



ANNUAL REPORT 2020



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I. EARLY CHILDHOOD DEVELOPMENT PROGRAMME



1.1 OVERVIEW

Objective: The Early Childhood Development Programme is run in the villages in and around Odzala. The programme includes emotional, cognitive, sensory, physical, social and communication development from ages 3-6 years.

This report provides an overview of SPAC's Early Childhood Development (ECD) activities for the period 1 January to 31 December 2020. In February, the ECD Director visited Sanza Mobimba, the flagship school in Mbomo, to discuss construction needs and address staffing issues. In the wake of the COVID-19 outbreak, all subsequent trips to Congo had to be cancelled as our countries were in lockdown and travel restrictions were imposed. SPAC's ECD programme was severely disrupted by the pandemic and school closures legislated by Government.

During that time SPAC teachers played a pivotal role in advising the community on how to keep safe during this pandemic by making and distributing natural soaps and face masks, and teaching about sanitary precautions to take, among other activities. While schools remained closed for the remainder of the 2019-2020 school year, the ECD team, in collaboration with the SPAC EduConservation and Conservation Research teams developed activity sheets for preschool and school-age children. These activity sheets were inserted into newspapers in an attempt to reach a wider audience. Six activity sheets were produced, each focusing on an iconic animal or bird species found in one of Congo's national parks. In this way, Congolese youngsters could learn more about their parks and animals. Given the success of this project, the activity sheets have been compiled into a bilingual (French/English) booklet to be distributed to schools.

A two-week staff training, initially scheduled for July 2020, took place in August. Due to the Covid restrictions on international travel, our teachers' trainings were administered remotely using training videos.

1.2 EDUCATION

The Congo preschool programme framework forms the basis of the teaching activities offered. A detailed daily programme fleshes out the broad themes allocated to each of the school months: School, Family, Holidays, Habitation, Food, Animals, Water, Professions, Holidays and Health. The activities have been created specifically with an Afro-centric content bearing the culture, beliefs, and values of the Congolese communities in mind. Health, nutrition, and safety are important aspects addressed in the schools and the focus on nature as context and stimulus for creating learning opportunities forms an important basis within the natural environment and lifeworld of the children.

The child-focused philosophy of teaching, the importance of play in learning as well as the interconnectedness between the child, the environment and learning are at the heart of the SPAC ECD methodology. The child is encouraged to participate actively in the learning activities through creativity and play to fully realise his understanding and learning. Through playing children develop physically, intellectually, creatively, emotionally, and socially. Language, communication, and numeracy skills are also acquired. The programme enables children to develop foundational skills in reasoning as well as critical values. Instead of rote learning, a regular day will feature songs, dances, crafts and games. The programme also makes provision for teaching basic hygiene and nutrition.

Schemes of work for three classes have been drawn up and distributed to the schools, ensuring that all the teachers are covering the same activities and achieving the same goals. The P1 class is for the youngest children (3-4 years); P2 for the 4–5-year-olds and the P3 class for the 5–6-year-olds.

The activity booklets consist of daily plans with detailed instructions and clear routines. These incorporate learning targets in maths, language, music, motricity and art using the five senses. Songs and stories have been written, translated or sourced to tie in with the themes being covered. Resources and visual aids are included to help teachers.

The booklets have been refined to ensure that the activities are accessible to the majority of the rural children, but will soon be evaluated by focus groups in Brazzaville to ascertain whether the children in deep rural Congo have different educational levels and needs when compared to children in an urban setting.

Beside the ECD programme, about 20 primary school children are involved in the Afternoon Programme at Sanza Mobimba. These are children from the government schools who need assistance and extension. Moreover, members of the communities in which SPAC centres operate are identified and trained as teachers. All staff attend a two-week training workshop annually, but teachers also undergo ongoing training during the year to ensure they remain current. In addition to learning new teaching methodologies, staff have also learned various new skills, such as using computers, writing reports, balancing petty cash, creating nutritional meals, or fixing vehicles.

Along with the flagship centre in Mbomo, the programme also had 5 satellite schools in Ebana, Mbanza, Lango, Makouagonda and Mielé-Kokoua. Additionally, two mobile classrooms reach out to the pygmy communities in Ollémé and Makébé once a week. There are plans to upgrade these mobile classrooms to satellite schools. However, those plans have been delayed due to the pandemic. The project is envisaged to go ahead in 2021.

Table 1: ECD programme statistics

Centre	Type	No. of Staff	Ave. number of children attending per day	Comment
Sanza Mobimba	Flagship	16	80	
Ebana	Satellite	0	0	Closed due to elephant invasion of village. Staff seconded to Sanza Mobimba.
Mbanza	Satellite	3	32	
Lango	Satellite	2	6	Elephant conflict has pushed families to relocate
Makouangonda	Satellite	4	26	
Mielé-Kokoua	Satellite	3	25	
Olléme	Mobile	-	30	Once a week
Makébé	Mobile	-	30	Once a week
Youth programme	Sanza Mobimba	1	20	
Other staff		1		
Totals		31	249	



1.3 COVID-19

The COVID19 pandemic saw all schools close and as a result a new rhythm and routine developed for SPAC ECD:

- All centres were disinfected, the schools, materials and toys.
- The teachers were trained on the dangers of the virus, concentrating on the correct hygiene and prevention protocols.
- Educational posters were made and put up around the village.
- Water bucket systems were set up at various entrances and the teaching of washing hands before entering.
- The teachers were taught earlier in the year how to make soap. Hence, the ECD teachers made soap for the small villages around the park. In collaboration with APN and with the permission of the sous-prefecture, SPAC visited seven villages along the road to Ebana and four villages on the road to Mbanza. At Makébé, the 250 soaps made by the teachers were handed out to the children, the adults were just as interested, and this became a learning opportunity to train villagers on the prevention of the virus.



- With a lot of the youth not attending school, traffic became a problem in the village, especially the youth on Djakarta's. It became a problem with the pre-school kids playing in the roads. SPAC ECD compiled a little traffic educational program with photos and did activities on the road to create awareness about the lack of adherence to basic traffic rules.



- Annually, in collaboration, APN and SPAC visit the surrounding villages and present a holiday program to the young kids and youth.
- The first village visited was Mbomo. The villages of Mbanza, Olleme, Bossouka and Ntolo were visited thereafter. On average between 30-50 children attended the holiday program in each of the villages.



1.4 TRAINING

COVID19 impacted the training of teachers and led the SPAC management to having to find other solutions as international travel was not allowed:

- Local Congolese staff (trainers) were recruited and trained via zoom.
- These trainers in turn met with the teachers to do the annual teacher training for 10 days at a local hotel observing all the correct COVID-19 health protocols
- SPAC in conjunction with a consultant started making teacher training videos as resource for teachers (on the SPAC website, under 'Resources').
- COVID impacted normal procedures. Yet, within the goal of SPAC to develop local people, a management team of 3 staff members was formed and received training. They are being supported remotely.



[Teaching With Stories \(Enseigner Avec les Histoires\)](#)

 [Download Dudu et Didi](#)



[The concept of quantity \(La Notion de Quantité\)](#)



The annual two-week staff training which was initially supposed to take place in July was postponed to August 2020 and then finally deferred to September and October 2020. With the help of CCC, two of their staff (Net Destin and Annoncia Moyongo) who were on *chômage technique* were seconded to help with the training not only of the management team, but also of the other staff members.

There were three levels of training: firstly, Net and Annoncia were trained in Brazzaville. Aspects covering financial transactions such as décharges forms, petty cash, computer programs such as Excel and Word, writing and sending emails with attachments, report writing, etc. had to be covered when they trained the candidates of the management committee. They were also guided on how to explain the activities in the educational booklets.

The second tier of training took place in Etoumbi since Mbomo does not have consistent internet and having reliable communication was imperative. Five possible candidates had been earmarked for the management team. Training on how to manage the cohort of centres in Odzala was given as well as how to guide the other teachers on the educational booklets.

Lastly, with the help of Net and Annoncia, the candidates trained the other teachers from the satellites. At the end of the training, three members were selected for the management team, with Aïcha Mboyo at the head.

At the end of the training in Etoumbi, Net accompanied the management team to the satellites, and Annoncia returned with the Mbomo teachers to help with the start of the new school year. Net and Annoncia remained in Mbomo for another couple of weeks to assist the management team when required.



Second-tier training of five candidates



Third-tier training of the teachers by the candidates

1.5 CHALLENGES

The condition of the roads has not improved. Torrential rains turn the roads into raging rivers, making travel difficult and dangerous. With these conditions, SPAC vehicles need constant repair. Maintenance of vehicles and equipment is problematic, as spare parts are not always readily available and technical know-how is lacking.

Etoumbi still has no bridge. For most of the year everything had to be ferried across the river by 'pirogue' which was costly, time-consuming and, at times, unsafe. Fortunately, APN has recently allowed SPAC to use their BAC, making the transporting of goods across the river easier.

The lack of internet and a sound communication network make logistical planning and administration very difficult in the remote areas of northern Congo. Renting an office from APN where internet and power are available during certain hours only has partially alleviated these problems.

Constant maintenance of all the satellites buildings is required, for example guarding against termite infestations of door locks amongst other things.



1.6 OTHER HIGHLIGHTS

To ensure compliance, the ECD programme has been brought under the umbrella of the MoU already signed between the EduConservation programme and the Ministry of Education.

The members of the centers' management team have learnt computer skills and are increasingly confident in managing the schools and staff. During the lockdown, Dr Magdalena Bermejo was appointed as the SPAC representative in the local community with regards to the decisions related to the COVID pandemic.

There has been close cooperation with EduConservation, CCC and APN, not only regarding education and conservation, but also logistically. We are particularly indebted to CCC: over and above the staff seconded to ECD, other members helped with cheques and salaries, satellite maintenance, vehicle repairs and purchasing of items during lockdown and for the start of the school year.

Health and hygiene are big concerns in these remote rural areas, particularly sensitizing the community to the dangers of Covid. Soaps were made and distributed with masks and sanitizers.



Christmas Party 2020

1.7 BOMASSA ECD CENTRE

Despite the challenges imposed by the Covid pandemic, the new preschool in Bomassa, in the Nouabalé-Ndoki National Park, was completed on 23 December. A 'soft' opening is planned for 1 February 2021, with the official opening envisaged for the start of the 2021-2022 school year. Finishing touches like solar panels for lights, satellite dish for internet and furniture for the school needs to be completed in 2021.



II. EDUCONSERVATION PROJECT



2.1 OVERVIEW

General Overview

- A **pan-African education project** focusing on integrating well researched **Africa-centric environmental resources** to enrich and supplement the **curricula** of the formal education systems in participating countries.
- **Partnering with** governmental ministries, schools, inspectors and teachers, EduConservation aims to develop nature conservation awareness amongst the youth, inspiring a new generation of responsible citizens in Africa who will maintain focus and resolve to keep balancing human needs with available natural resources.
- EduConservation's **core values** guide the project:
 - To work **collaboratively** with the countries for whom the content is intended and specifically with their national education departments and with input from their national environmental departments.
 - To ensure that the material produced is not only **Africa-centric** but also **country-specific/localised**, bringing together local professionals including educators, biodiversity specialists, scientists, and environmentalists to develop resources.
 - To be '**teacher-centric**', by recognising the teacher's role and producing material to support the teacher in the classroom, while ensuring the learner ultimately benefits.
 - To ensure **sound pedagogy** and **methodologies** are developed.

The Pilot Phase

- The EduConservation project started with a **Pilot Phase** in three countries, namely the Republic of Congo, Senegal and Morocco. A **Memorandum of Understanding (MoU)** was signed in 2017 by the Education and Environment Ministries of these countries.
- Between **2017** and **2018**, an **Activity Booklet** was developed to cover nine core topics related to conservation for 12-13 year old learners (second year of secondary school). 75% of the content of the *Activity Booklet* is global, 25% is national.
- In **2018**, almost **20 000 Activity Booklets** were delivered across the three pilot countries and **training workshops** on the use of the *Activity Booklet* took place in all three pilot countries in 4-hour training sessions with both teachers and inspectors.

Evaluation of the Pilot Phase and Informative Assessment

- In **2019**, the EduConservation Team conducted an **Informative Assessment** to review the Pilot Phase outcomes and assess next steps in the Republic of Congo. This included an assessment of the *Activity Booklet* and a **mapping of the educational environment for 6 to 11 year old learners (primary school)**. It was agreed the first strategic mapping would be carried out in the Republic of Congo in the first instance, also to guide the way forward for EduConservation in other countries.

Elementary Phase

- Based on the research conducted, which is available in the comprehensive report produced in 2019, and which included best practices and other relevant factors, the next steps for EduConservation were agreed upon in consultation with the CEO of SPAC and Mrs. Plattner. EduConservation is **now focusing on content development for primary school (6 to 11 year olds)**, referred to as the Elementary Phase. The resources developed for this phase will be collated and presented in a **multi-grade Teachers Toolkit**, teachers being the multipliers of education across Africa. An active as opposed to passive pedagogy will be a focus, the importance of conceptual progression through the grades and a natural fit with the countries curriculum is key. In addition, a two-to-three day **Teachers Symposium** will be planned in each country before the implementation of the teacher's toolkit, to not only guide teachers on the use of the toolkit but to also nurture teachers as champions of the environment.
- Further, EduConservation will expand the project to at least two new countries, Gabon (discussions have already started) and Rwanda. .

In 2020, EduConservation primarily focused on:

- The development of the **Teacher's Toolkit Template**, being the key instrument to be used in the development of all the toolkits across the participating countries going forward
- **The first collaborative workshop** with Congolese experts in Brazzaville, being the start of an eight-month collaborative process, for the development of a teacher's toolkit for Congo;
- The development of the **Ouanda Discovers Activity sheets** in the Republic of Congo for children who were largely confined to their homes during the COVID19 pandemic, and the publication of these sheets in a major national newspaper;
- The development and printing of 100 **Ouanda Discovers booklets** in both English and French for further distribution in the Congo;
- **Engagement** continued with the various ministries of education and/or environment in the participating countries. **Three Country Coordinators** were officially appointed or renewed in

the Republic of Congo, Senegal and Namibia and a **new/updated MOU** with the Ministries of Education and Environment in Senegal was signed.

- The re-activation of the EduConservation **social media platforms** and the distribution of the first **EduConservation newsletter** to relevant stakeholders.

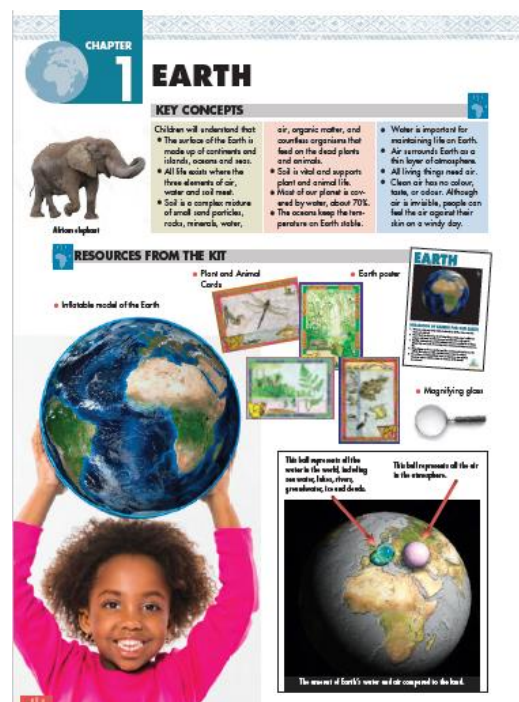
2.2 DEVELOPMENT OF THE TEACHER'S TOOLKIT TEMPLATE

a. Summary and general information

- Environmental education interventions are considered important from an early age. Thus, EduConservation is now focusing on **content development for primary school (6- to 11-year-olds), referred to as the Elementary Phase**. The resources developed for this phase will be collated and presented in a **multi-grade Teachers Toolkit**.
- This toolkit will essentially be a “box” (both physically and electronically), filled with teacher’s guides (manuals) and resources (posters, sets of plant and animal cards, storybooks, an interactive element). The conceptual progression is well developed across the grades and meticulous attention given to relevant teaching methodologies for the local context.
- The first step in the development process of the Teachers Toolkit was **to develop a template**, which was completed in October 2020.
- This template is used as a guideline to develop the country specific teacher’s toolkit in collaboration with local experts and contributors from each country.

b. Collaboration with the Primary Science Programme (PSP), Cape Town

- The EduConservation Development Team consists of content development experts, and works collaboratively with the Primary Science Programme (PSP), also based in Cape Town, South Africa. PSP is non-profit organisation recognised for its effective approaches to improving the quality of primary education in South Africa through the development of resources and the training and development of teachers.
- From February to October 2020 (nine-months), the EduConservation Development Team worked on the development of the Template, with a combination of weekly calls and in-person meetings (when possible, due to the pandemic).
- The development process included: the development of the educational framework, the template - which defines the topics, age breakdown, pedagogical flow, country-specific focus and conservation linkage, draft versions of chapters and accompanying resources that serve as the basis for the country-specific collaborative meetings, revisions of the chapter



Cover page of the Chapter 1 of the Teachers Toolkit Template

flow, topic narrative and logical progression that has been revised to better align with stronger conservation message as well as to align to developed content (an iterative process).

- The final draft of the Teacher’s Toolkit Template is available in both English and French.
- This Template will be updated progressively from lessons learned in the Republic of Congo, and used in other countries as a guideline to develop the country specific teacher’s toolkits.

2.3 ACTIVITIES IN THE REPUBLIC OF CONGO IN 2020

a. Weekly meetings with the Country Coordinator

- Weekly team calls take place with Nazaire Massamba (EduConservation Country Coordinator) based in Brazzaville, which allow the team to be aligned on the project objectives and missions locally and to foster a close relationship with local expert consultants that we collaborate with.



The EduConservation Team in front of the SPAC office in Brazzaville

b. Official meetings and on-going communications

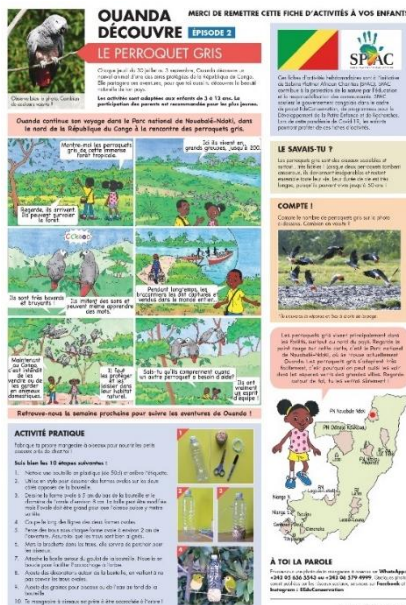
- The comprehensive Informative Assessment Congo report was written in English, and then translated into French in January 2020.
- The report was then introduced to key officials - an online version was submitted in February 2020 and hard copies with an associate letter in May 2020 to both Ministries: Education and Environment. Unfortunately, the presentation of this important comprehensive document had to be done virtually due to the Covid-19 pandemic.

- A general strategy presentation was submitted electronically to Mr Menga (Advisor to the Cabinet Director of the Minister of Education) in February 2020 to introduce the next steps of EduConservation in the Republic of Congo for 2020/21.

- In April and September 2020, online meetings took place with Mr Menga again, to finalise the next steps and to take the project forward.

c. Activity Sheets – Ouanda Discovers

- **Overview:** Six-Activity Sheets were developed, designed, and published in Les Dépêches de Brazzaville Newspaper from 30 July to 3 September 2020. *Ouanda Discovers* is a series of fun, colourful and interactive activity sheets documenting the adventures of Ouanda, a young Congolese child, as she travels to the various protected parks



Episode 2 of Ouanda Discovers activity sheets on grey parrots

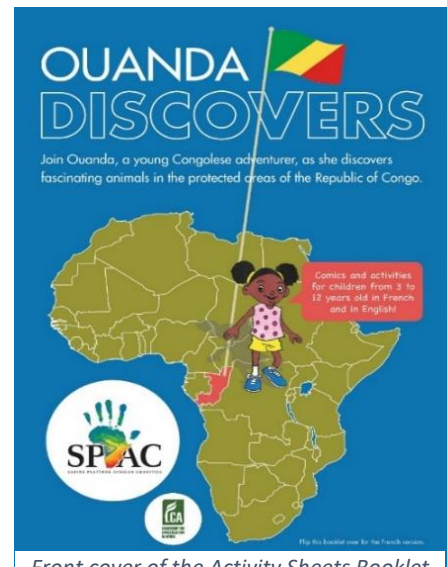
of the Republic of Congo discovering fascinating wildlife.

The animals featured were the **Leather Back Turtle, Grey Parrot, Hippopotamus, Leopard, Pangolin and Gorilla.**

- In April 2020, EduConservation proposed to produce SPAC Activity Sheets for children (to cut-out-and-keep by children) in local newspapers, starting in the Republic of Congo. This

proposed initiative was to support learners with little or no access to online learning in the Republic of Congo and to keep “stay-at-home” children positively engaged during the Covid-19 lockdown.

- The development and eventual publication of these Activity Sheets was led by the EduConservation Team with input from various members of SPAC – Zanne Viljoen (ECD), Paul Telfer and Magda Bermejo from April to August 2020.
- These sheets were also translated into English. The reason being, following the evaluation in 2019 at schools in the republic of Congo, it was noted that there is a need for English resources by school learners.
- Both versions, English and French, are available on the SPAC website as a free downloadable resource.
- These activity sheets have now also been published in a booklet format in both French and English, to be distributed to children in rural areas of the Republic of Congo.
- On the 21 November 2020, an evaluation of the Activity Sheets *Ouanda Discovers* took place in Brazzaville with a focus group consisting of 15 children and their parents. We used of an informal focus group of parents and children outside of the classroom environment as those sheets were produced and published during the pandemic for children confined at home. Short interviews with children and parents took also place and the event was filmed.



Front cover of the Activity Sheets Booklet format



Group of children and their parents - a hands-on workshop on the SPAC *Ouanda Discovers* Activity Sheets - November 2020

d. Collaboration

- The EduConservation team travelled to the Republic of Congo between 14 and 29 November 2020, and during this time facilitated an intensive five-day First Collaborative Workshop with Congolese specialists to start the collaborative process of localising the Teacher’s Toolkit Template.
- Initially, shortlisted specialists were interviewed, and four (4) specialists were chosen to form part of the development team. The Ministry of Education ‘signed off’ their involvement in the EduConservation project for a period of 8-months.
- While in the Congo for this workshop, the team met with the **Cabinet Director of the Education Minister** and also hosted a one-day workshop for approximately **70 inspectors** to introduce them to the concept of the EduConservation Teachers Toolkit. This was specifically done, as the evaluation of the previous resource, the *Activity Booklet* (2017/18), revealed that the formalised acceptance by school inspectors was a step missed in the overall process. This needed to be rectified in this instance as they are key to ensuring the use of this toolkit in schools. The event was filmed for the local television station.
- Since December 2020, all four Congolese experts have been working closely with the Country Coordinator, Nazaire Massamba. They meet and work in the SPAC EduConservation office in Brazzaville on a daily basis. In addition, they all take part in the weekly call with the EduConservation Development Team working according to a schedule to ensure all ten chapters of the teacher’s guide and other elements of the Teacher’s Toolkit will be completed within the required timeframe.



Four Congolese experts joined the EduConservation Team in Congo – First collaborative workshop – November 2020



Introductory day of the first collaborative workshop in Brazzaville with inspectors

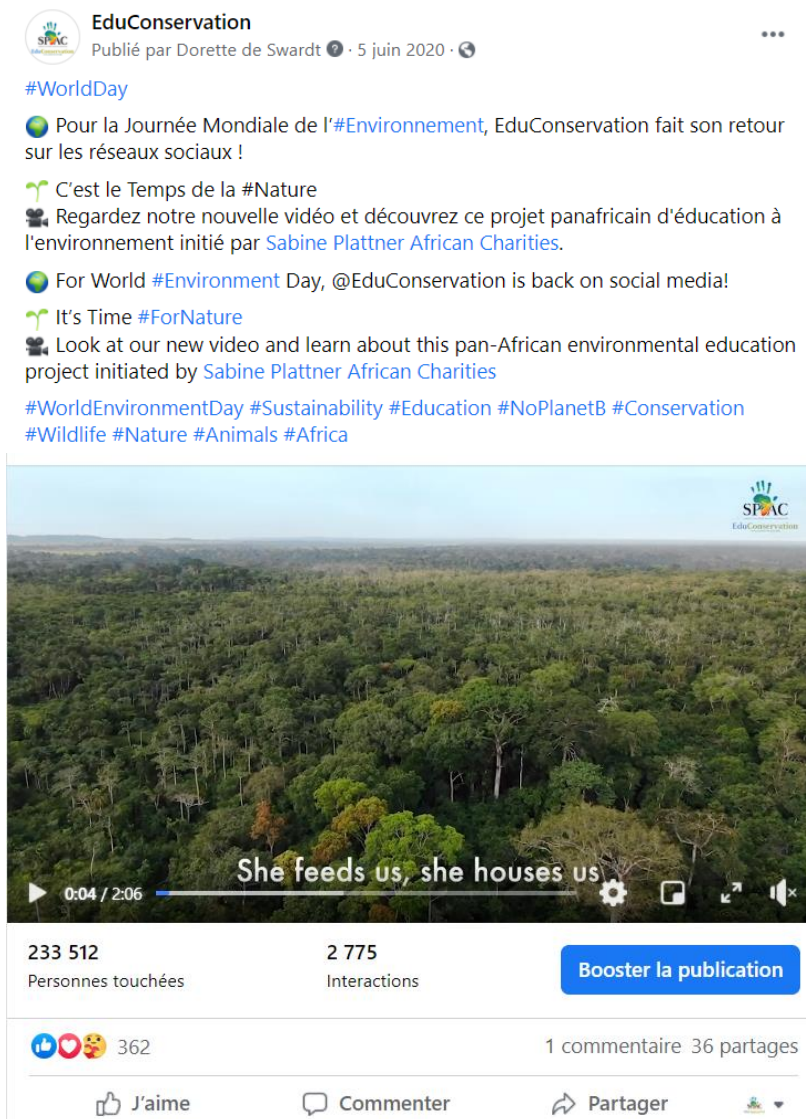


Meeting with the Cabinet Director of the Education Minister in Brazzaville

2.4 COMMUNICATIONS & NEWSLETTER

a. Communication Strategy and relaunch of social media platforms

- EduConservation’s social media platforms (dormant for 2019) were reactivated in 2020 on the premise that the approach would be in an informative and educative manner with positive, afro-centric and interactive messages that celebrate local wildlife and places in order to strengthen ties with EduConservation’s target audience (learners, teachers, officials etc.) and mainly in the participating countries.
- A short and long-term communication strategy was finalised.
- A social media consultant joined the team and regular communication on the development of relevant content and the selection of visuals is ongoing to ensure a consistent social media presence.
- To note, is the new video created to mark this re-activation, which was posted on the EduConservation social media platforms on 5 June 2020, World Environment Day.
Link: <https://www.facebook.com/1818779975045249/videos/877084812800730>






Post example on EduConservation Facebook page



EduConservation Instagram

b. Social Media statistics for 2020

- Social media platforms, specifically Facebook, Instagram, Twitter, LinkedIn, and YouTube are now fully operational with regular posts (images, videos, articles, EduConservation news, etc.).
- Statistics for 2020 outlined in the table below:

Statistics of EduConservation Social Media platforms from January to December 2020			
	Facebook: 		
11 044	Total Page Following		
98	Number of posts made in 2020		
92 000	Average number of users reached per month		
3865,4	Average engaged users per month		
2851449	Total video views for 2020		
	Instagram: 		Twitter: 
324	Total Following	296	Total Following
208	Stories posted		

c. Newsletters

- EduConservation's first e-Newsletter was distributed on 20 July 2020, to a database of 109 members. At least 12 comments were received thanking for the receipt of the newsletter and a few giving feedback on EduConservation.
- A second Newsletter will be sent out in January 2021.

2.5 HIGHLIGHT

The Covid-19 pandemic impacted the implementation for many projects across the globe in 2020, and of course EduConservation as well. However, despite the restrictions on travel, the goals proposed for 2020 for EduConservation were largely met, including the additional initiative of developing interactive, entertaining Activity Sheets for children in the Congo, who were mostly confined to their homes because of the pandemic. These are also the first free downloadable EduConservation resources available on the SPAC website, in both English and French.

The bulk of EduConservation's time in 2020 was spent productively in the development of the key instrument for the entire project going forward, being the development of the Teacher's Toolkit Template.

In the first part of the year, before the pandemic imposed restrictive travel measures, the EduConservation team was able to complete trips to both Namibia and Senegal, helping to progress the initiative forward in these two countries.

In November as soon as travel was allowed, the team travelled to Congo to start the collaborative process, using the newly developed Teacher's Toolkit Template to start the development of a localised toolkit for the Congo. While in Congo, the team used the opportunity to conduct an evaluation on the

Activity Sheets with a small focus group of children and parents, and to meet with relevant officials and communicate the way forward to a group of 70 education inspectors in Congo.

This year also afforded the opportunity to implement a communication strategy with aim of encouraging positive engagement with our target audiences to further the mission of EduConservation – *“...to develop nature conservation awareness amongst the youth, inspiring a new generation of responsible citizens in Africa who will maintain focus and resolve to keep balancing human needs with available natural resources...”*

Virtual communication became easier as the year progressed, and our engagement continued with the various ministries of education and/or environment in the participating countries. Notably, two new Country Coordinators were officially appointed (Senegal and Namibia) and the contract with our Congolese Country Coordinator renewed. A new MOU was also signed with the two relevant Ministries in Senegal.

Towards the end of the year, extensive forward planning took place with the impetus on accelerating the process required to produce resources, without compromising the integrity of the resources or the core values of EduConservation.

What has become evident is that now more than ever, in this changing world, it that our stakeholders in the various countries are embracing EduConservation with more urgency and enthusiasm and adapting quickly to working virtually. However, there are still clearly some processes that will require in-person meetings to facilitate long-term virtual engagement and development. Specifically, the on-boarding of the Ministries (MOU and appointment of country coordinators), the first collaborative workshops with local experts, the Inspectors Workshops and the Teachers Symposium. We believe some countries may move quicker than others to collaborating virtually. Our relationships are becoming stronger in each country and the integrity and approach of this initiative as conceptualised by Mrs Plattner is genuinely acknowledged and appreciated.

The EduConservation team is extremely pleased to work on this project that is relevant and essential for Africa, especially in the context we all now find ourselves globally.

III. ODZALA CONSERVATION AND RESEARCH



3.1 OVERVIEW

SPAC takes an approach to conservation and research that is focussed on helping communities appreciate the value of their resources, and that empowers community members to become protectors of the rainforest and its animals, as well as their own families. Through an interdisciplinary research network, the SPAC research team, under the leadership of Dr Magdalena Bermejo, has established the SPAC Field Station Network (SFSN), involving various universities cooperating and contributing to conservation research in Africa. Our conservation and research efforts primarily take place in the Northern Congo, home to Western Lowland Gorillas, Chimpanzees and Forest Elephants. SPAC funds research and wildlife conservation institutions in Odzala National Park and periphery areas, in their studies of primates in their natural habitat, and the investigation into the behaviour of western lowland gorillas and their recovery capacity after demographic crashes. Another unique methodological focus of SPAC and the Field Station Network is developing novel visualisation methods for the presentation and analysis of complex network data. The multi- and interdisciplinary network can provide a unique collaborative research environment, for exploring cooperation and collective thinking in conservation research, which will ultimately lead to richer data and a better understanding of the gorillas and their natural habitat.

3.2 PUBLICATIONS AND PRESENTATIONS

a. Understanding drivers of fruit phenology in Central African Tropical Forest

The SPAC World-Class Field Station Network in Afro-Centric Area (SWFSN) has a first draft manuscript on “Understanding drivers of fruit phenology in Central African tropical forests”. In this line, the study of forest phenology (i.e. timing and drivers of seasonal lifecycle events) has gained a lot of interest within the research community in the last decades (Abernethy *et al.* 2018). Investigating the causes and factors affecting tropical forest seasonality is essential to understand the magnitude of the impact that climate change will have on forest biodiversity. Our study is described in more detail below.

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Introduction

There is still a lot of uncertainty regarding phenology in tropical forest. Previous studies suggest that we need a better understanding of phenology in under-studied habitats such as tropical forests, especially considering their global role as reservoir of biological diversity (Dunham *et al.* 2018; Saxena & Rao 2020). Therefore, the aim of this study is to use the available published information on tree phenology in Africa to further investigate the environmental factors driving forest seasonality at tropical latitudes. To achieve this, we focused on Central African tropical forests, which are a relatively under-studied areas (Abernethy *et al.* 2018; Adamescu *et al.* 2018). We also concentrated on fruit phenology, which are the most abundant data, given that phenological data in those regions were often collected for the study of food availability for animal species (Abernethy *et al.* 2018).

We hypothesized that, even though in the tropics there is a high diversity of individual phenological behaviors, phenological patterns emerge at the community level that will be determined to a high extent by climatic variables and photoperiod. Comprehensive studies that disclose the relationships between environmental variables and seasonal fluctuations of forest resources will be essential to understand the mechanisms through which climate change will affect phenology, and thus, the ways in which future global change will impact biodiversity.

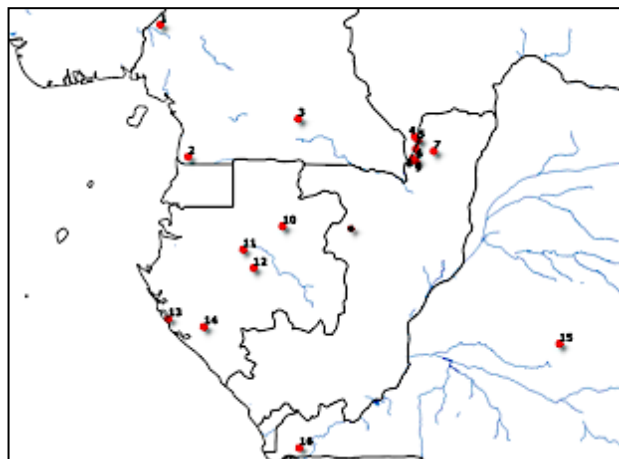


Figure 1. Map with locations (red marks) with available fruit phenological data
The black dot represents Ngaga, from which data could also be potentially

Results

As hypothesized, we found an influence of climate and photoperiod on the fruit phenology at the community level. Variables concerning both fruit maturation (recently measured) and flower triggering (lagged variables) seem to explain fruit patterns (Table 1). Both models gave similar results, and thus, to avoid repetition, the graphical representation of the effects is only presented for the case of the first Model (i.e. *Fruit phenology (Scaled/Centered)*). Daylength showed a positive effect on fruit availability, implying that fruit maturation and production increases in month with longer days. On the other hand, we did not find clear support for an influence of lagged photoperiod change (i.e. through its potential impact on flowering months earlier) on current fruit availability (Table 1; Fig. 2a, f).

The influence of rainfall also seemed to vary depending on the moment of measurement. While accumulated rainfall in the last three months and increases in rainfall around five months earlier showed a positive effect on fruit production (Table 1; Fig. 2b, g), higher accumulated rainfall four to seven earlier seemed to cause a decrease in fruit availability (Table 1; Fig. 2h). Similarly, the different temperature variables also affected fruit phenology in different ways. Mean temperature four-five months earlier showed a quadratic effect, with intermediate temperatures causing the higher values of current fruit phenology, whereas rising temperatures around that same period (i.e. higher values of *Lagged temperature change*) led to higher fruit production (Table 1; Fig. 2d, e). We did not find, however, strong support for an effect of accumulated degrees of temperature in the last three months before measuring fruit availability (Table 1; Fig. 2c).

Regarding the predictive power of our models, we found that our models were able to predict fruit phenology to a great extent, although there is substantial variability among study cases and correlation measures. Both models provided similar results and therefore, to avoid redundancy, we present correlations measures and graphs comparing observed and predicted values for only Model 1 (*Fruit phenology (Scaled/Centered)*). Correlations between observed and predicted values were greater than 0.6 in 57% of the data series (65% of the studies) for the case of *Simple Corr*, larger than 0.6 in 72% of the cases (77% of the studies) for the *Running mean Corr*, and greater than 0.6 in 45% of the data series corresponding to 61% of the studies in the case of the *Relative peak Corr*.

Discussion

As predicted our results show that not only recent environmental conditions are important for explaining fruit availability, but also the temperature and rainfall in previous periods of the year (i.e. time-lagged variables). Our approach and findings contrast with most previous studies, which have focused mostly on relating phenological stages to contemporaneous or recent environmental variables (Sun *et al.* 1996; Yamagiwa & Basabose 2006; Head *et al.* 2011; Adole *et al.* 2019, although see for example also Alexandre 1980 and Tutin & Fernandez 1993). The effect of time-lagged temperature and rainfall variables on fruit availability could be explained through their impact on previous phenological stages, namely the flowering period, since fruit production depends to a great extent on the amount of flowers in the previous period.

Overall we observed that by combining recent and lagged variables we obtained models that were able to reproduce the observed seasonal fluctuations in phenology to a great extent in most of the cases studies of central African tropical forests. These findings are even more remarkable when considering the variability in methods and data types of the empirical data, as well as the fact that, due to the lack of local meteorological measurements in many studies, we had to use data from climatic models to build our explanatory variables. Nevertheless, these sources of potential noise do

not invalidate our results, but more of the opposite highlight the strength of the patterns found despite the variability in the data.

In conclusion, although more studies are needed which will focus on obtaining longer phenological data series, exploring new study sites, and collecting more local weather data, our study is a first step towards understanding and predicting the complexity of phenology in tropical areas. With studies like this we will not only be able to predict the future effects of climate change on biodiversity, but also to better understand current biological process such as spatio-temporal variations in animal movements (i.e. following vegetative resources), in routes of diseases transmission and potential spillovers, and species competition and coexistence.

Table 1. Results of GLMMs investigating factors driving fruit phenology in Central African tropical forests. Represented are the posterior means of the effect of each variable with its corresponding 95% credible intervals (CrI). Posterior probabilities (PP = 0.5 - 1) represent the strength of the support for a given effect.

Effects	Model 1: Fruit phenology (Scaled/Centered)			Model 2: Fruit phenology (between 1&0)		
	Posterior mean	CrI 95%	PP	Posterior mean	CrI 95%	PP
Intercept	0.129	0.071; 0.185		-0.255	-0.432; -0.076	
Daylengt	0.195	0.130; 0.258	1	0.211	0.210; 0.289	1
Accumulated rainfall	0.096	0.040; 0.152	1	0.089	0.020; 0.159	0.99
Accumulated degree	-0.034	-0.083; 0.016	0.91	-0.009	-0.083; 0.063	0.59
Lagged mean temperature	0.122	0.067; 0.177	1	0.168	0.093; 0.245	1
Lagged mean temperature ²	-0.112	-0.146; -0.079	1	-0.133	-0.180; -0.086	1
Lagged temperature change	0.068	0.017; 0.119	1	0.064	-0.003; 0.127	0.97
Lagged photoperiod change	-0.039	-0.108; 0.029	0.87	-0.006	-0.087; 0.077	0.55
Lagged rainfall change	0.058	0.007; 0.109	0.99	0.066	0.003; 0.128	0.98
Lagged wetness period	-0.302	-0.356; -0.246	1	-0.344	-0.413; -0.274	1

Model 1 (distribution = normal & link function = identity); Model 2 (distribution = beta & link function = logit)

Random factors = study + site + method + datatype

N = 1262. Note that this represents the total raw sample size, but in mixed models effective sample sizes lie somewhere between the total sample size and the number of clusters defined by the random factors (Snijders & Bosker 2012)

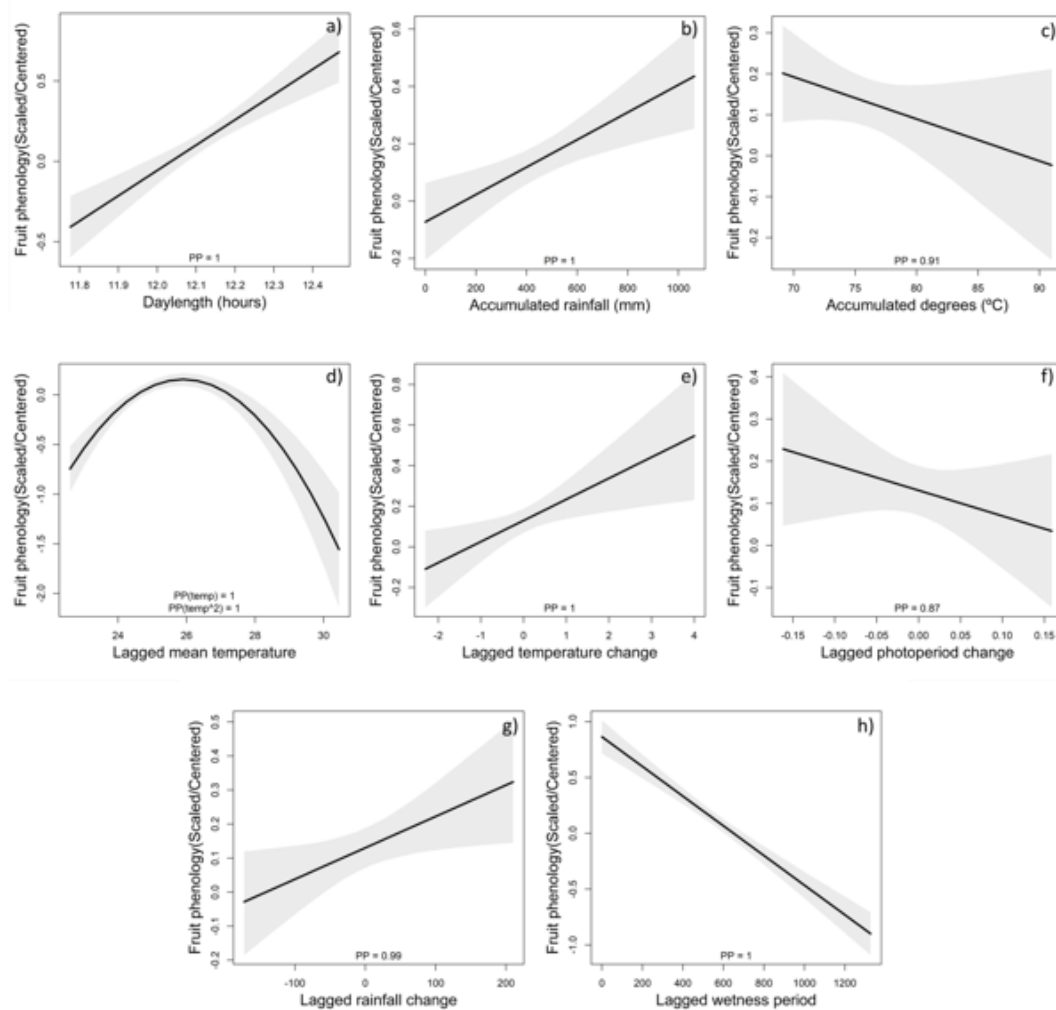


Figure 2. Factors influencing fruit phenology (estimated means \pm 95% credible intervals). Posterior probabilities (PP = 0.5 - 1) denote the likelihood of the given effect (slope) being different from zero.

References

- Abernethy, K., Bush, E.R., Forget, P., Mendoza, I. & Morellato, L.P.C. (2018). Current issues in tropical phenology: a synthesis. *Biotropica*, 50, 477–482.
- Adamescu, G.S., Plumptre, A.J., Abernethy, K.A., Polansky, L., Bush, E.R., Chapman, C.A., *et al.* (2018). Annual cycles are the most common reproductive strategy in African tropical tree communities. *Biotropica*, 50, 418–430.
- Adole, T., Dash, J., Rodriguez-Galiano, V. & Atkinson, P.M. (2019). Photoperiod controls vegetation phenology across Africa. *Communications biology*, 2, 1–13.
- Alexandre, D.Y. (1980). Caractère saisonnier de la fructification dans une forêt hygrophile de Côte-d'Ivoire. *Revue d'écologie*, 34, 335–359.
- Dunham, A.E., Razafindratsima, O.H., Rakotonirina, P. & Wright, P.C. (2018). Fruiting phenology is linked to rainfall variability in a tropical rain forest. *Biotropica*, 50, 396–404.
- Head, J.S., Boesch, C., Makaga, L. & Robbins, M.M. (2011). Sympatric chimpanzees (*Pan troglodytes troglodytes*) and gorillas (*Gorilla gorilla gorilla*) in Loango National Park, Gabon: dietary composition, seasonality, and intersite comparisons. *International Journal of Primatology*, 32, 755–775.
- Saxena, K. & Rao, K. (2020). Climate Change and Vegetation Phenology. In: *Reproductive Ecology of Flowering Plants: Patterns and Processes*. Springer, pp. 25–39.
- Sun, C., Kaplin, B.A., Kristensen, K.A., Munyaligoga, V., Mvukiyumwami, J., Kajondo, K.K., *et al.* (1996). Tree phenology in a tropical montane forest in Rwanda. *Biotropica*, 668–681.
- Tutin, C.E.G. & Fernandez, M. (1993). Relationships between minimum temperature and fruit production in some tropical forest trees in Gabon. *Journal of Tropical Ecology*, 9, 241–248.

Yamagiwa, J. & Basabose, A.K. (2006). Diet and seasonal changes in sympatric gorillas and chimpanzees at Kahuzi–Biega National Park. *Primates*, 47, 74–90.

b. Apes - Human Interactions, and Covid-19

SPAC Field Station Network invited by Dr Tomas Gillespie to participate in the IUCN Primate Specialist Group

Webinar: One Health – Planetary Wellbeing

Webinar Dr Sian Waters, Dep of Anthropology, Durham University, UK and UCN Primate Specialist Group, Co-Vice Chair, Section for Human-Primate Interactions to intervene in the Talk “Apes Case Studies, Human Interactions, and Covid-19” (15th June at 3pm GMT). <https://human-primate-interactions.org/>

1. The current alert for Covid-19 caused by the transmission of a virus or disease from animals to humans (zoonosis) is not uncommon. What has been unusual is the dimension it has had across the planet. Zoonoses have always existed. However, global changes on our planet, mainly global warming, the destruction and modification of natural habitats and the movement of people and goods, increase the frequency of transmission of animal diseases to people and consequently the likelihood of them becoming pandemics. The seminar aims to reflect on the issue of the hand of experts from the Biodiversity Research Institute and the Institute of Nutrition and Food Safety of the University of Barcelona. <http://www.ub.edu/irbio/emergencia-sanitaria-salud-ambiental-video-online-n-826-ca>
<https://www.youtube.com/watch?v=sJZDs41J6yw>

1 de juliol de 2020 de 12:00 a 13:30h
Enllaç: <https://eu.bocollab.com/guest/2764e156da634854918f03a9da3159db>

L'alerta actual del Covid-19 causada per la transmissió d'un virus o malaltia dels animals als éssers humans (zoonosis) no és un fet inusual. El que ha estat inusual és la dimensió que ha tingut en tot el planeta. Les zoonosis han existit sempre. No obstant això, el canvi global del nostre planeta, principalment l'escalfament global, la destrucció i modificació dels hàbitats naturals i el moviment de persones i mercaderies, augmenten la freqüència de transmissió de malalties d'origen animal a les persones i en conseqüència la probabilitat que esdevinguin pandèmiques. El seminari pretén reflexionar sobre la problemàtica de la mà d'experts de l'Institut de Recerca de la Biodiversitat i de l'Institut de Nutrició i Seguretat Alimentària de la Universitat de Barcelona.

Ponents:

- **Dr. Jordi Serra Cobo:** Eco-epidemiòleg i especialista en salut global. Universitat de Barcelona. IRBio-Institut de Recerca de la Biodiversitat.
- **Dr. José Domingo Rodríguez Tejerina:** Catedràtic de Zoologia. Universitat de Barcelona. IRBio-Institut de Recerca de la Biodiversitat.
- **Dr. Albert Bosch:** Catedràtic de Microbiologia. Universitat de Barcelona. INSA-Institut de Recerca em Nutrició i Seguretat Alimentària.
- **Dra. Magdalena Bermejo:** Director de la Red Internacional de la Estación de Campo en Africa Central. Fundación Plattner y Spain-LifeWeb-UNEP.

Moderador/a:

- **Dra. Rosina Gironés:** Catedràtica de Microbiologia. Universitat de Barcelona. IdRA-Institut de Recerca de l'Aigua.

Organitza:

IRBio Institut de Recerca de la Biodiversitat UNIVERSITAT DE BARCELONA

UNIVERSITAT DE BARCELONA

<http://www.ub.edu/irbio/index.html>

3.3 SCIENTIFIC NETWORKING

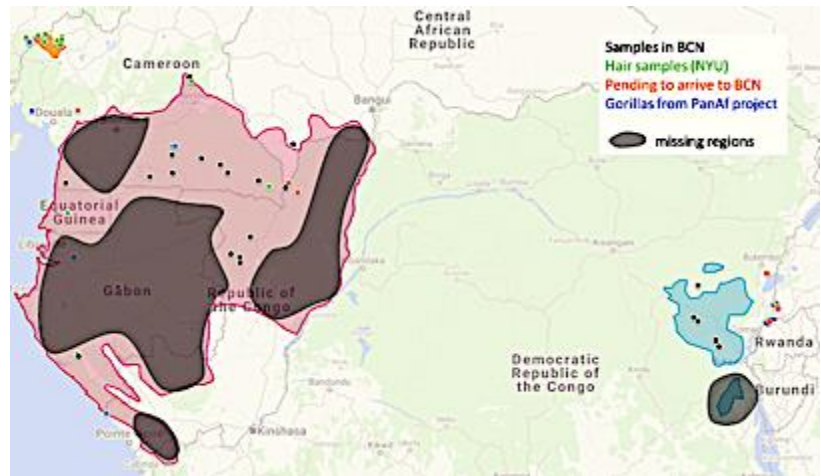
a. Global Gorilla Genomic Variation Study

SAMPLES

Currently, there are a total of 205 samples in Barcelona: 191 faecal samples and 14 hair samples. We have extracted all 191 faecal samples and sequencing libraries using the BEST protocol is done.

Estimation of their host DNA content (% DNA from gorilla in the sample) is under way by whole genome sequencing at very low coverage (0.1X).

In New York University (NYU) there are a total of 140 hair samples that have been cleaned and prepared for DNA extraction and are being extracted. A total of 8 hair samples were used as a pilot study to do library preparations using a novel SRSLY protocol (single hair library preparation) and have been sequenced at very low coverage to estimate the host DNA. These libraries are now in our laboratory and will be used to test whether we can merge data from capture and whole genome sequencing (WGS) by both capturing them and sequencing at a deeper depth.



The main caveat now is that there are still some regions from which we are missing samples are indicated by dark grey in the map. Samples indicated by orange dots will arrive during 2021 to the laboratory (~50 samples from Uganda, 50 samples from Rwanda, ~10 samples from Ebo forest). We continue our search of new samples from under-represented areas of the gorilla distribution and we hope we receive more during 2021 and 2022.

PLANNING

	2021												2022											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Feces																								
DNA extraction																								
Library prep																								
Sequencing																								
%eDNA estimation																								
Pooling and capture																								
Sequencing																								
Data analysis																								
Hairs																								
Test Capture SRSLY libraries (BCN)																								
Analysis - Test capture vs WGS SRSLY																								
DNA extraction NYU																								
Library prep SRSLY																								
Data analysis																								

RESULTS

Due to the COVID-19 pandemic we had to close the laboratory for 6 months during 2020. Therefore, our capacities to extract the samples that we had and sent them for sequencing have been limited. The preliminary results suggest that faecal DNA libraries extracted with new methods and that have been sequenced and the host DNA analyses estimated suggest that these samples have higher endogenous content compared to the average found in other faecal samples sequenced in our laboratory. From the single hair DNA extractions, we have obtained 8 SRSLY libraries and performed shallow sequencing to have a quality control. Half of these libraries show a proportion of host DNA higher than 5%, higher than the average found in common faecal samples in our group.

In fall 2020, we have been able to go back to the laboratory and we are finishing the DNA extractions of the samples we had, and we are preparing all the libraries to estimate their host DNA content before being captured (both chromosome 21 and exome). We have also designed from scratch a new RNA bait capture array based on the gorilla genome that will be used for the exome capture in order to

optimize it in comparison to the commercial human design by Agilent. These new baits are already in the laboratory ready to be used for the capture experiments.

These data will be part of two PhD thesis projects of Marina Alvarez-Estape and Harvinder Pawar supervised by Tomas Marques-Bonet and Esther Lizano.

¹We expect writing a manuscript draft in 2021

COLLABORATORS

- | | |
|-------------------------|---|
| - Magdalena Bermejo | University of Barcelona |
| - James Higham | New York University |
| - Richard Bergl | North Carolina Zoo |
| - Martine Peeters | University of Montpellier |
| - Klára Petrzelková | Institute of Parasitology in Czech Republic |
| - Eiji Inoue | Kyoto University |
| - Katerina Guschanski | Uppsala University |
| - Damien Caillaud | University of California, Davis |
| - Bethan Morgan | San Diego Zoo Global |
| - Michael-Jensen Seaman | Duquesne University |

NETWORKING TEACHING PLAN

As part of the dissemination of our knowledge, which we strongly believe should be one of the goals of academics, we are organizing an “in situ” courses for specific training of the genomics of conservation to students and teachers at the University of Brazzaville.

This Course, running several days, would include a theoretical approach to population genomics and conservation, a practical course with DNA sequencing (Oxford Nanopore and Illumina sequencing) and would include the participation of editors in chief of a major journal to share publication guidelines.

WHO WE ARE

Marina Alvarez-Estape – PhD student
Harvinder Kaur Pawar – PhD student
Clàudia Fontserè – PostDoc
Joseph Orkin – PostDoc
Esther Lizano – PostDoc and Co-Supervisor of Marina Alvarez-Estape
Martin Kuhlwiilm – PostDoc and Co-Supervisor of Harvinder Kaur Pawar
Tomas Marques-Bonet – Principal Investigator and Co-Supervisor of Marina Alvarez-Estape and Harvinder Kaur Pawar



b. Conservation X Labs Artificial Intelligence

SPAC - Conservation X Labs combines the power of wildlife research, computer vision, and artificial intelligence to assess wildlife health and habitat, speeding population analysis and conservation action.

Webinar “Gorilla ID machine learning (ML) project – seeking machine learning experts” discussed the following key points:

- Introduction was made by Magda Bermejo, Director of the World-Class Field Station Network in Afro-Centric Area regarding the project and scope.
- The ultimate goal of this collaboration is to detect behaviour and individual gorillas. We all stated that it's technically challenging to detect individuals, but absence/presence and signs of particular behaviour may be the first place to start.
- There was a high interest from all parties to explore the project further. Conservation X Labs noted that they have capacity and high interest to review the initial dataset at this point in time.
- We proposed the use of a video annotation tool to annotating a subset of videos to identify specific behaviours. This will be necessary to gauge the complexity of identifying behaviours in general as the technical team won't know what to look for without this metadata.
- We will be provided with the VGG Image Annotator (VIA) tool (see software ZSL sample, slides 1-3).
- It would be good to follow up with a hardware discussion at a later date (January 2021) to discuss edge-ML opportunities and capabilities / advantages once we have assessed the initial data.

The Terms of Reference and the MoU indicate who will see the data and how it's used was required for the key people in each partner organisation. The MoU was signed by Jason Holmberg (WildMe); Sam Kelly (CXL); Shah Selby (Conservify); and Akasdair Davies (Arrivada).

Alasdair Davies (Arrivada, and ZSL) recently met PJ Stephenson (member of the Great Ape IUCN SSC Primate Specialist Group) to request for a chair in IUCN Conservation Technology Task Force. Our work will be a good focus for the task force to also advance the hardware needs in the field once Conservation X Labs finish the model and facilitate others would benefit from similar functionality.

Hannah Doll is a Conservation X Labs fellow, who has been working with DeepLabCut for a while (and also B-SOID for behavioral clustering).

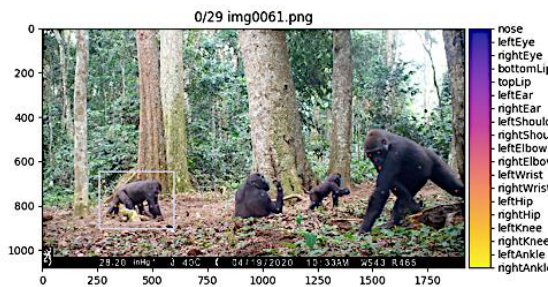
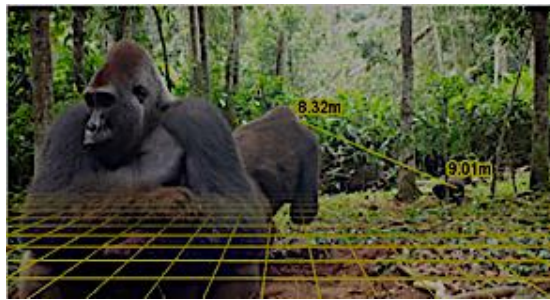
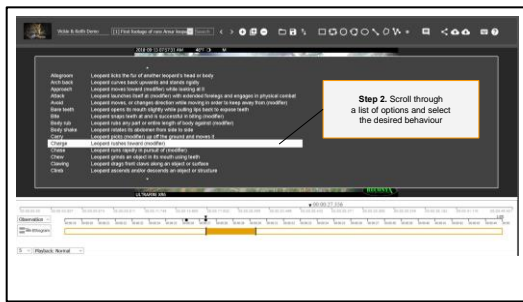
1. We are doing two separate models (a facial model and a body model) for the basic point tracking. We proposed to cluster behaviours in an unsupervised way (let the machine decide what is similar, and then cross-correlate the timestamps to what you have labeled). We would then have to work with the experimented primatologists to see if this is useful/correct;
2. On being able to put this software on devices in the field: we are waiting on a new version of the software from the DeepLabCut and Google teams that would enable us to put it onto our forest device, we expect this to be in the coming month (Feb 2021), which we are aiming to make connectable to our existing cameras.

STEP I. Train computer vision to find individuals in videos

STEP II. Algorithms and Neural Networks identify individuals, scanning for matches across tens of thousands of videos.

STEP III. Track Within Group Social Relations and Dynamics, Groups Social Relationships and Population Social Network to Generate diseases transmission models, and Data-driven conservation action.

Amur Video Annotation Workflow, Version 1.0 / 28/06/2020 by Alasdair Davies, Zoological Society London. New Ethogram Software is being adapted to our gorilla remote video-monitoring Database.



Technology and Conservation for Youth

c. Nutritional Choice in Apes

Hunter College, Dep of Anthropology, New York University in the SPAC Networking System

The scope of the **Nutritional Choice** study we propose is- answering the question of **which nutrients are prioritized by great apes as they forage in their environments**. Mountain gorillas prioritize total energy while their intake of protein and other nutrients fluctuates from day to day. This is potentially a key element in the question of:

1. How the level of food competition that a species experience is modulated by both food availability and nutrient requirements, and illuminates which nutrients are most limiting to fitness for different species.

We do not yet know how bonobos or western lowland gorillas prioritize nutrients. If bonobos prioritize protein, like chimpanzees, and western lowland gorillas prioritize total energy, like mountain gorillas, it would suggest that:

2. Phylogenetic constraints shape how a species prioritizes nutrients.

However, both bonobos and western lowland gorillas have intermediate diets to those of chimpanzees and mountain gorillas. It is therefore possible that:

3. Relatively high fruit intake in western lowland gorillas compared to mountain gorillas is related to a divergence in nutrient prioritization in the gorillas, and that a relatively high intake of herbaceous foods in bonobos compared to chimpanzees stems from a divergence in nutrient prioritization in Pan.

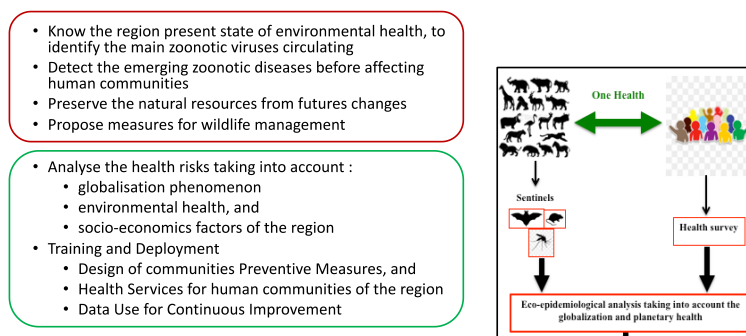
The intra- and intergenus comparisons that this study would allow with published research will illuminate how flexible or deterministic nutrient prioritization is in shaping the feeding ecology of the great apes and would indicate which nutrients are limiting to fitness in different great ape species.

d. Interface of Ecological and Human Systems

Today's era is the speed at which change occurs and the magnitude of such changes. This has an impact not only on the globalisation of trade and the economy, but also on the distribution of pathogens. To understanding the zoonotic diseases is necessary the eco-eco-epidemiological approach that consider complex relationships and provides relevant information in terms of human and animal health, because it allows assessing the epidemiological risk and take preventive measures. The interaction between human and animal health is not a new phenomenon, but the impact that zoonoses have today worldwide on human populations is an unprecedented phenomenon.

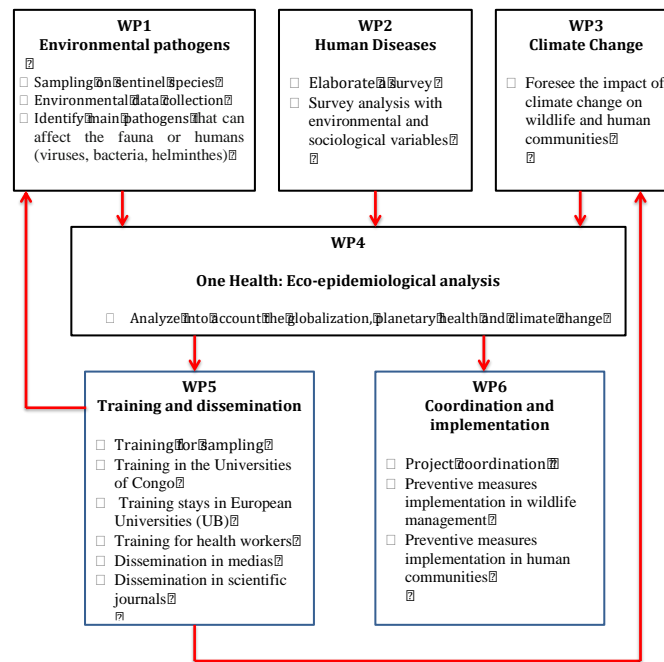
The current mobility of people is unprecedented and is a very important epidemiological factor to consider, since it increases the risk of spreading diseases. A good example we can find in COVID-19. An epidemic produced in China has been quickly expanded around the world because the Wuhan city is high international connected. We hope it is an opportunity to start a new way to work before that be producing environmental changes how occurred in other tropical regions in the world.

One Health Eco-Epidemiological Analysis: Objectives



A significant challenge to integrating ecological knowledge into decision support is a lack of understanding and data for key biological, ecological, social and geographical features of many zoonoses and their reservoir hosts (including for high priority diseases such as viral haemorrhagic fevers). Tackling these problems requires integration of knowledge, evidence, and research programs across ecological, social, and health domains. Bringing relevant, already existing data (e.g. wildlife, livestock and human serological surveys together through development of open-access data platforms could support analyses of future zoonoses responses to environmental change. More broadly, involving ecologists in public health research and policy design – and vice versa – could both fill data gaps and construct programs that enhance infectious diseases prevention control.

More immediately, enhancing systematic and community-based disease surveillance, specially in areas undergoing rapid land use and/or climatic changes, will be vital to early detection and response for both known and novel infectious. Zoonoses are concerned not only for health policy, but for environmental policy more generally.



Work-Package System

This is very preliminary, and more information will be forthcoming

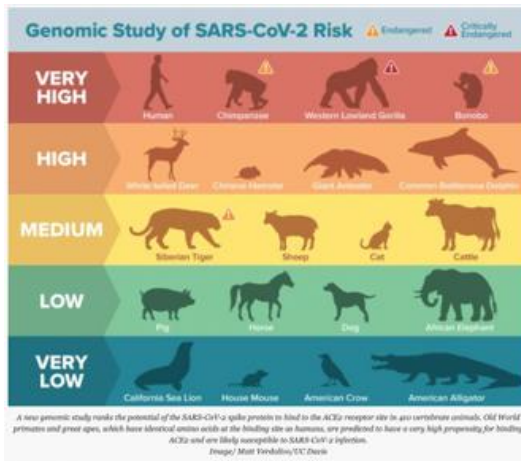
Currently known about COVID-19 Disease in non-human primates:

1. Zoonotic Diseases Prevention Human to Animal Transmission

A recent genomic study <https://www.pnas.org/content/pnas/117/36/22311.full.pdf> ranks the potential of the SARS-CoV-2 spike protein to bind to the ACE2 receptor site in 410 vertebrate animals. Old World primates and great apes, which have identical amino acids at the binding site as humans, are predicted to have a very high propensity for binding ACE2 and are likely susceptible to SARS CoV-2 infection

The novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the cause of COVID-19, a major pandemic that threatens millions of human lives and the global economy. The authors of this study identified a large number of mammals that can potentially be infected by SARS-CoV-2 via their ACE2 proteins. This can assist the identification of intermediate hosts for SARS-CoV-2 and hence reduce the opportunity for a future outbreak of COVID-19. Among the species they found with the highest risk for SARS-CoV-2 infection are wildlife and endangered species. These species represent an opportunity for spillover of SARS-CoV-2 from humans to other susceptible animals. Given the limited infectivity data for the species studied, we urge caution not to over interpret the predictions of the present study.

Several critically endangered primate species, such as the Western lowland gorilla, Sumatran orangutan and Northern white-cheeked gibbon, are predicted to be at very high risk of infection by SARS-CoV-2 via their ACE2 receptor. Other animals flagged as high risk include marine mammals such as gray whales and bottlenose dolphins, as well as Chinese hamsters.



2. Covid-19 Disease – New Considerations for Great Apes in Human Care

IUCN Non-Human Primate Covid 19 Information Hub

The corona viruses responsible for SARS, MERS and now SARS-CoV-2 (the corona virus that causes COVID-19) have dramatically altered the pathogenicity and threat to human populations of this family of coronaviruses. ***There has now been a confirmed case(s) of SARS-CoV-2 in gorillas in the USA (San Diego Global- Safari Park). This is very preliminary, and more information will be forthcoming.***

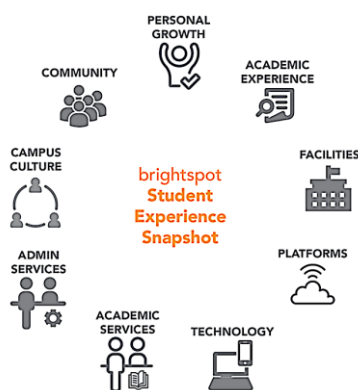
[San Diego Zoo's initial press release from Jan 11th 2021 can be downloaded here](#) 📄

[San Diego Zoo's follow up press release from Jan 25th 2021 can be downloaded here.](#) 📄

e. Networking Teaching: Latest Master's from the SPAC Field Scientific Network

In 2019, SPAC Field Station Network initiated a new take on learning. SPAC integrated four students from the University of Brazzaville to join our research team and do their internship. The general objective of this internship program is to introduce four in-country grad students (i.e. two from level Master 1 and two from Master 2) to the scientific methods and system, while evaluating their potential, attitude (both individual and collaborative), and their learning progress. The results of this pilot program can help define the potential long-term collaborative programs between SPAC and the University of Brazzaville, including also supervision of PhD students.

On December 15th, Arnaud MACK-ZOLA presented his defence of master with distinction (17,6 from 18).



Congratulations to the latest MASTERS of the Ngaga Scientific Station Network. We are thankful for his dedication and hard work.

ABSTRACT. Cameras-trap are a tool increasingly used in ecology, having the capacity to capture a large number of files in short periods of investigation. In this study, he assessed the feasibility of using non-target data from a survey of the western lowland gorilla in the Ngaga Forest, southwest of PNOK in the Republic of Congo, to assess the effects of anthropogenic structures (roads and Ngaga camp) on the specific richness of wildlife. For this objective, the

master student analyzed the data from 14 camera traps from March and September 2016. These data were submitted to species identification and with generalized linear model (R software v. 3.6.1), he

explored the relationship of this specific richness with the minimum distance from “roads” and “Ngaga camp”. On the basis of 388 photos and 468 videos processed, he have identified a wealth of 15 species including 9 species of large and medium mammals, one species of bat, one species of squirrel, one species of small rodents and 3 species of 'birds. He showed that the specific richness increases as the distance to the “road” increases. On the other hand, he did not find a significant influence of distance to “Ngaga camp” on species richness. This study suggests that roads have a negative influence on wildlife species richness. This study uncovered the ability of camera traps to provide information-rich datasets for effective conservation projects.

Keywords: conservation, specific richness, non-target fauna, camera traps, anthropogenic structures, Ngaga Forest.

On December 2020, seven Master I and II students (University of Brazzaville) joined the Virtual Course “Nutritional Choice in Apes”). The experiential learning that we are developing gives students an opportunity to assess / reflect on their critical thinking, empathy, collaboration, and flexibility in a variety of environments—and with a variety of people—in order to engage, lead, and effect change in a meaningful way (see also *B) Scientific Networking 1. Global Gorilla Genomic Variation Teaching Plan*).

At present, the three students participating in the pilot 2019 internship have presented to us their Master II draft document that will be reviewed by Professor Arsene Lenga, Zulima Tablado, and Magdalena Bermejo.

f. Connected Conservation Foundation

Using technology to help eradicate poaching around the world

Connected Conservation Foundation as a non-profit organization, Connected Conservation Foundation (CCF) raises funds for projects, which use technology to protect the environment, safeguard wildlife, and uplift communities. Supporting the collaborative partnerships that are critical to stop poaching through the application of technologies.

We strive for a world where animals can roam free, safe from harm. Wildlife poaching is at a crisis point, made worse by the Covid 19 pandemic. The Foundation brings together like-minded people and partners in the use technology to increase our capacity to respond. Raising funds for projects that protect wildlife and habitats through technology and create opportunities to help rebuild local communities and ecosystems.

3.4 ODZALA SOCIAL ENVIRONMENT PLATFORM

a. Green Deal Space (GDS)

Moving Outside Confort Areas – Social Environment Transformation

During the Covid-19 pandemic, SPAC Field Station Network initiated regular meetings with the Odzala communities and local authorities to evaluate the social environment context and potential improvement of preventive measures in and around Odzala. As a result, it was created the **Green Deal Space** (GDS) inspired on the African Palabra- as a free space for dialogue.

More than a physical area is a psychological and social environment open to communication, it is a symbolic space to encounter and discover the other; it offers space and time for the identification of oneself and of the other/s. Through GDS we set a process for reconciliation and the creation of harmony within the community, important to confront the extreme difficulties during the pandemic.

This civic spiritedness, and social solidarity would need to extend beyond the Covid-19 crisis as a partnership platform of commitment to the public good inside the social complexity of Odzala National Park.

On 25 May, the Sous-Prefecture of Mbomo invited the Prefect to intervene in a GD-Space Meeting. In this séance the Prefect mentioned very positive results: 1) unprecedented cohesion between partners and local authorities; and 2) highly request to preserve the **GD-Space** as a “New Normal” in the Odzala Complex.



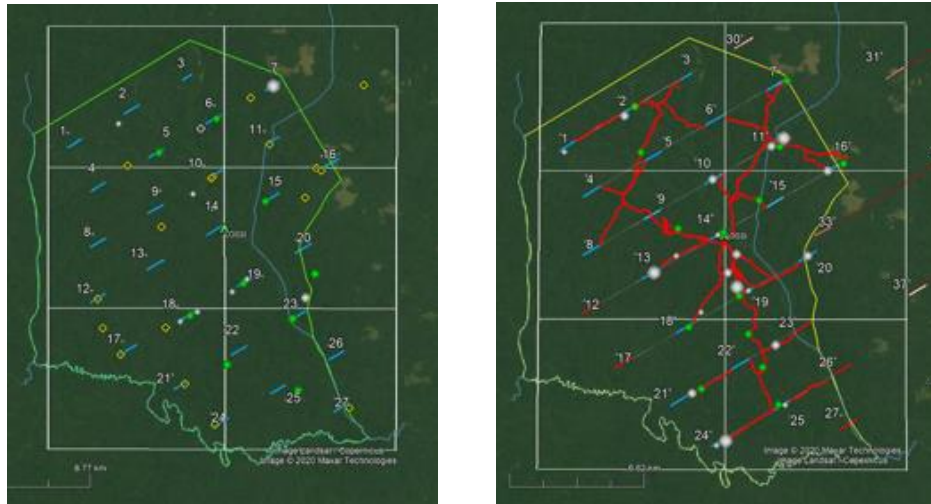
Green Deal Space

These results are linked to SPAC Networking specific project on the Interface of Ecological and Human Health we are initiating in 2021 to develop a one-health preventive model in the area.

b. Post-Ebola Gorilla Recovery Population in Lossi Reserve

In the framework of SPAC – Odzala Foundation Collaborative Platform, we studied the mechanisms and consequences of the Ebola virus epidemics (2002-2003) affecting the gorilla population of the Lossi Reserve of Fauna. We used capture/recapture surveys to estimate the demographic parameters of the population before and after the demographic crash (2004, 2007 and 2019), with an emphasis on immigration and reproduction parameters, predicting spatial-temporal population recovery with data of non-affected areas available. This study will add data to understand the spatial-temporal dynamics in the forest habitat compared to bai data.

Continuity of surveillance is crucial in determining the longer-term impact of the disease. Our results suggested a gorilla population in a recovery phase of new groups within the residual population (groups of 4-6 and 7-10 individuals); and possible integration of neighboring mature groups (migrants) of 10 to 15 individuals from the eastern outskirts of the Reserve. The non-invasive analyses of the dung samples collected will add more information to these results.



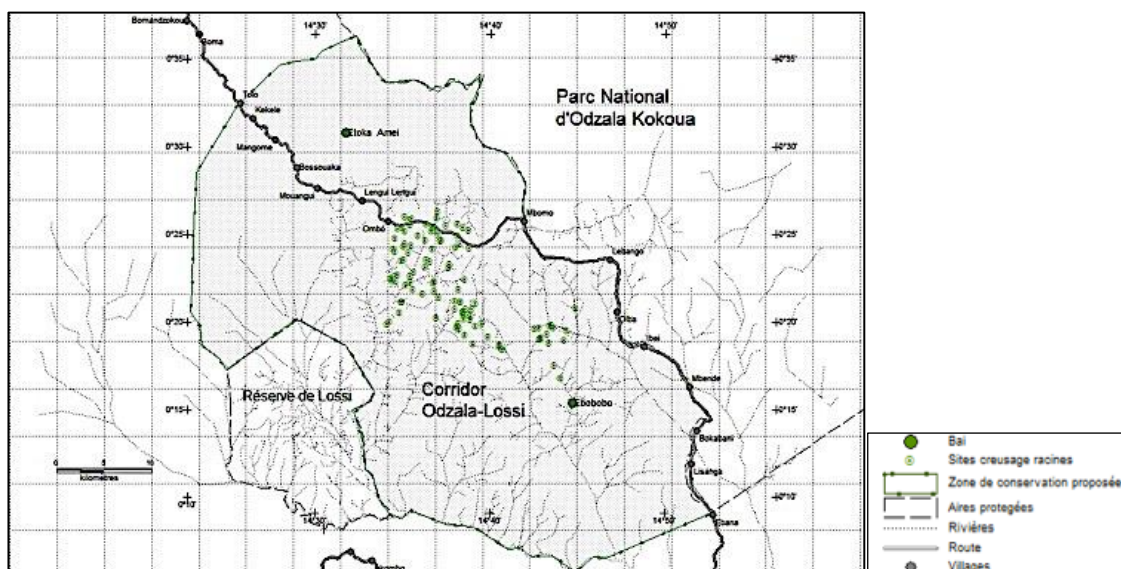
Post-Ebola epidemic census survey 2007 (left) and 2019 (right).

The gorilla nest sites and indices are represented by white circles of different size (**groups**) and green circle (**solitaries**).

c. Odzala-Lossi-Mwagna Biological Corridor

From 14-20th October, with the Bourges Djoni Djimbi, PNUP Coordinator, we delineated the Odzala-Lossi Natural Conservation Corridor. Figure 1 shows– the Conservation Corridor Area for maintaining functional connectivity between protected areas. In our specific Corridor model by integrating new actions for human prosperity and well-being according to Planetary Health priorities.

The figure below shows the Corridor delineation by including the gorilla root-mining “hotspots” and 2 “bai” where gorillas routinely feed on the roots of *Maranthes glabra* and *Panda oleosa*. This shows gorilla behavioural diversity associated with - New Cultural Behaviour in Gorillas. The Area also present specific human population conditions could be associated to Natural world Heritage Site (UNESCO).



IV. CONSERVATION & SCIENCE COMMUNICATION

4.1 OVERVIEW

This is a new position that was created in June 2020. This new portfolio has the purpose to “*promote all SPAC activities, scientific findings, as well as the value of conserving the Congo Basin and Central African rainforests, in a clear, publicly accessible and enlightening way, in order to raise international awareness regarding the global importance of these forests*”. The value-add of this position includes:

- ◆ Bridging the information gap between the salient scientific knowledge regarding the rainforests, and the (uninformed) general public.
- ◆ The continental and international positioning of SPAC and all activities per targeted countries and selected audiences.
- ◆ Qualitative research to be conducted on the impact of COVID-19 on educational methodologies and content. This to create an awareness of its impact and possible future conservation, as well as educational strategies, with the ongoing focus on the *connection between human actions and human impact on the fast-depleting natural resources*.

4.2 HIGHLIGHT

Through the first two months (July and August) the terms of reference and primary activities were elaborated in collaboration with the acting CEO and members of the board. The TORs and KPAs consisted of 5 key areas and were implemented in a phased approach due to the uncertainties around the COVID-19 pandemic. The five primary tasks include the development of the Congo Basin Chronicles (bridging the information gap around the rainforests of central Africa), conducting research on the impact of the COVID-19 pandemic on SPAC’s strategies and performance, creating a cross-cutting communications strategy to promote SPAC’s work in the countries where we work (and regionally), to gradually expand SPAC’s activities into other African countries, and to provide scientific content development advice (upon request) to the other SPAC project directors. The outcomes were structured in such a way as to allow for the groundwork and development of the projects while the world in general and South Africa in particular was under varying degrees of “lockdown” and international travel being prohibited or severely limited until 2021.

Work began in earnest in September with strong support given to the EduConservation and ECD projects in Congo by assisting in the development of activity sheets that were published in the local newspapers. In addition, remote meetings were held with Gabon’s Minister of Environment to obtain agreement for additional support from Forestry-Environment Minister to facilitate agreement with Education Minister to begin the EduConservation project in Gabon. At the same time, support was provided to the development of the Cornell University’s Elephant Listening Project (ELP) in the Central African Republic, aiding Cornell’s team in the development of workplans and budgets for the “Dzanga

Bai Elephant Long Term Protection and Demographic Monitoring Project.” Finally, preliminary work on the Covid-19 research project began with meetings with Research Specialists to discuss and determine specific methodologies.

Throughout the remaining three months of the year, specific timelines and budgets were elaborated and submitted for board approval. Additionally, work with the film company Homebrew and the distribution platform Waterbear progressed, resulting in the beginning of two different film projects where SPAC’s scientific input was central to the production. These films focus on the Congo Basin in general and Gabon’s rainforest in particular. The first film is about the effects of climate change on the forests and wildlife of the Gabonese rainforests, and the second film is about the national parks network in Gabon among other Gabonese political achievements. Pre-filming aspects of both projects including script writing and research is ongoing with the filming to be scheduled in the first quarter of 2021 (Covid-19 permitting). Additionally, final edits are being done on a third film, shot in 2019, about Odzala-Kokou National Park that highlights, among other conservation aspects, the SPAC supported scientific research taking place at the Ngaga Research Station. These three film projects, while not funded by SPAC, have received considerable input and guidance to insure accuracy and accessibility of the scientific elements in the films. In January, Gabonese input and approval for the two above mentioned films was obtained and pre-filming and logistic trip is scheduled to Gabon for the end of February.

The Congo Basin Chronicles project has been evolving over the last two months with 10 story topic ideas having been elaborated and discussed at length with the film producers. Feedback has been received from the CEO and from Homebrew (from an ease of production perspective) and is being incorporated into a penultimate version that will be discussed with Mrs. Plattner shortly.

A formal relationship has been established with a Masters student at the University Institute of Lisbon to help implement and analyze the data collection of the study on the effects of Covid-19 on SPAC’s work in northern Congo. Survey methodologies and questions have been elaborated and are being refined to take into account the three SPAC project innervations, as well as the various ethnic, economic, and language variance within each subject group. A final set of questions is being reviewed and preparations are underway for implementing the survey in March.

Meetings with SPAC project directors and the interim CEO have taken place over the last two months to shape the outcome of the communication strategy. In addition, several meetings have taken place with communication and marketing experts for them to make proposals to provide a project scope and timing to provide professional input into the production of the communication strategy. These proposals are under review and decisions are being deliberated.

As part of the gradual expansion of existing SPAC-related activities into other countries in the Congo Basin progress has been made via teleconferences with the Gabonese Minster of Forests, Environment, Oceans and Climate Change Planning. The EduConservation project has been advanced by this minster to his colleague in the Ministry of Education and meetings will take place this month, with the hope of finalizing an MOU during the next trip to Gabon scheduled to take place in two to three weeks. Finally, the Dzanga Bai Elephant Long Term Protection and Demographic Monitoring Project has been fully approved and initiated. Funding has been released and the project initiated this month.

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