, making future resources much less valuable than present ones.
- The Santomean governance structures, namely those related to forestry, were considered to hinder sustainable use of resources by making the extractors bear the costs of legalisation. It was also often mentioned that corruption and lack of effective enforcement greatly decrease the risk of penalties being applied to offenders, and especially when these are influential in Santomean society.
- In relation to primary schools, we can conclude that few children were aware of the existence of the ONP, even when living within walking distance of its boundary. The children were also alien to the concept of endemic species, although they were familiar with many of these endemic species.
- A large number of students, almost all boys as expected, declared using slingshots to kill birds.
- The São Tomé Caecilian was the preferred species in the drawing exercise, a surprising fact especially as the species is largely killed on sight. It should also be mentioned that although the California Academic of Sciences started promoting the species as a flagship to some school teachers, the school of Monte Café was not targeted by that campaign. It would be interesting to see to what extent this is a more generalised trend and preference data is crucial to choose flagship species (Veríssimo et al. 2009; Veríssimo et al. 2011).
- In terms of high schools, the students seemed to be highly knowledgeable, not only in relation to the ONP but also in relation to the concept of endemic species and the identification of the endemic species of São Tomé and Príncipe. Yet, few students had visited the park. This improvement is, however, likely to be related to the integration of Environmental Education as part of the eight grade high school national curriculum (A. Meyer pers. comm.). It remains, however, to be seen if these changes in knowledge translate into meaningful behavioural change, something that should be investigated by future projects around environmental education in the country.

There is a pressing need for further community-based conservation, environmental education and social marketing work in São Tomé and Príncipe, a diagnosis echoed in the only other island wide assessment of environmental education (Monte Pico 2008). Only through these initiatives can we spread knowledge, change attitudes and influence behaviour towards biodiversity. This work needs to be conducted as part of a long term continued program, delivered preferably by Santomeans. Another critical aspect should be the emphasis on the evaluation of evidence-based approaches that can explicitly demonstrate what works and what does not. This will allow not only for more effective behaviour change outcomes, but also support more robust fundraising. Currently, there is still a great need for capacity building and funding, two aspects where outside actors can play major roles, especially as in the context of São Tomé and Príncipe, where even a small budget can have a large impact.

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