



**Cavally:  
community  
resilience  
in service  
of forest  
regeneration**



**2022**



With the support of



**Nestlé**

**IMPACT  
REPORT**



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## **A challenge in the face of climate issues**

- A global context of climate crisis
- Deforestation and cacao, a major challenge
- Initiatives to safeguard forests are encouraging, but they are still cautious
- Tackle the core of the deforestation problem and reverse the trend
- The Cavally Project, a comprehensive strategy emphasizing community support

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## **The Cavally Project, a solution for a prosperous and resilient ecosystem**

- Regenerative approach to forests through community inclusion
- The foundations of a prosperous and resilient ecosystem
  - The principle, pillars and strategic levers
  - The implementation of a triennial programme
  - Means that match ambitions (stakeholders)

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## **Mid-term results & feedback**

- A sharp decline in deforestation
- Between collective forest restoration and natural regeneration
- Community involvement in conservation efforts
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## **Perspectives & scaling of the Cavally pilot project**

- Effective and collaborative management by supporting transitional routes for farmers (classified and peripheral area)
- Monitoring zero deforestation and new carbon potential

0.5

Annual  
deforestation rate (%) in 2021;  
compared to 6% in 2018

167

Number of hectares  
degraded per year in 2021;  
compared to 2,487 in 2018

## Summary of the report

For decades, the history of Ivory Coast, the world's largest cocoa producer, has been defined by intensive agriculture at the price preserving forests (16 million ha of forest in 1960 to 2.5 million now), which are a carbon reservoir. Fortunately, in recent years, there has been a collective awareness among stakeholders to reverse this trend.

In this spirit, a pilot project in the Cavally classified forest was funded by Nestlé and implemented by Earthworm Foundation. This project was able to put into practice the preservation and **regeneration of the Cavally forest reserve**, which had been damaged by more than 30%. Mid-term results augur hope for the progressive regeneration of Ivorian forest cover; especially if scaled up to the whole country.

Protecting, conserving or restoring the forest are words familiar to all actors in rural development. However, these words raise certain questions; which, when poorly addressed, never find answers. Who destroys and protects forests? What are the reasons? How do you fix this?

Since July 2020, Earthworm Foundation has established a strategy for conserving forests by assisting community development, with the help of the Nestlé Group and the Ministry of Water and Forests. This approach can be summarised in one sentence:

- **“Resilient communities can guarantee sustainable forest protection”**. To facilitate community resilience, Earthworm Foundation has focused its approach around three pillars:

- **Optimising the productivity of existing crops:** Building on existing resources to improve the income and living conditions of communities by facilitating access to quality agricultural inputs, implementing good agricultural and environmental practices, building sustainable partnership relationships, sound and transparent access to safe and cost-effective markets;

- **Income diversification:** To cope with fluctuating prices and seasonality of products, Earthworm Foundation encourages communities to diversify their sources of income. This involves coaching in agricultural entrepreneurship, animal husbandry, and food and tree cultivation;

- **Agro-forestry:** Planting trees in existing plantations as a source of additional income or as a beneficial addition to existing crops or soil.

This approach has enabled collaboration with more than a hundred producers and local communities to reforest 366 hectares in the Cavally forest in just one year. In addition, thanks to satellite monitoring of forest cover with Airbus, supported by patrols with SODEFOR, we were able to reduce deforestation from 1,474 ha in 2018 to 63 ha by the end of 2021. These results demonstrate the effectiveness of this holistic approach and future prospects for forest conservation.

## Results & objectives

This pilot project revolves around the conservation and restoration of Cavally National Park and contributes to the achievement of the United Nations Sustainable Development Goals (SDGs).

### 17 goals to save

The Sustainable Development Goals show us how to move forward to create a better, more sustainable future for everyone. They respond to global challenges we face, among these are issues with justice, peace, prosperity, involving poverty, inequality, and environmental destruction. The goals are interconnected and, to leave no one behind, it is important to reach each of them and their targets, by 2030.

SDGs concerned



### A sharp decline in deforestation

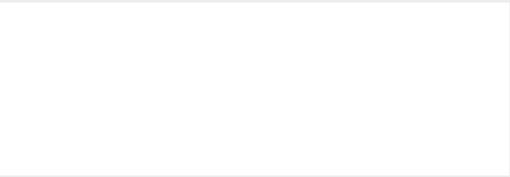
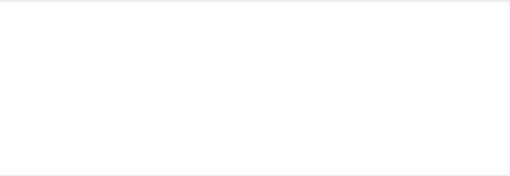
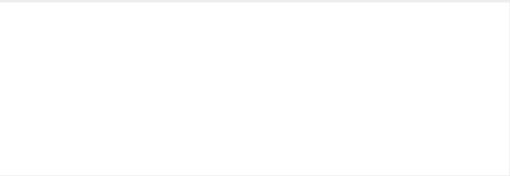
	Situation in 2018	Results in 2021	Objectives in 2023
Annual deforestation rate (%)	6	0.5	0.0
Hectares degraded yearly	2 487	167	20
Preserved forest area (ha)	-	36 437	38 968
Number of Sodefor partnerships - intra-zone communities	-	82	95
Number of mixed patrols	-	8	36

### Forest restoration and regeneration

People engaged in reforestation	-	200	400
People engaged in seedbeds	-	300	180
Hectares of naturally regenerated forests	-	777	7 143
Hectares of reforested forests	-	366	1 500
Trees planted annually	-	75 000	312 000

### Community involvement

Area mapped for transition (ha)	-	138	1 200
Identified sectors for regenerative activities (no.)	-	4	6
Farmers engaging in a transition	-	313	500



# 1

## **A challenge in the face of climate issues**

- A global context of the climate crisis
- Deforestation and cocoa, a major challenge
- Forest protection initiatives that are encouraging but conservative
- Tackling the core of the deforestation problem and reversing the trend
- The Cavally Project, a holistic programme emphasising community support



### **A global context of the climate crisis**

A declaration on forests and land use was endorsed by about 100 heads of state and government at the most recent COP26 in Glasgow. Signatory countries are committed to halting and reversing deforestation and land degradation by 2030.

Forests are at the forefront of international concerns, because they help combat climate change by sequestering carbon, reduce extreme weather events, filter water, and protect against floods. Forests are also home to remarkable biodiversity, which accounts for 75% of living species. It is also – and perhaps most importantly – home to village communities and provides income to more than 1.6 billion people.

Agricultural production and livestock are the leading cause of deforestation worldwide and one third of the production from these sectors is destined for export. European Union (EU) consumption accounts for nearly 10% of global deforestation and the EU's cumulative share of imports linked to deforestation over the period of 1990-2008 would amount to 36% of total global trade-related deforestation. This impact is particularly strong in humid tropical regions where most commodities likely to be exported to the EU are grown.

*©Atharva Tuli*

*\*Source Ministry of Ecological Transition*

## Deforestation and cacao, a significant challenge

Driven by global demand, the increase in areas for cocoa production has been sustained since 1970 - from 4 million to more than 10 million hectares (Source: Iddri). At least half of this expansion has been at the expense of natural forests (Kroeger et al., 2017). In Ivory Coast, between 1960 and 2015, the forest increased from 16 million ha to 3.5 million ha, a loss of 12.5 million ha in 55 years (BNETD, 2016).

A study by Mighty Earth with MapHubs to map cacao-related deforestation in Ivory Coast highlights this evolution.

Several layers of maps have been used to interpret the extent and causes of deforestation in the country. For an overview, the working team used three data sets on forest loss in Ivory Coast during the years 1990, 2000 and 2015. Information was provided by the National Office of Technical Studies (BNETD).

Data on tree loss from the University of Maryland's GLAD (Global Land Analysis and Discovery) laboratory was also utilised to calculate the amount of deforestation brought on by cocoa farming.

After analysing the various data, it appears that forests cover only between 3.6% and 3.7% of Ivory Coast.

*\*Source: Mediaterrre Ivory Coast: Maps to explain deforestation related to cocoa  
Source: Mighty Earth, Chocolate's Dark Secret*

## Forest protection initiatives that are encouraging but conservative

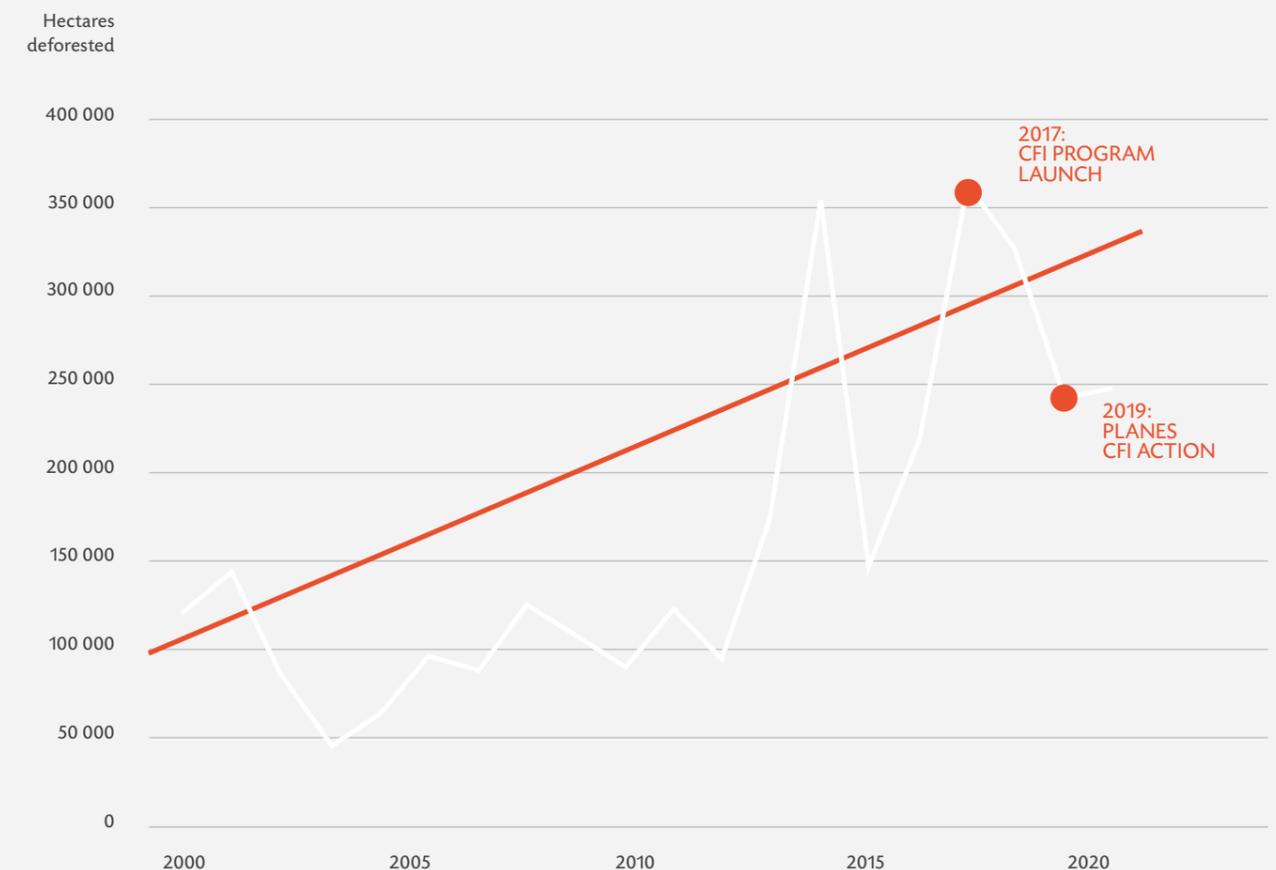
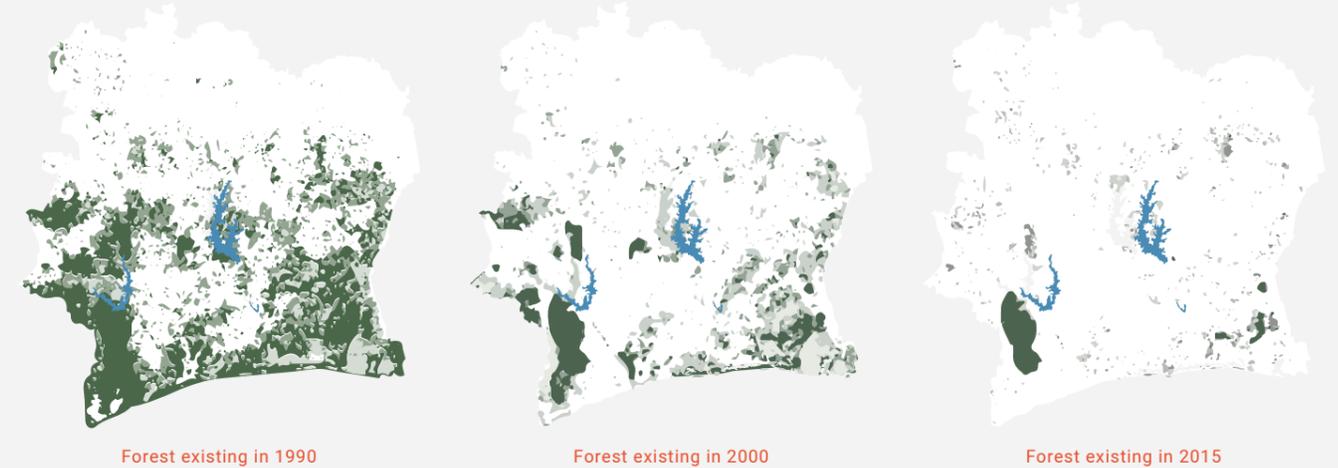
Deforestation is a major problem in Ivory Coast, which lost 25% of its primary forest area between 2002 and 2019, with a significant part attributable to cacao cultivation.

In 2017, a first major programme, the Cocoa & Forests Initiative, was undertaken under the auspices of the World Cocoa Foundation. It is the first global partnership bringing together governments of the largest cacao producing countries and the private sector in a common framework for action on sustainable cacao. This logic underpins a global commitment to preserve forest resources, protect the rich but fragile biodiversity of highly threatened classified forests, and engage communities in a resilient joint project.

The results of these numerous initiatives (ICI\*, CFI\*, Cocoa Plan\*, ISCOS\*) have not sufficiently incorporated important challenges in deforestation. As pointed out by the NGO Mighty Earth and its report Sweet Nothing, Ivory Coast lost almost 20,000 hectares of forest between 2019 and 2020 mainly to cocoa cultivation.

*\*ICI: International Cocoa Initiative, the CFI - for Cocoa Forest Initiative - brings together public & private actors as well as NGOs on the issue of deforestation driven by the cocoa industry  
ISCOS: Initiatives for Sustainable Cocoa*

## Historical forest cover in Ivory Coast 1990 - 2015



CFI: COCOA FOREST INITIATIVE

*Source: Tree cover loss (HANSEN/UMD/GOOGLE/USGC/NASA).  
The historical loss of forest cover was calculated using an older methodology.*

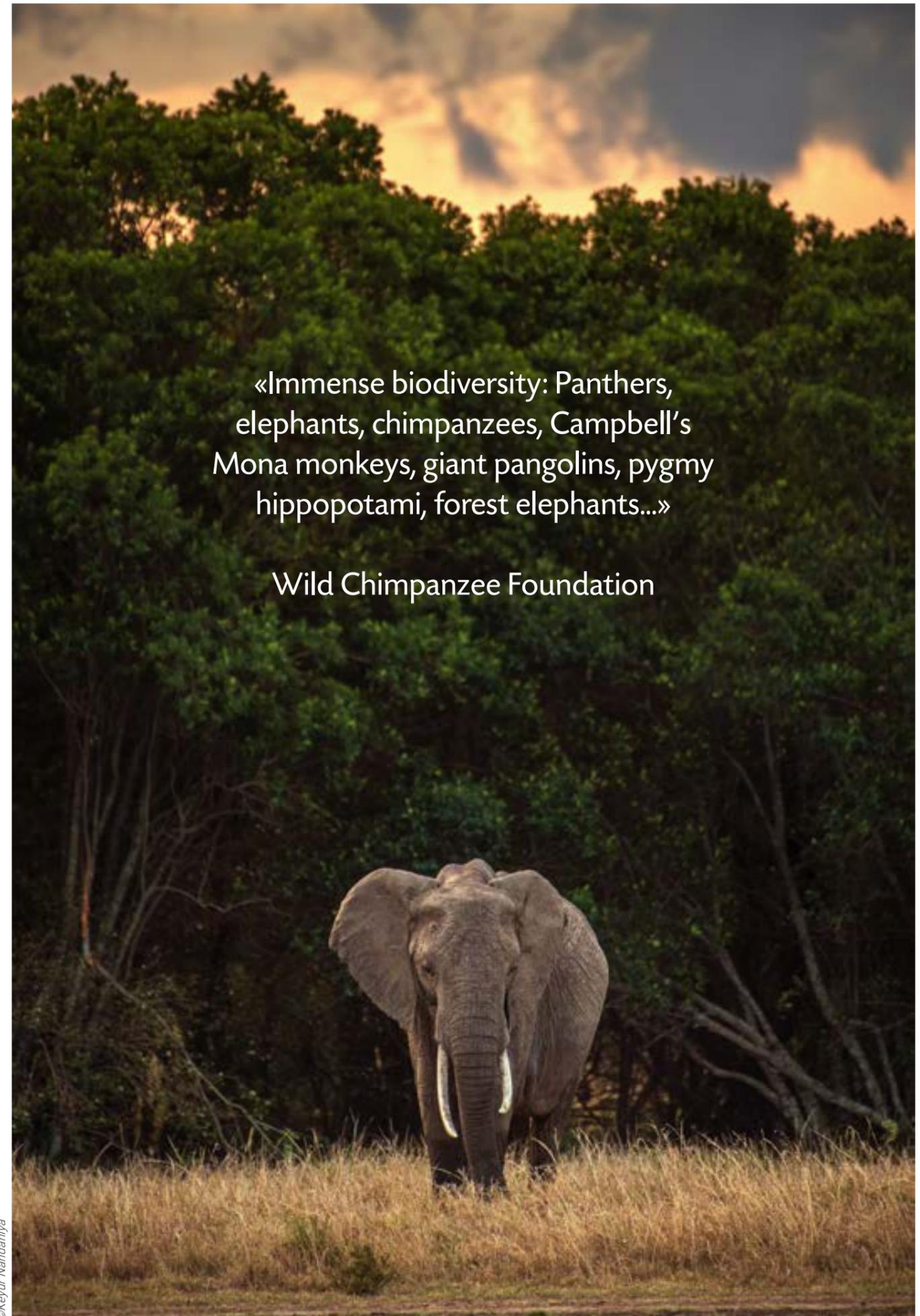
### **Tackling the core of the deforestation problem and reversing the trend**

As one of the last shelters to biodiversity, classified forests in Ivory Coast are also among the country's last carbon reserves. Like a smoker whose lungs are gradually contaminated with tar, primary forest areas are regularly eroded by agriculture, especially cacao cultivation.

A study conducted by Ohio State University, in collaboration with Ivorian researchers, examined 23 protected areas in Ivory Coast, and concluded that seven of them had been almost entirely converted to cacao crops. The study estimated that in 7 of these protected areas, 93% of deforestation was due to cacao. (Source: Mighty Earth, Chocolate's Dark Secret)

This phenomenon is particularly difficult to detect especially when plantations are set up under the canopy. But this technique is consistent in protected areas, as some set up open-air plantations.

The NGO World Chimpanzee Foundation points to the fragility of ecosystems hosting biodiversity that is in great danger - forest elephants, pygmy hippopotami, and large primates whose habitats grow restricted year after year.



«Immense biodiversity: Panthers, elephants, chimpanzees, Campbell's Mona monkeys, giant pangolins, pygmy hippopotami, forest elephants...»

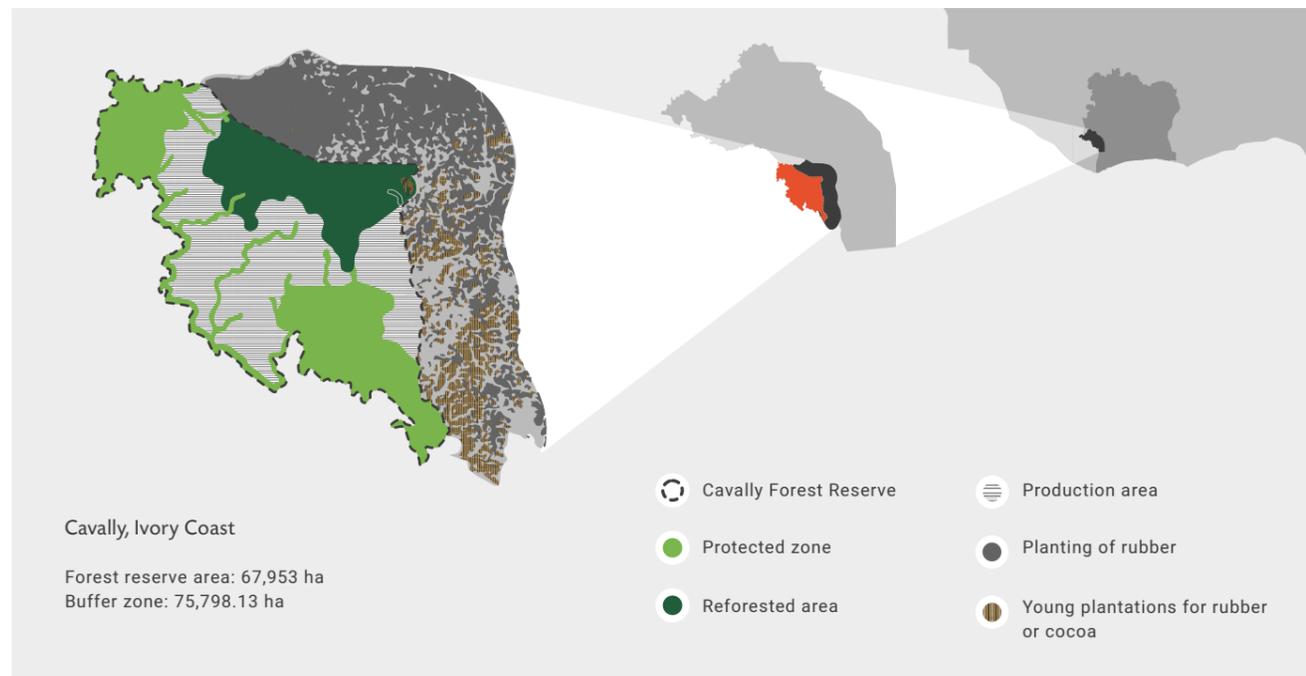
Wild Chimpanzee Foundation

@Keyur Nandaniya



## A holistic project emphasising community support

In 2017, Earthworm Foundation (EF), SODEFOR and Airbus collaborated on the development of a satellite-based reference map to identify forest areas for conservation. In 2019, the project took full flight with the involvement of the Ministry of Water and Forests (MINEF) and the Nestlé Group, thus launching a clear vision for the Cavally territory for 3 years and an investment amount of more than **€2.4 million**.



«The fact that the communities have reforested 366 ha of forest and set up nurseries for reforestation convinces us of the uptake of conservation by local communities. We remain convinced that it is by trusting and involving communities that it is possible to succeed in the challenge of forest conservation and restoration. Awareness is necessary to go through with this. Do not do the work for them, but with them by coaching them.»

*Gerome Tokpa, Regional Head, Earthworm Foundation, West Africa*



## Nestlé

«To achieve our climate commitments and contribute to the regeneration of agricultural systems, we need to go beyond managing the risks of deforestation in our supply chain and invest in the regions where we supply from.

This requires an approach to forest conservation and restoration in countries such as Ivory Coast. Our work in the Cavally Forest aims to help stop deforestation and restore this forest, in particular by empowering local communities to become environmental protectors and helping them improve their living conditions.»

*Darrell High, Nestlé Cocoa Plan Manager*





## A mobilised Ivory Coast for the protection of its forests and biodiversity

And yet, like our smoker, the phenomenon can be reversed!

To do this, we must understand the reasons for such degradation: "People go into the forest to grow cacao because the land is more fertile, and they have no other choice. There have been many projects on the forest, but here we do not have many alternatives. "Are trees more important than men?"» These are the words of a planter interviewed by Earthworm Foundation.

"If you ask people who work illegally in the forest to leave, what are you going to do for them?" says Dabo, a planter. "If you give them money or create a project for them, then you produce frustration with those who have never worked in the classified forest. But if you approach them through a consensus, listening to the communities, and developing a project together, it can work.»

From these findings, there will be several structural axes:

- **Keep** forest areas intact
- **Rehabilitate** severely degraded areas
- **Ensure** a transition respectful of the human rights of cacao farmers whose plantations are in the Cavally Forest
- **Develop** the resilience of producers living in peripheral areas, to dissuade them from destroying classified forests.

## Forest Plan

Adopted by the Council of Ministers on Wednesday, May 23, 2018, the policy of preserving, rehabilitating and extending forests has included the thorny issue of the future of forests in Ivory Coast, among other priorities in the state. This policy differs from previous initiatives, because it highlights the efforts that will have to be made by all actors (state, private sector, civil society, and technical and financial partners) for the preservation, rehabilitation and extension of forests.

**The Forest Conservation, Rehabilitation and Extension Strategy (SPREF)**, is structured around the following axes:

- **improving** forest governance;
- **strengthening** the protection of residual forest areas, their extension and their sustainable management;
- **recovery** of degraded forest areas;
- **adaptation** to climate change.



Press Release  
National Preservation Strategy

«The State of Ivory Coast has opted for a forestry policy whose implementation strategy aims to increase forest cover to at least 20% of the national territory by 2030, an increase of three million ha of forests, which would increase it from 2.97 million ha in 2020 to about 6 million ha of forests in 2030. May the model of protection and conservation of the Cavally classified forest, as developed by the Ivorian Ministry of Water and Forests, Nestlé, the Forest Development Agency (SODEFOR) and Earthworm Foundation, inspire our actions as well as those of all lovers of nature.»



Laurent Tchagba,  
Minister of Water and  
Forests of Ivory Coast

«We are convinced that the best way to protect Cavally's classified forests is to resolutely involve communities to take ownership and show that conservation could be a source of additional income.»

Alain Richard Donwahi,  
President of COP15



# 2

## **The Cavally project, a solution for a prosperous and resilient ecosystem**

- A regenerative approach to forests through community inclusion
- The Cavally project, a path to a prosperous and resilient ecosystem
  - The principle, pillars and strategic levers
  - The implementation of a triennial program
  - Means that match ambitions (stakeholders)

«It is by combining people, skills and tools that we will collectively achieve environmental and socio-economic goals. The vision at Earthworm Foundation is to promote an ecology of solutions, as opposed to punitive ecology, which provides few solutions. It is about ensuring that farmers are the engines and beneficiaries of ecosystem protection, and are not the collateral victims of this environmental demand. In this, it is essential that companies listen and co-create solutions with them, as well as with public authorities. Ivory Coast has an opportunity to be the driving force on the subject.»

Bastien Sachet,  
CEO of Earthworm Foundation.



### **Earthworm: a regenerative approach to forests that requires community inclusion.**

Small farmers often work in precarious conditions, regularly lack adequate training and are forced into low yields that affect their livelihoods. This situation, combined with globalisation, disease and pest epidemics, and climate change, further weakens the future of these farms.

How can we succeed in reconciling economic needs based on agriculture with the environmental needs on which agricultural activities depend? The approach employed by Earthworm Foundation is to work toward the conservation of existing forests. These are generally identified by the integrated HCV/HCS approach\*. Their protection is done using a high resolution (1.5 m) satellite monitoring technology called STARLING that can detect deforestation. Protection and rehabilitation activities are conducted while involving rural communities and other stakeholders, including forest administrators.

*\* The HCS (High Carbon Stock) approach is a rigorous methodology proposed to companies that commit to zero deforestation policies. The HCS approach includes HCV (High Conservation Value) standards, which relate to biodiversity criteria or the respect of local populations (including the observance of free, prior and informed consent before any industrial project).*

## The Cavally project, a path to a prosperous and resilient ecosystem

### *The principle, pillars and strategic levers*

#### **Forests, biodiversity and carbon sinks.**

The protection and restoration of the Cavally classified forest has multiple objectives:

- End cacao-related deforestation and regenerate degraded areas
- Regenerate the significant potential for carbon storage (direct consequence)
- Promoting the security of protected species' habitats (indirect consequence)

#### **Support for local communities.**

Planters and village groups in peripheral areas are involved in the restoration project and are supplemented by regenerative farming models and alternative economic solutions, thus encouraging a transition to initiatives outside the classified forest such as agroforestry and diversification of income sources.

#### **A durable and replicable model.**

By guaranteeing, on the one hand, the economic autonomy of local communities outside the forest through sustainable agriculture based on diversification (cacao and other products) and by involving these communities in the safeguarding of the forest, the Cavally project becomes sustainable and replicable on other forest areas. Thus, forest protection and restoration, empowerment of local communities outside the classified area, preservation of threatened species, and recovery of the carbon stock/sink meets the objectives of the SDGs set by the UN.



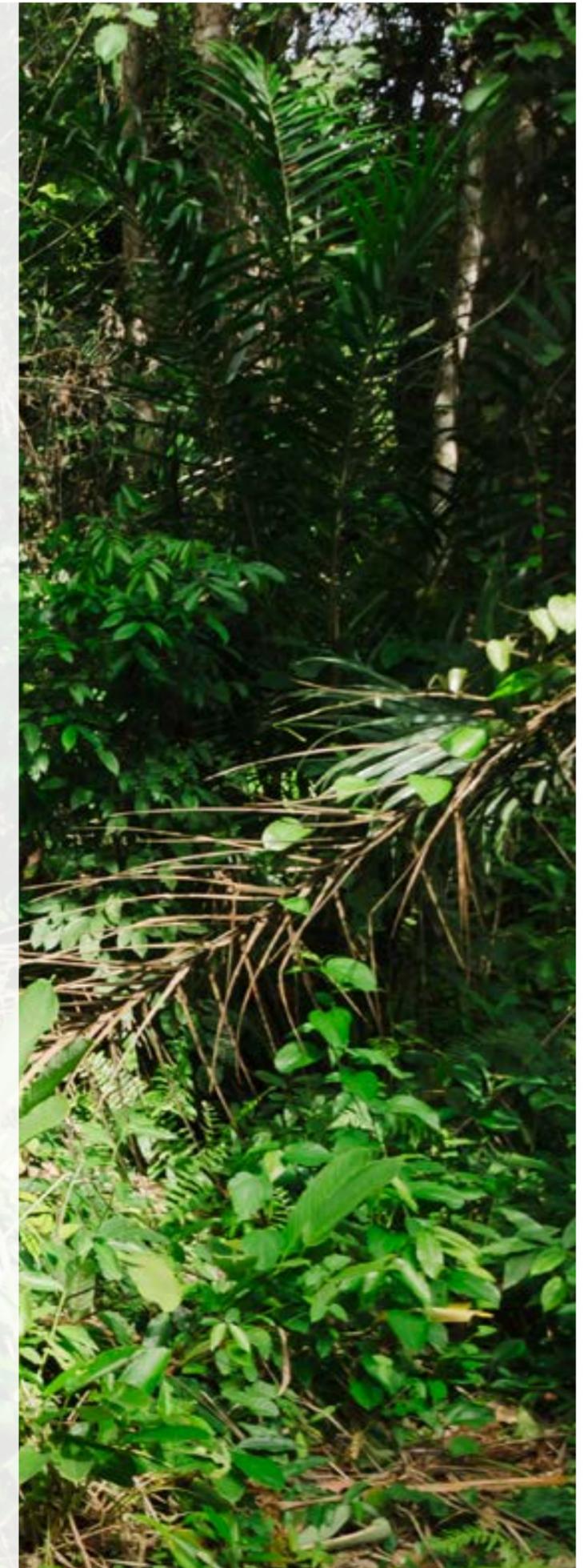
Stopping deforestation  
Replanting degraded areas  
Protection of protected wildlife habitats



Support for planters  
Regenerative Agriculture  
Resilient Communities



Sustainable agricultural production including the cultivation of cacao





### The implementation of a three-year program

The fundamentals of the Cavally programme revolve around a holistic diagnosis of the entire economic zone, understanding ecosystem dynamics and stakeholder interactions. The keys to success are based on the commitment of the communities and their involvement in the joint project.

Once the needs and means have been defined, solutions should be co-built with communities over time. In the case of the Cavally project, this has been made possible by the implementation of sustainable solutions for forest protection and regeneration, alternative solutions to cacao cultivation in classified areas, and agroforestry solutions in buffer zones.

The following phases include the implementation of the action plan, monitoring and evaluation of its impacts and possible corrective actions.

The final phase is to evaluate the project and gradually transfer governance to local communities and stakeholders.



**HOLISTIC DIAGNOSIS**  
Provide a comprehensive understanding of territory dynamics and key stakeholder mapping

**COMMITMENT & SECURING PARTNERSHIPS**  
Engage key stakeholders to understand the dynamics of the territory and establish partnership agreements to drive transformation activities on the ground

**CO-CREATE SOLUTIONS & BUILD TRUST**  
Foster community dialog to find alternatives and co-create solutions. Develop forest protection and restoration projects

**IMPLEMENTATION OF ACTIONS BY EF & STAKEHOLDERS**  
The implementation of activities on the ground is done with partners in accordance with agreements

**CONTROL & EVALUATION**  
Project activities and impact are continuously monitored and evaluated using technology such as Starling and community tools

**TRANSMISSION & REPORT**  
The project's benefits are shared to extend the impact beyond the territory, while the governance of the project is gradually transferred to local actors

## Resources that match ambitions

The Cavally project is a partnership between the Ministry of Water and Forests (MINEF) and Nestlé, which was entrusted to SODEFOR and Earthworm Foundation, who relied on technical stakeholders such as Airbus/Starling.

### Governance of the Cavally

The project will rely on a multi-stakeholder platform (launched February 20, 2020) to interact with key players

#### CAVALLY REGION

Regional Authority  
Civil Society  
Agricultural cooperatives, industrial associations (rubber, wood, cacao)  
International organisations (IDH, WCF, CFI) MINEF

#### STAKEHOLDERS FROM THE CAVALLY REGION

Local communities  
Local chiefs, landowners, farmers (intra/extra forest area)  
Cacao sector  
(Cooperatives, traders, industrial actors like Nestlé)  
Civil Society (NOFNA)

#### PROJECT IMPLEMENTATION

Earthworm Foundation, SODEFOR, and other partners  
CSRS, ANADER, ICRAD, etc.

#### PROJECT AUDIT COMMITTEE:

Starling, civil society, ...

A local operational steering committee is set up to oversee the project activities and management. It is composed of EF, Nestlé, IC, and SODEFOR.





In March 2019, we published our Cocoa and Forestry Initiative Action Plan. It outlined the main activities to be undertaken to fulfill our commitment to ending deforestation and forest degradation in the cocoa sector. All activities will be implemented in Ivory Coast and Ghana by 2022.

The Cavally Forest Reserve in Ivory Coast forms an important natural corridor to the neighbouring forest areas of Liberia. Its 67,593-hectare estate is full of life, and is home to several endangered species. However, this hot spot of biodiversity is becoming increasingly fragile as cocoa farmers are moving westward into the reserve in search of more fertile land. Left unchecked, densely covered areas of the forest will continue to be cleared illegally for new crops.

The encroachment of small-scale agriculture over the past sixty years, linked to the increasing demand for cocoa, has had devastating effects on Ivory Coast's forest cover. Between 1960 and 2015, the forest area of Ivory Coast was divided by five (it increased from

1.6 million hectares to 3.5 million hectares). The Ivorian government recently adopted a national policy for preserving and protecting its 234 classified forests. Nestlé has partnered with the Ministry of Water and Forestry to end deforestation in the Cavally Forest Reserve and engage in a community-based approach to protect this valuable ecosystem.

Nestlé has invested CHF 2.5 million to fund a three-year project implemented by Ivory Coast, the Ivorian Forestry Agency (SODEFOR) and Earthworm Foundation. In collaboration with other stakeholders, the initiative aims to end illegal cocoa farming, restore degraded forest areas and increase the resilience of communities and cocoa producers around the reserve.



It will also play an active role in monitoring the forest carbon stock to assess the impact of activities aimed at reducing greenhouse gas emissions.

The action plan will include replanting 500 hectares of trees and 11 kilometres of forested perimeters by members of neighbouring communities. Community members will also participate in regular patrols in selected areas on the ground and will be trained to replant seedlings from existing community nurseries. Satellite mapping of these areas will be undertaken by technology partner Starling, who will monitor the regeneration of the landscape.

## Earthworm

Formerly known as «TFT», Earthworm Foundation is an international non-profit organization driven by the desire to positively impact the relationship between humans and nature. Our wish is that future generations do not simply survive, but thrive.

Present on five continents, we are a team of just under 250 people in 17 countries around the world. 80% of Earthworm Foundation staff work in countries where raw materials originate.

We work where value chains have the most impact on man and nature. In doing so, the objective is to minimise harmful social and environmental impacts as much as possible and build the resilience of small producers.

Earthworm works on harnessing supply chains. Regeneration of supply chains involves restoring soils and forests. We work alongside companies, at the base of their supply chains - with farmers, local communities, governments and partners - to create regenerative agricultural practices, economic prosperity, and protect and conserve forests, to create reproducible cases for change in supply regions.



«With the beginnings of the pilot phase, we hope that the results of this new phase will allow us to successfully extend follow up actions to other forests of Ivory Coast.»

*Colonel Mamadou Sangaré, Director General of SODEFOR*



## MINEF

### The need to revive Ivorian forest cover

From 16 million hectares at the beginning of the last century, Ivorian forests shrunk to 7,850,864 hectares in 1990 and to 3,401,146 hectares in 2015. Today, there are barely two million hectares of natural forest. This is largely attributable to anthropogenic activities, including extensive agriculture based on slash-and-burn shifting cultivation, over-exploitation of lumber and wood for energy, rampant urbanisation and bush fires often practiced for hunting.

In addition, the political and military crisis that the country has experienced for a decade has fostered the plundering of natural resources and massive infiltration of protected areas (classified forests and other parks and reserves) by populations coming mainly from sister nations in the sub-region.



### Cover 20 percent of the national territory, or about 6 480 000 hectares in the coming decade

A national effort is needed from all actors in the forestry sector, public and private partners, and decentralised structures and populations to rehabilitate the forest. On the other hand, the government, having taken stock of the disappearance of Ivorian forests, is developing a new plan of action to include the nation in the global effort to protect the environment and combat climate change.

“The aim will be to reverse the degradation trends in Ivorian forests to cover 20% of the national territory, or about 6,480,000 hectares, in the coming decade. To achieve this, agroforestry will have to be practiced on a larger scale and an effective and rigorous institutional framework will have to be put in place.”

*Alain-Richard DONWAHI, President of COP15, former Minister of Water and Forests of Ivory Coast.*

## WILD CHIMPANZEE FOUNDATION

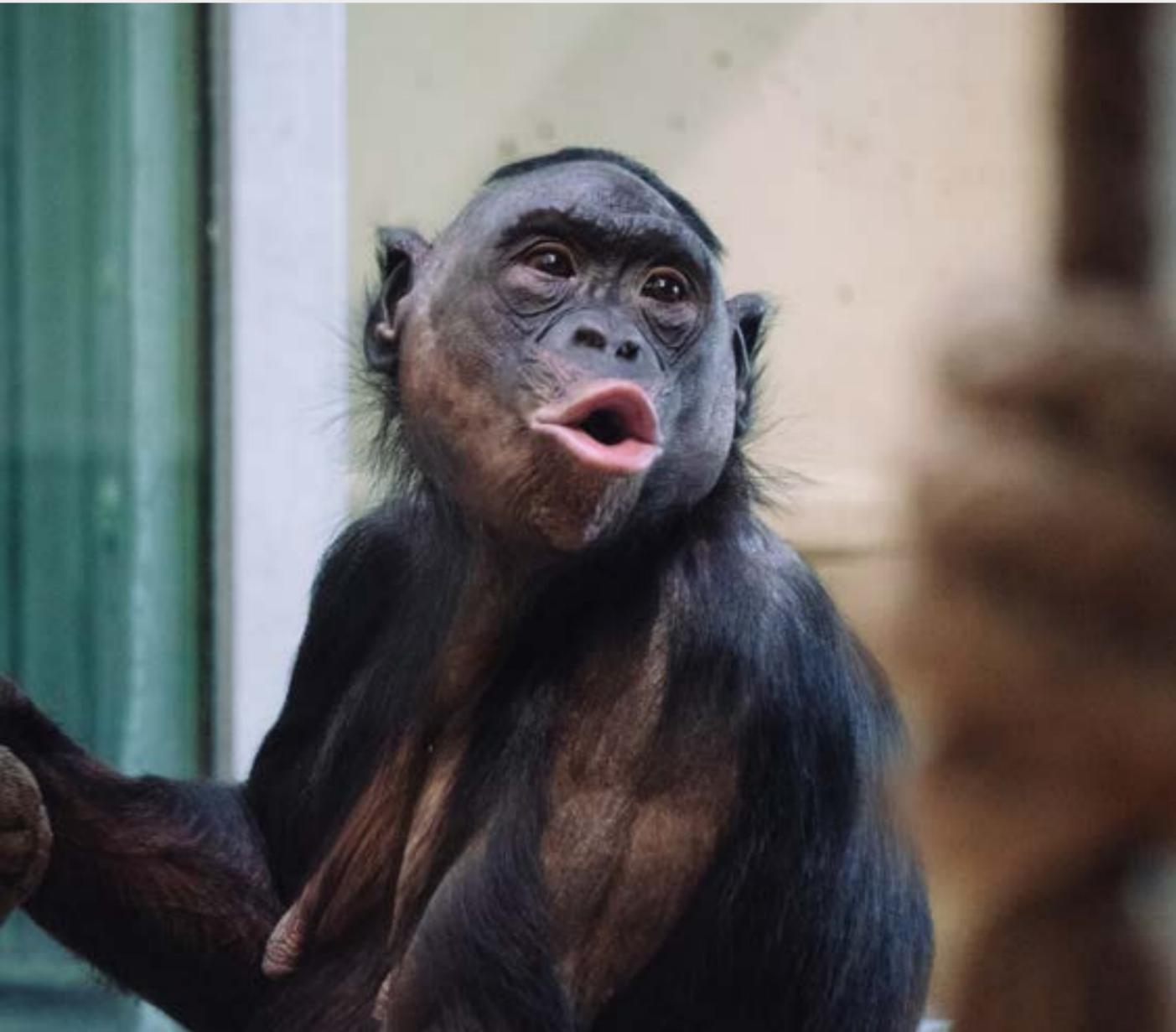


The Wild Chimpanzee Foundation (WCF) is an international NGO active in Ivory Coast, Guinea and Liberia to preserve chimpanzees and their habitat. Since 2000, our NGO has been working in Ivory Coast to conserve biodiversity within the Taï National Park and in some classified forests including the classified forest of Cavally.

Taï National Park is the largest protected area of rain forest in West Africa and is a UNESCO World Heritage Site. Among others, it is home to an impressive 12 primate species including chimpanzees, forest elephants, pygmy hippos, leopards and several duiker (antelope) species.

For more than 20 years, the Wild Chimpanzee Foundation has been working to improve forest management and sustainable development in the Taï area. This is possible thanks to funding obtained from donors that support the Wild Chimpanzee Foundation in its approach to protecting nature. This funding differs from one another and requires monitoring both in terms of technical development (on the ground), and administrative and financial development (in the Abidjan office).

@Chris Curry



@Airbus DS



## AIRBUS STARLING

### Airbus – Starling

Airbus Defense & Space (AIRBUS DS), Earthworm Foundation and SODEFOR have been engaged in deforestation monitoring work on the Cavally classified forest with satellite monitoring technology "Starling".

Used as part of a pilot project carried out from December 2017 to July 2018 in Cavally classified forest, Starling combines high-resolution satellite images (optical and radar) to allow unbiased monitoring of changes in forest cover. The tool made it possible to detect forest cover disturbances with an accuracy of 95% and to establish an up-to-date reference map of the Cavally classified forest.

Satisfied with the results obtained from the pilot project, the government agency in charge of Ivorian forests (SODEFOR) decided, by signing an agreement with Earthworm Foundation, to continue using Starling for monitoring the Cavally classified forest until the end of December 2019.

The Director General of SODEFOR, Colonel Mamadou Sangaré, places great hope in this satellite surveillance action.

«With the beginning of the pilot phase, we hope that the results of this new phase will allow us to successfully extend monitoring actions to other forests of Côte d'Ivoire.»



## ONG NOFNA

The NGO Our Forest Our Future (NOFNA) is an Ivorian non-governmental organisation. It is a conservation organisation whose head office is located in Zagne in the Cavally region in the west of Côte d'Ivoire. Thanks to its knowledge of the region and its relationships, NOFNA supports Earthworm Foundation teams in awareness-raising activities in the riverside communities at Cavally.

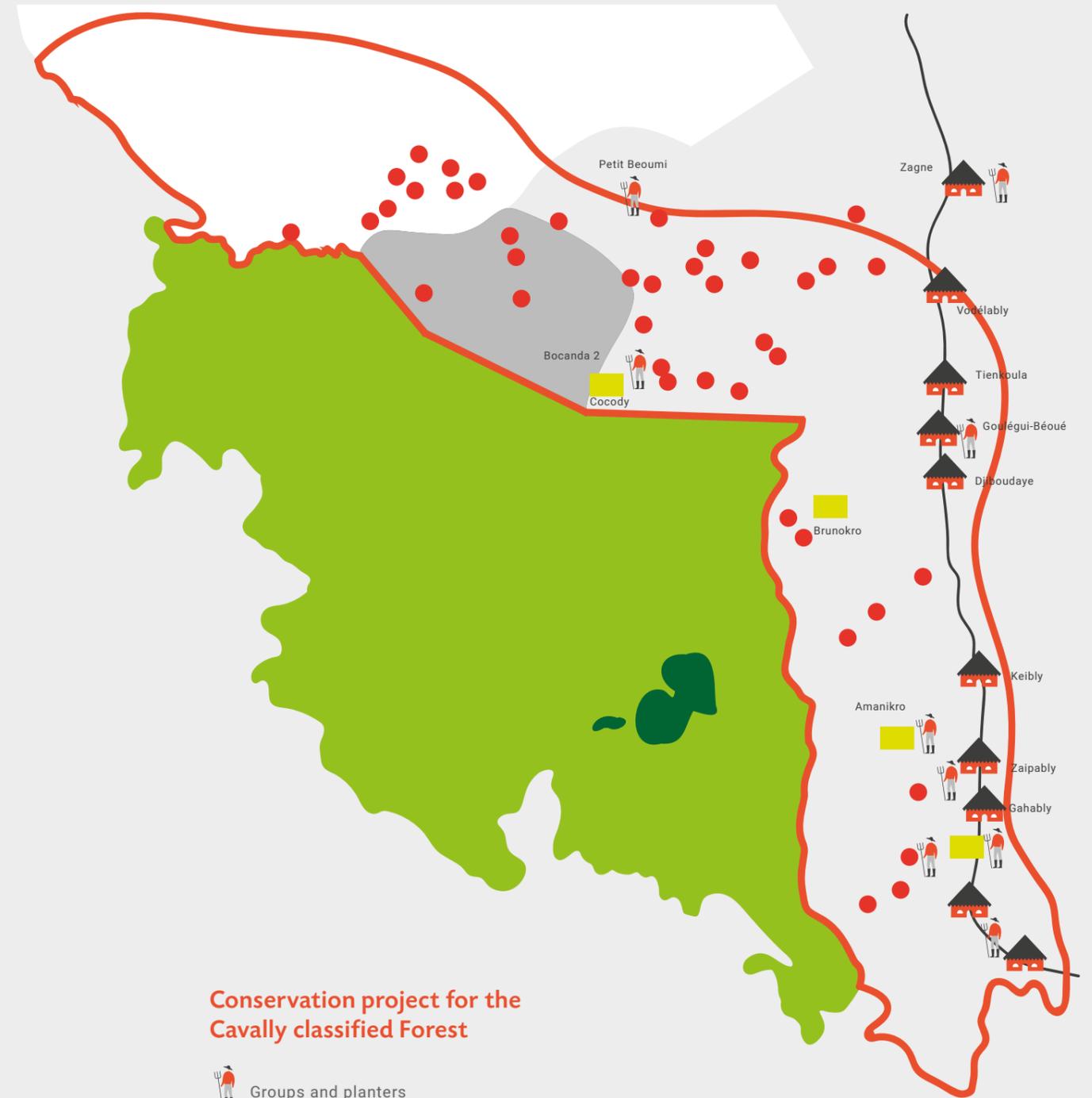
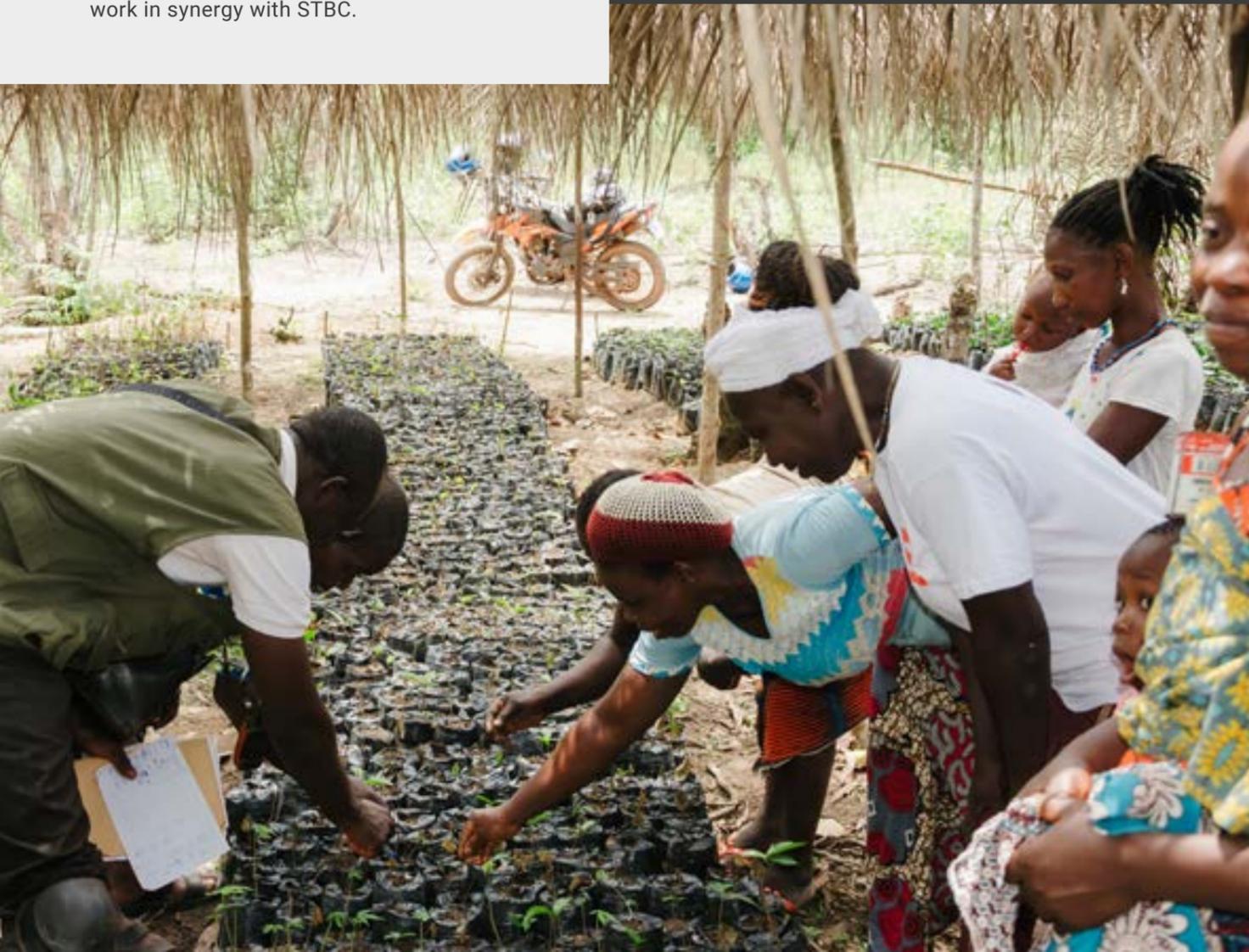
The Wood Processing Company of Cavally abbreviated "STBC" is a logging company. Having a partnership agreement with the Forest Development Corporation (SODEFOR), STBC participates in managing the classified forest of Cavally. As part of the Nestlé-funded Cavally project, SODEFOR and Earthworm Foundation work in synergy with STBC.

## SODEFOR

Created in 1966, SODEFOR is a government body attached to the Ministry of Water and Forests. Its mission is to restore vegetation cover. Its four main objectives are protection, management, reforestation and forest reclamation.

As part of the Nestlé Cavally project, SODEFOR is engaged with Earthworm Foundation to

- provide a detailed methodology for plant production and reforestation activities;
- supervise the proper execution of plant production and reforestation work and prepare related reports;
- conduct patrols and produce reports on patrols as well.



### Conservation project for the Cavally classified Forest

- Groups and planters
- Plantations
- Villages
- Camps
- Unpaved Routes
- Plots reforested and maintained in 2021 Industrial
- CHC Plantation
- Cavally Forest
- Buffer zone of 10km
- Goin Debe FC Limits

# 3

## Mid-term results & feedback

- A sharp decline in deforestation
- Between collective forest restorations and natural regeneration
- The involvement of communities in conservation efforts
- Effective and collaborative management by supporting transition paths for farmers (classified and peripheral areas)

# Objective 1

## A sharp decline in deforestation, securing of carbon potential

Thanks to precise satellite surveillance conducted by Airbus-Starling on the reference map established in 2018, and the joint action of surveillance patrols on the ground, **deforestation alerts have decreased**. The rate of deforestation thus remained below 0.5% of the total protected area in 2021.

We have three types of patrols, whose number of people can vary from 20 to 125 people. However, the surveillance is carried out by an average of 50 people and constitutes: simple patrols (SODEFOR, Ecogarde, EF), and mixed patrols. The «patrol» approach seems to be efficient. Surveillance is carried out by 50 people fully engaged in forest protection (SODEFOR, Ecogarde, EF), mixed patrols (SODEFOR and local communities) or large-scale patrols in collaboration with World Chimpanzee Foundation (WCF), STBC, PIF, CNS.

Damage alerts are geo-locatable thanks to Airbus-Starling technology and satellite photographs allowing efficiency of field travel over such a vast space:

*«Systematically and proactively monitoring deforestation alerts and using this data to guide patrols can allow action on reducing deforestation.»*

Improving relations between local communities and forest protection authorities will ensure that everyone is working toward the common goal of reducing deforestation and will establish a sustainable model. We welcome the effectiveness of joint patrols (SODEFOR, local community) and the establishment of new patrols that will cover more areas and increase efficiency.

The initial minimum target in deforestation reduction is being met. It is now necessary to consolidate the achievements, and this is made possible thanks to fieldwork by Earthworm Foundation and SODEFOR teams with local communities, through extension, training and transition programmes.

**Keeping deforestation at a low rate has the direct consequence of preserving biodiversity and conserving habitats of endangered species.**

**36 437**  
Forest area preserved (ha)

**0.5**  
Deforestation rate 2021 (%)

Contribution of the Cavally project to the SDGs



	Annual deforestation rate (%)	Number of hectares degraded per year	Preserved forest area (ha)	Number of Sodefor partnerships / intra-zone communities (%)	Mixed patrols
Situation in 2018	6	2 487	—	—	—
Results in 2021	0.5	167	36 437	82	8
Objectives for 2023	0.0	20	38 968	95	36

Satellite imagery is crucial for the continuous monitoring of the evolution of forest cover and, more generally, of land use. Airbus DS and Earthworm Foundation have jointly developed the Starling solution for this purpose, with the objective of linking the best of space technology with “boots on the ground” activities, which are essential to actions capable of having an impact that reconciles environmental conservation and social development. Today, **nearly 5 million km<sup>2</sup> of tropical areas are mapped**, in which deforestation is observed.

As part of the Cavally Forest project carried out on behalf of SODEFOR, specific reference maps (‘basemaps’) and deforestation monitoring (‘monitoring’) products have been produced to meet very specific needs, such as early identification of degradation under the canopy; displaying the unique ability of this service compared to existing solutions.

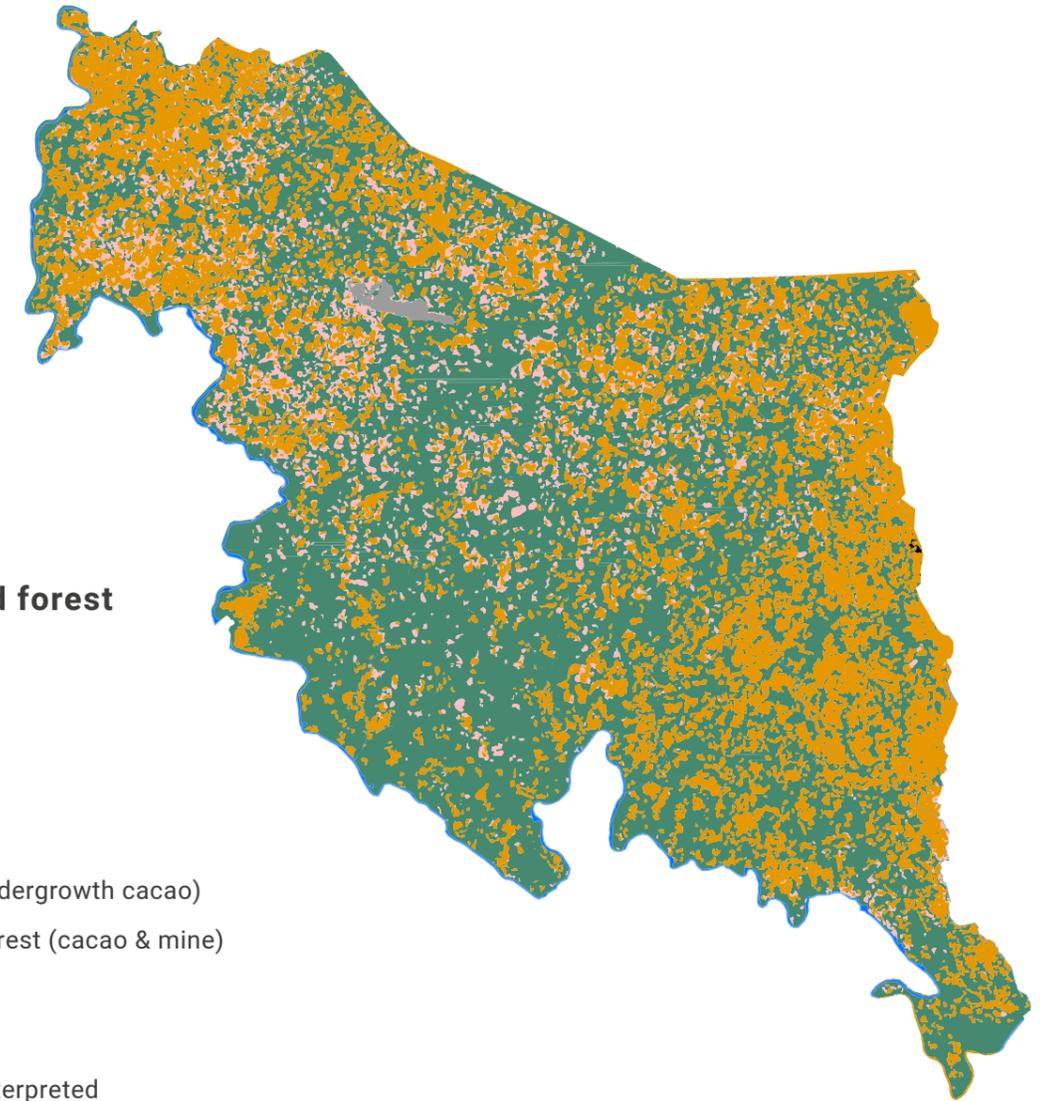
«With the Starling service and the robust data processing methodology implemented, this Cavally Forest map shows a level of accuracy of 94.8%. We were able to achieve this precision by relying on a judicious mix of data (Sentinel, SPOT and TerraSarX) and innovative approaches allowing, for example, a physical classification of vegetation. We must not forget the essential work of validation and exchanges with the actors in the field led by Earthworm to ensure that the products delivered would indeed allow for effective action. And what makes us most proud, beyond technological performance, is to find that by handling the subject appropriately and with the right approach, deforestation in Cavally’s forest has been drastically reduced.»

*Patrick Houdry,  
Head of Sales Agriculture and Forest Solutions at Airbus Defense and Space - Intelligence*

Starling Verification



Eyes in the sky at the Cavally Forest Reserve



### Cavally classified forest

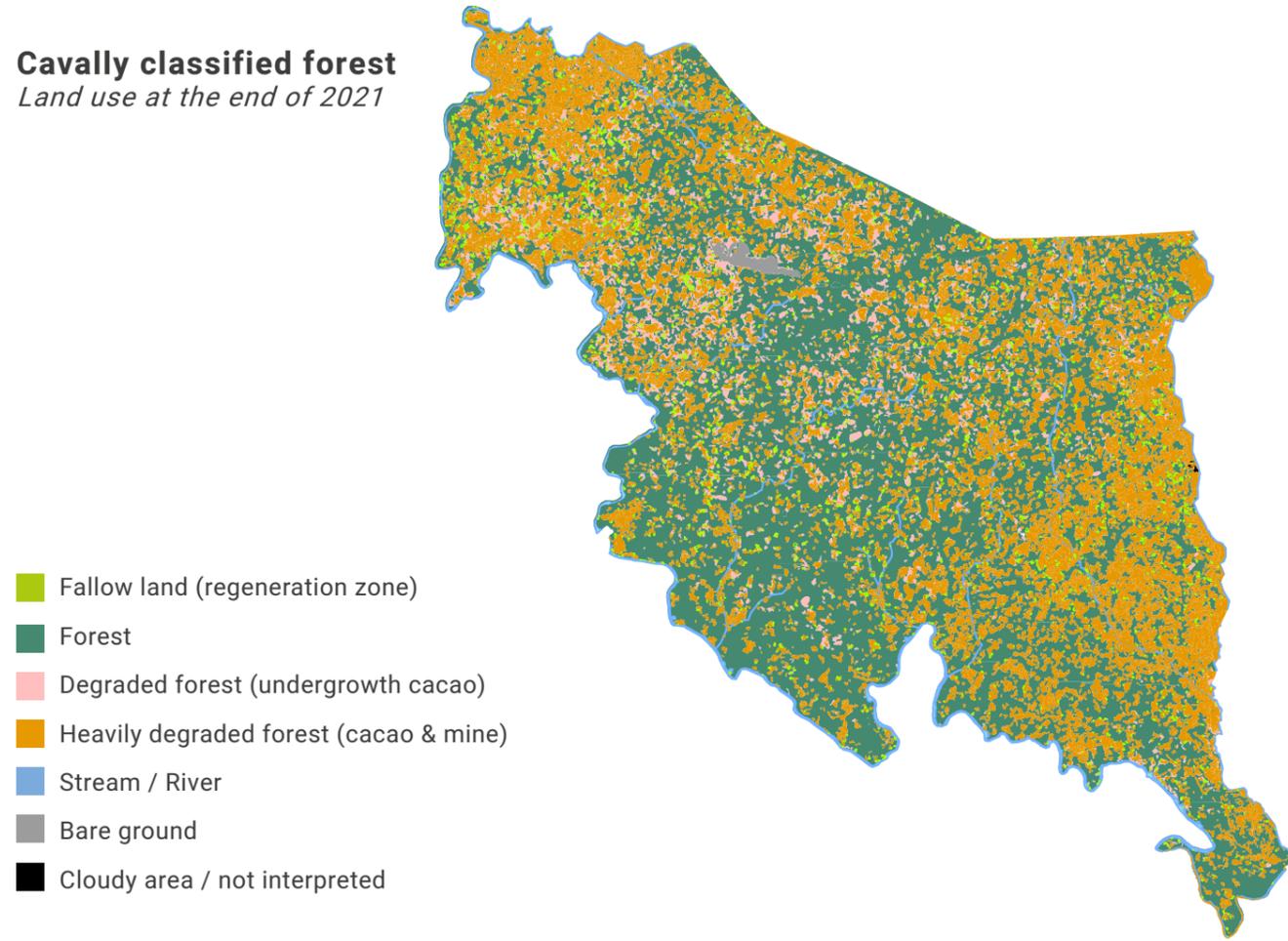
*Reference map  
for Monitoring  
2018*

- Forest
- Degraded forest (undergrowth cacao)
- Heavily degraded forest (cacao & mine)
- Stream / River
- Bare ground
- Cloudy area / not interpreted

Occupation classes	Area (ha)	Percentage %
Forest	849.51	1.26
Waterways	38 968.15	57.70
Degraded forest (undergrowth cacao)	4 997.34	7.40
Heavily degraded forest (Cacao & Mine)	22 493.28	33.30
Bare ground	224.23	0.33
Uninterpreted area	8.84	0.01
<b>TOTAL</b>	<b>67 541.34</b>	<b>100</b>



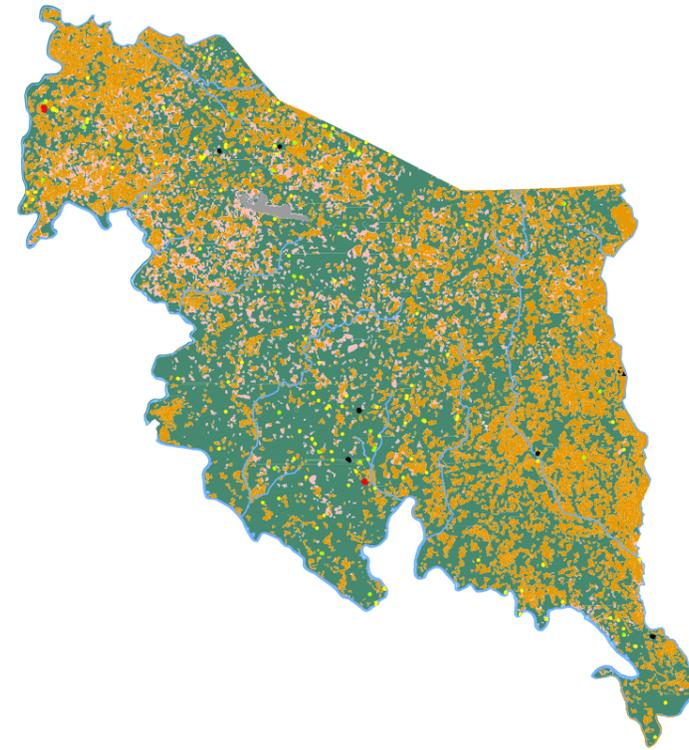
**Cavally classified forest**  
Land use at the end of 2021



- Fallow land (regeneration zone)
- Forest
- Degraded forest (undergrowth cacao)
- Heavily degraded forest (cacao & mine)
- Stream / River
- Bare ground
- Cloudy area / not interpreted

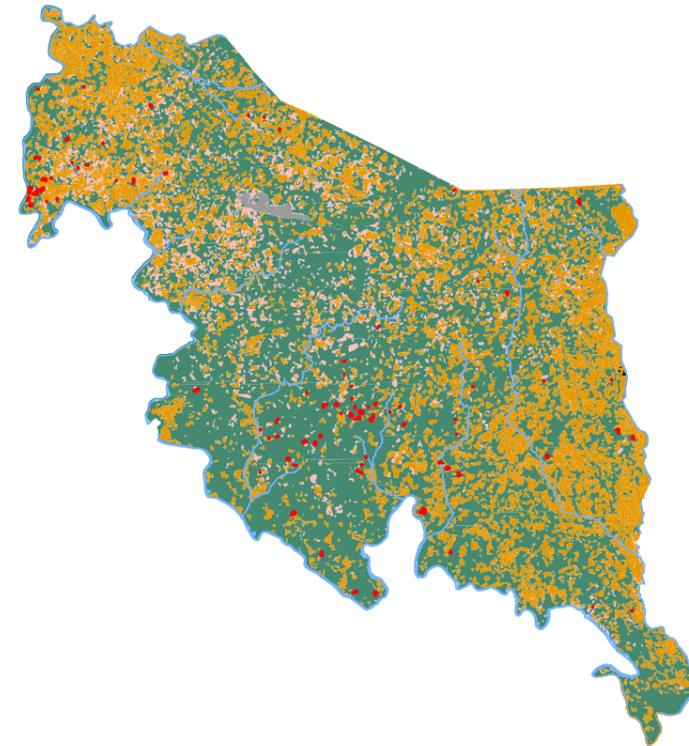
Class	(ha)	%
Waterways	912	1.35
Forest	36 437	53.91
Degraded forest	4 947	7.32
Heavily degraded forest	24 288	35.93
Bare ground	223	0.33
Fallow land	777	1.15
Cloudy area	10	0.01
<b>TOTAL</b>	<b>67 593</b>	<b>100</b>

*Degradation Alert Map Q4 2021*



- Disturbances under canopy**
- Less than or equal to 0.25 ha (total: 19 ha)
  - 0.250001 - 0.5 ha (total: 8 ha)
  - 0.00001 ) 1.000000 ha (total: 4 ha)
  - Greater than or equal to 1 ha (total: 3 ha)
  - Forest
  - Degraded forest (undergrowth cacao)
  - Heavily degraded forest (cacao & mine)
  - Stream / River
  - Bare ground
  - Cloudy area / not interpreted

*Deforestation alert map Q4 2021*

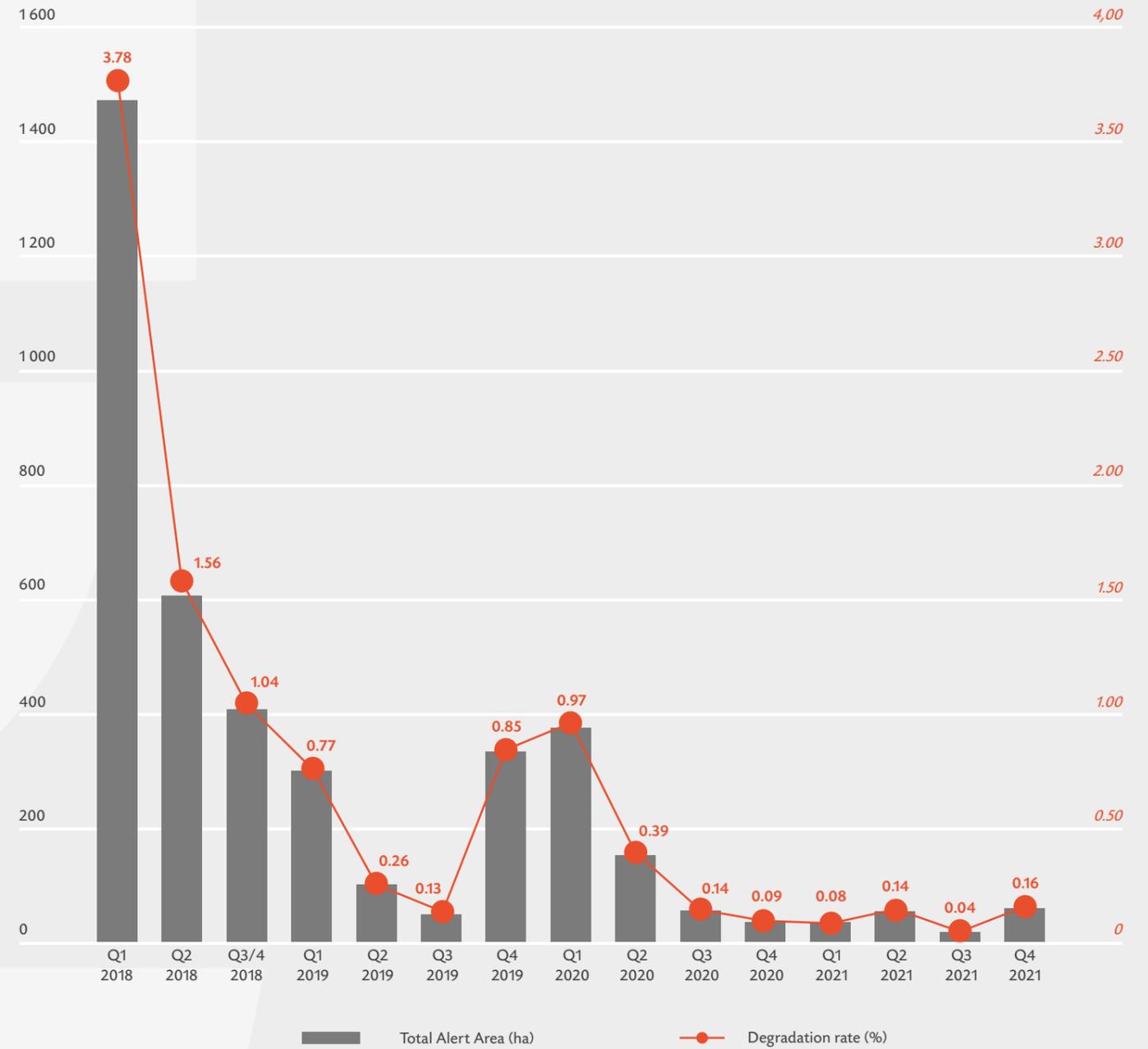


- Alerts Q4 2021
- Forest
- Degraded forest (undergrowth cacao)
- Heavily degraded forest (cacao & mine)
- Stream / River
- Bare ground
- Cloudy area / not interpreted

Alert class	(ha)	%
Alert < 0.25ha	6	10
0.25ha < = Alert < 0.5ha	6	10
0.5ha < = Alert < 1ha	2	3
Alert < 1ha	49	77
<b>TOTAL</b>	<b>63</b>	<b>100</b>



### ALERTS FROM JANUARY 2018 TO DECEMBER 2021



Thanks to satellite surveillance, we have data to guide surveillance and patrols on the ground.

## Objective 2 Between collective forest restoration and natural regeneration

With an ambitious goal of regenerating 25% of the total surface area of degraded forests, i.e. 7,143 hectares by 28,572 hectares, the first results were met with anticipation.

The launch of the operations was a success; a success due to the joint work of several teams. The combination of an active and participatory reforestation and the natural regeneration of the forest allowed by its protection will have made it possible to plant 75,919 trees or 366 hectares and will see 777 hectares of forests in regenerate naturally.

The phenomenon of natural regeneration is therefore important, and is testament to the capacity of soils to conserve valuable resources (seeds; humus). This brings immense hope for the Cavally classified forest.

**These successes are the result of collaborative work between groups engaged in nurseries and those engaged in the rehabilitation and maintenance of plots**, i.e. more than 500 people divided into more than 7 groups. These operations are accurately tracked and documented thanks to satellite imagery provided by Airbus-Starling, allowing us to qualify and quantify field actions quarterly.

The project has taken time to gain the support of local populations and this must be understood. Giving up farm income in the long term, giving up planting in a geographical area, and replanting unproductive species are contrary to prevalent approaches.

It is a challenge of the Cavally project to involve communities in the sustainable protection of the forest while offering them a viable economic alternative. With tenacity, the EF and SODEFOR teams have managed to **involve more and more groups and a local dynamic has been initiated.**

Thus, the first hectares have been reforested and abandoned plots are in a phase of natural regeneration, which motivates the teams on site. The project was well received, including nursery activities, as evidenced by local reactions and new groups being created.

75 000  
Trees planted annually

777  
Hectares of forests  
naturally regenerated

Contribution of the  
Cavally project to the  
SDGs



	People engaged in reforestation	People engaged in tree nurseries	Hectares of naturally regenerated forests	Hectares of reforested forests	Annual trees planted
Results 2021	200	300	777	366	75 000
Objectives 2023	400	180	7 143	1 500	312 000



### Interview with Elie Soungalo, EF field team, responsible for nurseries for reforestation

*Last year, two tree nursery sites were put in place. This year, we wanted to give several groups the opportunity to grow tree nurseries. Apart from this, and as part of the support we provide, we wanted to support groups in the implementation of activities. Since these activities require financial resources, which are a barrier, we asked to provide farmers with nurseries and subsequently, the funds that will come out of this production will be used to finance their activities. It is within this framework that we have set up this group - Bocanda Women's Group 2. It is a group composed of 30 people.*

*For this year, we signed a contract with them for the production of 10,000 plants for reforestation in the forest, but we handed them 11,000 seedlings, with*

*10% covering expected losses. It is land that is there, and they have planned to plant eggplants in the rest of the plot.*

**How many hectares are there?**

*The goal is not necessarily to have a large area but to show them a proper way to be able to conduct these small activities. This is why most of the sites we will visit are medium-sized plots.*



### Interview with Ms. Kouamé Amenan Suzanne, President of the Bocanda 2 Women's Group

*Today, we are gathered by Earthworm Foundation who gave us nurseries to help our husbands. Otherwise, before, all the activity revolved around cocoa and rubber. But today working together helps us. We have a stronger cohesion.*

**Do you think this project will bring you something?**

*We think it will give us money. Already we won a little. But we are optimistic.*

**How did it all start, President?**

*When Earthworm Foundation came to see us to work together, I brought my sisters together and talked to them. With the little money they gave us, we paid for eggplants. We started working on the eggplants in December.*

**What problems did you have with tree nurseries?**

*It was not easy to have the plans; we did not know. We had to buy some ourselves too, and we did not know the name of the wood.*





### The Ponan group (37 people):

The Ponan Group wanted to embark on the tree nurseries to contribute to reforestation efforts in 2022, after hearing about this profitable activity from the president of the Zaipobly Group, who had been involved in reforestation efforts in 2021.

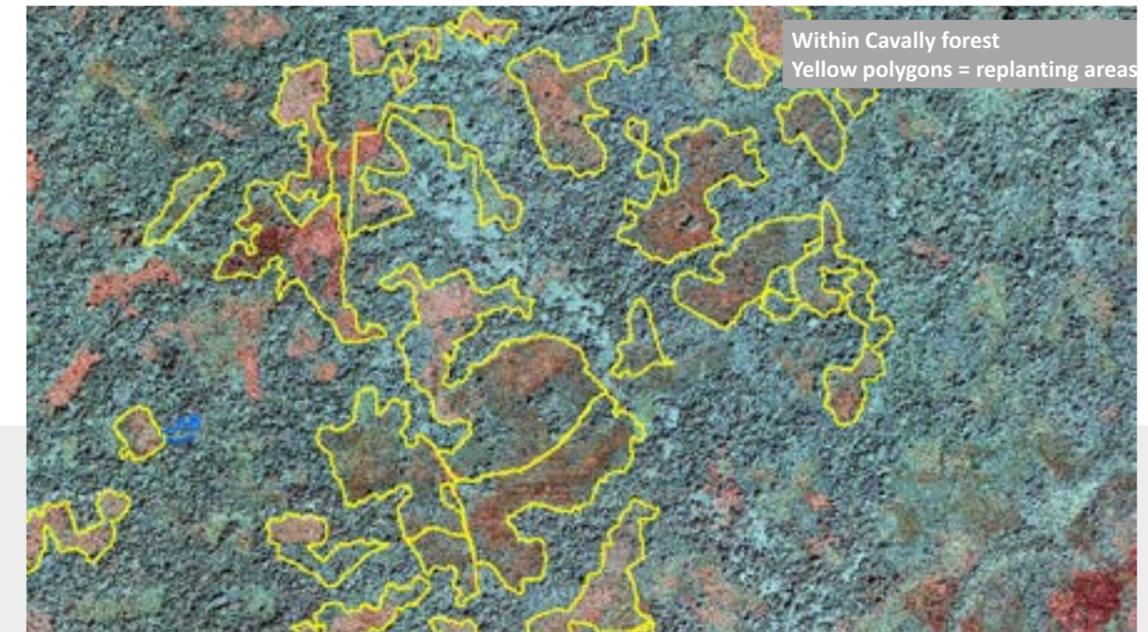
Thus, the women of Zaipobly coached those of Ponan, especially in the identification of seeds. EF and SODEFOR subsequently organised another training on the establishment of tree nurseries, etc.

The Ponan group wishes to use part of the income generated by the nurseries to finance the launch of a market garden business activity on the same site.

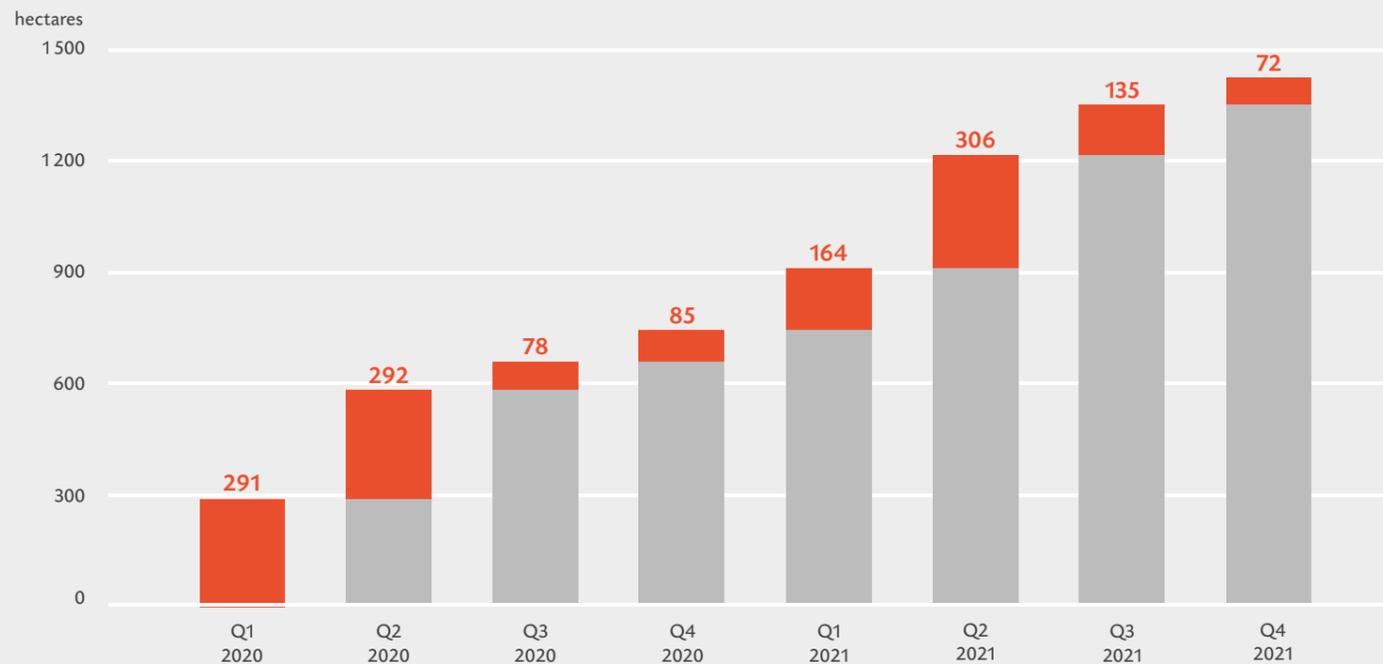


### Focus on plots P31 and P32:

The revival of vegetation, which is usually done naturally, is observed much more in the northwest part of the forest. As illustrated below, the Pleiades Neo images (©Airbus) at 30cm resolution allow us to follow the progress of reforestation operations



### RENEWED VEGETATION COVER BETWEEN 2020 - 2021



## Objective 3 Community involvement toward a resilient model around the reserve Cavally Forest

The holistic diagnosis carried out upstream of the Cavally project made it possible to carry out a socio-economic survey of the peripheral region of the classified forest. Thus, a population of about 13,000 people spread over more than 60,000 hectares were identified. Their annual income is estimated to be very low and mainly related to agriculture. About 6,900 people are identified as farmers and at least 25% of them have activities geographically related to the classified forest.

Therefore, the action plan comprises several components, all based on the support of each toward a sustainable and resilient model that can eventually overcome the occupied areas in classified forests. Earthworm teams are deployed in the field to support each component of the project: Improving cocoa farming productivity, conducting ancillary projects (tree nursery, breeding, market gardens), reforestation and maintenance, patrol and training.

EF teams, alongside other NGOs, support the project and enable:

- **Supporting these farmers** to become more resilient through coaching on good agricultural practices or the implementation of agroforestry models in peripheral areas, which will dissuade them from entering the forest; agroforestry, pruning and regeneration of old plantations for better productivity, to decrease inputs and transition to organic practices;
- **Support producer groups** to create autonomous agricultural activities: chicken breeding, snail breeding, and tree nurseries for reforestation;
- **Consideration of agricultural practices** to be put in place for sustainable production in the peripheral zone, in particular, a 32,000-hectare zone on which pilot projects are being tested.

More specifically, several sectors have been identified and are under experimentation (breeding, nursery, market gardens) **bringing together about 9 producer groups or 314 people (10%) who are already engaged in transitional agriculture. 138 hectares are already in transition.**

The forecasted objectives have not yet been achieved, but the consultation and diagnostic phases have identified viable and productive sectors. Groups and farmers have committed themselves, which suggests a good long-term commitment to the project. Many producers come forward to join the programme, seeing that the concept works.

**The teams are working to identify additional transition sectors and map new lands to apply these transition models.**

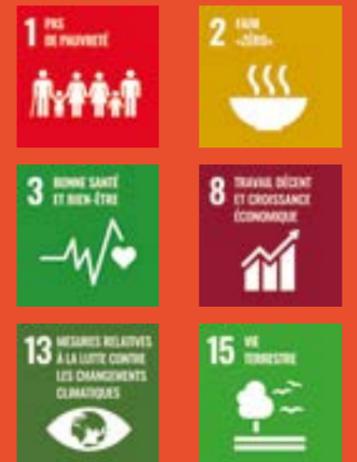
# 313

Farmers engaging in diversification

# 138

Area mapped for transition (ha)

Contribution of the Cavally project to the SDGs



	Area mapped for a transition (ha)	Identified regenerative activities (no.)	Farmers engaging in diversification
Results in 2021	138	4	313
Objectives in 2023	1 200	6	500

### Interview: Esther Gnamba, EF field team, responsible for maximizing production

*Cacao producers in this area come from various regions such as the centre and north, and are looking for opportunities linked to cacao. They can only grow cacao but the problem that arises for them is that they have no one to accompany them in this transition to better production. Some are discouraged. Following a diagnosis, we discovered that many individuals convert cacao fields into Hevea (timber) fields since, according to them, cacao no longer has enough yield because the environment has changed.*

*We decided to follow some producers after the diagnosis carried out.*

*For those whose trunks are old enough, we show them how they can regenerate their fields with new cocoa plants. This prevents producers from planting elsewhere, because there are not enough forests anymore, especially in this area.*

*An advantage with the cultivation of cacao is that it is possible to intercrop it with bananas, yam, and edible plants. This is not possible with hevea.*



### Interview: Mathilde Xicola, Project Manager, Cavally

*Community engagement is a key entry point to truly protect the forest. If we do not involve them in the process and if they do not feel like the solutions can be implemented, then the ecosystem we want to implement will not be sustainable.*



### Interview Stéphane Kouakou, Field Team Supervisor

*These activities make it possible to diversify income (through the sale of Guinea fowl, hybrid chickens and their eggs), increase the income of producers such as Bema and create new sectors in the area to encourage other producers to diversify and strengthen their activities. It is a concrete example of revenue generating activity that we supervise with our teams in the field.*

### The commitment of producer Kone Bema to Gbègbèkro

Kone Bema is a cacao planter and chicken farmer who wants to add additional income to his aging fruits and densely populated plantation.

He faces two problems to date: The lack of animal protein supply in the area and the difficulty of sourcing chicks for breeding, reports Soumayla Kané, Pooject Officer at Earthworm Foundation (right in image below)

Thus, EF proposed to add more resistant hybrid chicks and breeding young guinea fowl to his existent activities.



# 4

## Perspectives & scaling up of the Cavally pilot project

- Mid-term review
- Monitoring zero deforestation and new carbon potential

## Mid-term review

Choosing a landscape\* project in Cavally means choosing to co-create a sustainable model in which the preservation of forests, the reconstruction of carbon potential and the commitment of local communities to a resilient economy are articulated through a collective objective.

Based on a three-year calendar (2021-2023), the Cavally project was initiated in 2018. Halfway through its term, major monitoring of the forest and reforestation have been tested. The implementation of pilot projects with local communities has been carried out and studies to improve agricultural practices have even been initiated, allowing us to harvest our first data sets.

The successful execution of the Cavally project and its success are explained by a combination of factors:

- **The deployment of a particularly effective satellite technology** to diagnose the state of the forest and plan field interventions
- **The joint work** of several teams (MINEF, Earthworm, SODEFOR, Nestlé, Wild Chimpanzee Foundation and NOFNA) on the ground that promoted acceptance among local communities and their effective involvement.
- **Partners strongly involved** in the success of the project (Nestlé, SODEFOR, MINEF), giving the project a tremendously productive dynamic.

Of course, there are still a few steps left for the project to progress. But the indicators are positive and initial key performance indicators are headed in the right direction. They also suggest new perspectives, based on the fruits of the work done by stakeholders:

- **Consolidate** collaborative work and duplicate it throughout the peripheral zone: Tree nursery, community project, agroforestry, economic initiatives;
- **Maintain** a low deforestation rate (<0.5%) and increase reforested areas while accounting for areas in natural regeneration and achieve a positive reforestation/deforestation balance;
- **Develop** the long-term management plan (target areas for regenerative agriculture, reforestation, agroforestry, etc.)
- **Estimation of carbon stocks**, sequestration potential and work on carbon credit implementation.

*\* Earthworm's landscape approach is a holistic approach to regeneration in a supply chain that achieves socio-economic and environmental effects in the long term.*



### BALANCED REGIONAL DEVELOPMENT, PRESERVATION OF THE ENVIRONMENT AND THE FIGHT AGAINST CLIMATE CHANGE

This pillar will deal with the optimal planning of the whole territory and potential economic exploitation in the region, with a balance between regions, cities and country sides. This programme also supports the protection of the environment, safeguarding of natural heritage and ecological exploitation of natural resources, with a view on respecting nature, combating global warming and sustainable development.



Classified forests and natural reserves	Area (out of buffer)	Origin
Cavally	68 501 ha	SODEFOR / CFI
N'Guechie	3 702 ha	SODEFOR
Yaya	21 603 ha	CFI
Mabi	62 729 ha	CFI
Bossematie	22 491 ha	SODEFOR
Top Sassandra	105 448 ha	SODEFOR
Duekoue	53 135 ha	CFI
High Dodo	215 027 ha	CFI
Fast Grah	228 788 ha	CFI
Mopri	33 012 ha	SODEFOR
AgboBloc_1	16 116 ha	CFI

## Monitoring of zero deforestation and new carbon potential

The implementation of the Cavally project makes it possible to envisage new prospects for other forest areas.

The use of Starling as a cutting-edge solution in the verification of zero deforestation commitments makes it possible to guarantee accurate monitoring of degraded areas.

However, the precise monitoring of deforestation-reforestation areas is a key issue in scaling up the preservation of forests classified as priority (priority classified forests). Its deployment on other classified forest areas could also be in line with the DP 2021-2025 (Ivory Coast Rep.) and could also align with international initiatives on sustainable cocoa (ISCOS).

The joint USAID and Wild Chimpanzee Foundation identification of protected species habitats within the park could naturally be cross-referenced with Starling satellite surveys and help to accurately identify areas of protection for endangered animals.

The establishment of a certified carbon credit mechanism, with local communities, could add a new dimension to the project by valuing the land work of Ivorian farmers.

Thus, initial work carried out on the Cavally project highlights a strong capacity for resilience of local communities but also that of the forest itself, which, in some places, takes precedence. **Deforestation is not inevitable; the phenomenon can be reversed if we give ourselves the means.**

**11 classified forests declared priority for SODEFOR or of interest by the CFI have been identified in Ivory Coast. The Cavally project demonstrates that a resilient solution is possible.**

# The Cavally project demonstrates that a resilient solution is possible.



Special thanks for their contribution to this report:  
Ivorian Ministry of Water and Forests - SODEFOR - AIRBUS DS - Nestlé -  
Wild Chimpanzee Foundation - NOFNA - African Science  
Communication Agency (ASCA)

All Earthworm Foundation teams and specifically  
the Cavally landscape team.

Design and writing ODDS Agency

**odds**  
CRÉATIF & DURABLE