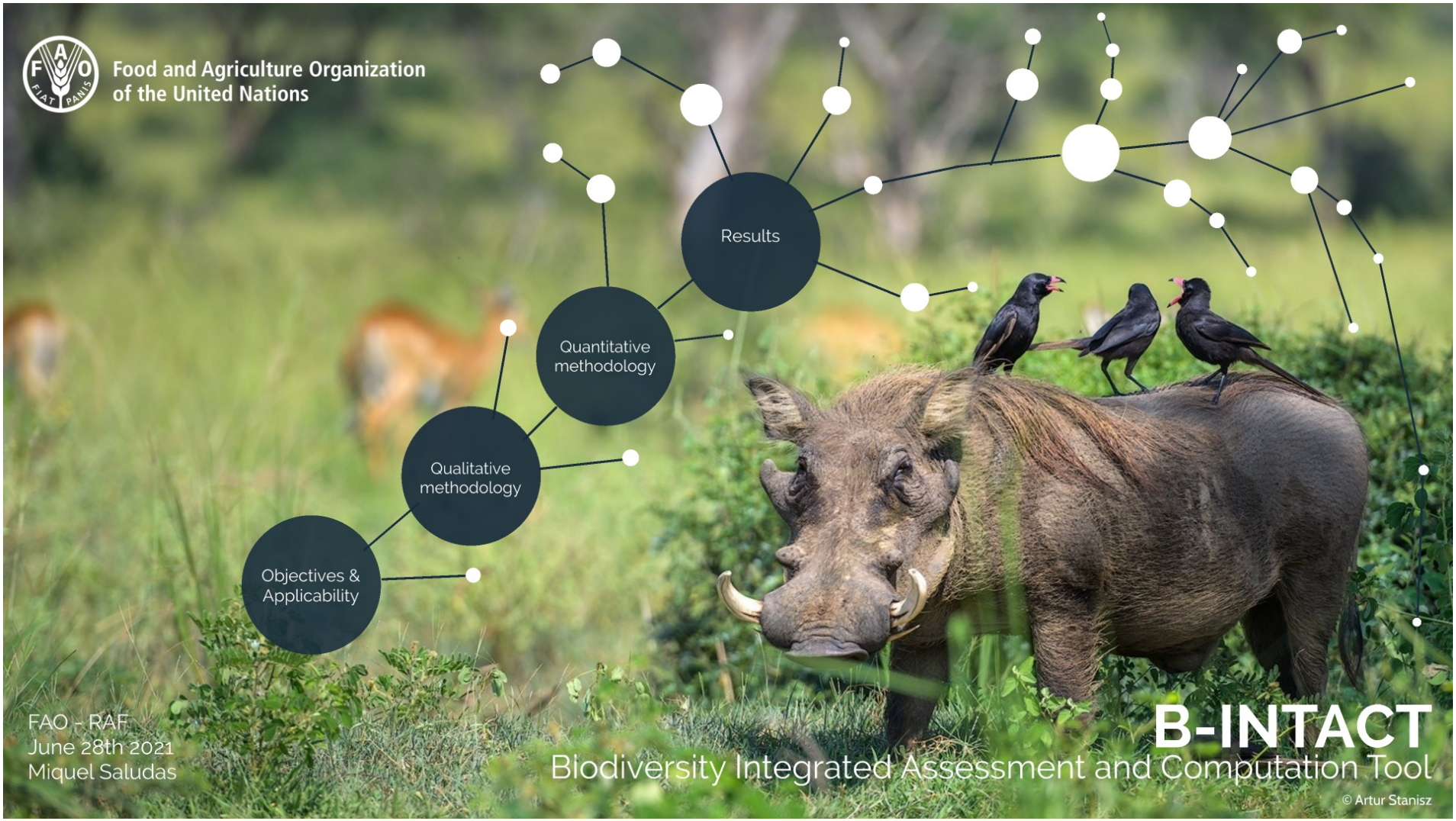
Food and Agriculture Organization
of the United Nations
Results
Quantitative methodology
Qualitative methodology
Objectives & Applicability
FAO - RAF
June 28th 2021
Miquel Saludas
B-INTACT
Biodiversity Integrated Assessment and Computation Tool
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The Biodiversity Integrated Assessment and Computation Tool : B-INTACT

Seeks to provide a thorough biodiversity assessment of project-level activities in the Agriculture, Forestry and Other Land Use **(AFOLU)** sector.

Generated on **Microsoft Excel** and is a **free open** tool launched on 2020.

Quantitative assessment based on the **GLOBIO** Model 3.6 by PBL* expressed in the mean species abundance **(MSA)** metric. (Schipper et al., 2016)

Qualitative assessment complementing the quantitative assessment of pressures on biodiversity.

* GLOBIO Model Version 3.6 developed by PBL was built on a set of quantitative relationships that describe **six anthropogenic impacts on biodiversity**: impacts of **land use, climate change**, **atmospheric nitrogen deposition**, disturbance by **infrastructure, habitat fragmentation** due to land use and **human encroachment**. A total six major taxonomic groups are covered by GLOBIO: **mammals, birds, reptiles, amphibians, terrestrial invertebrates and vascular plants**.

Schipper, A., Bakkenes, M., Meijer, J., Alkemade, R. & Huijbregts, M. 2016. The GLOBIO model. A technical description of version 3.5. The Hague.

1. Objectives

Quantify the biodiversity impact of various investments in the AFOLU sector at project and policy-level using globally recognized environmental assessment methodologies

Provide decision-makers with a set of policy indicators to help make informed decisions on possible biodiversity risks, biodiversity loss and management practices

Extend the scope of environmental assessments to capture biodiversity concerns, which are not accounted for in conventional carbon pricing

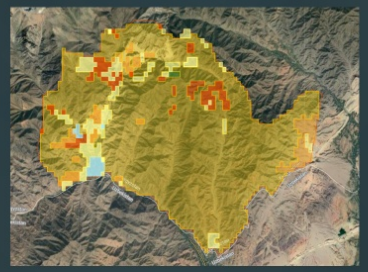
Small scale projects

Group of farms in Nghe An, Vietnam on 57 ha

Source: Authors' own elaboration

Medium scale projects

Municipality of Kyok Tashsky, Kyrgyzstan on 15 800 ha

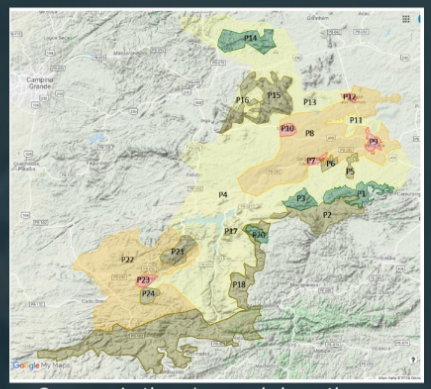


Source: Authors' own elaboration

Large scale projects

Paraíba

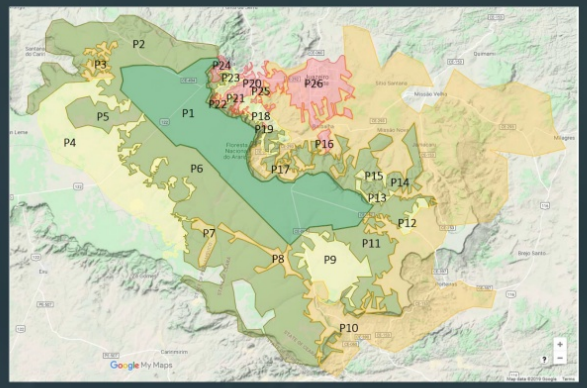
162 614 ha



Source: Authors' own elaboration

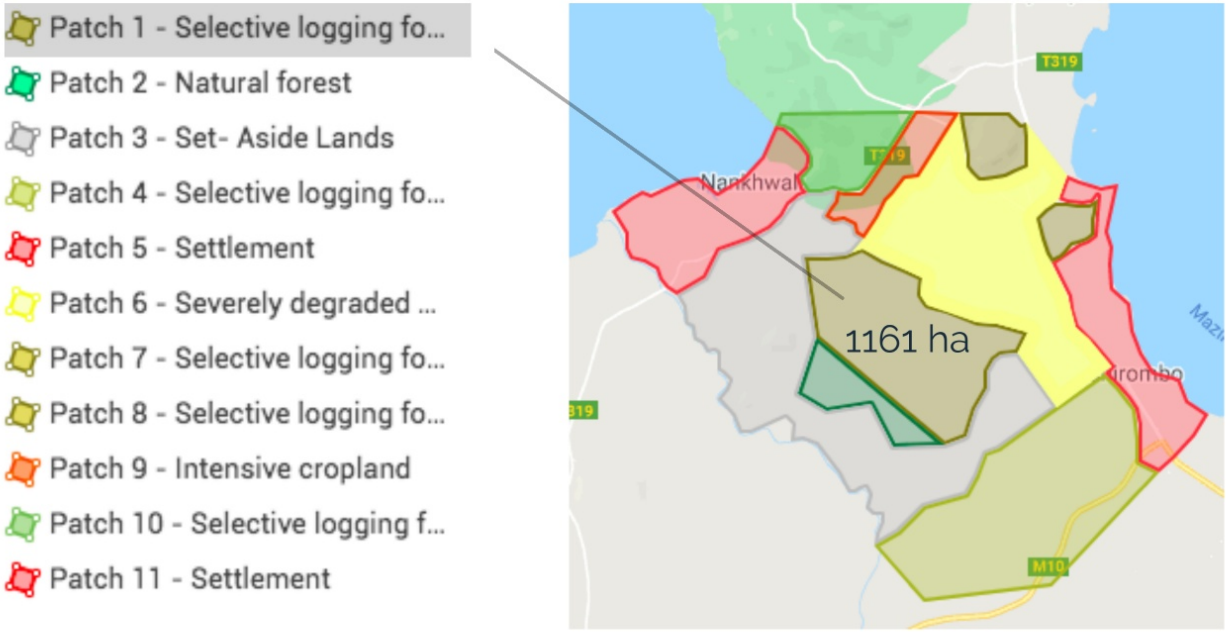
Juazeiro do Norte

300 768 ha



Source: Authors' own elaboration

2. Main logic and data needs



Source: Authors' own elaboration

Patch:
a connected plot of land characterized by a single type of land use.

Qualitative Impact Methodology

- The qualitative check control of the biodiversity module is a **quick appraisal of 16 questions divided in 4 sections** covering themes including:

S1	**Project zone biodiversity sensitivity**	4	Governance-regime (PA, KBA), threatened species, the level of water stress
	Project Intended Impacts		
S2	**Biodiversity sensitivity**		
S3	**Biodiversity management activities**	3	Biodiversity buffers, human-wildlife conflict, forest governance
S4	**Agrobiodiversity**	9	Crop diversification, IPM, conservation agriculture...

- Some questions require **reference to geo-spatialized data**.

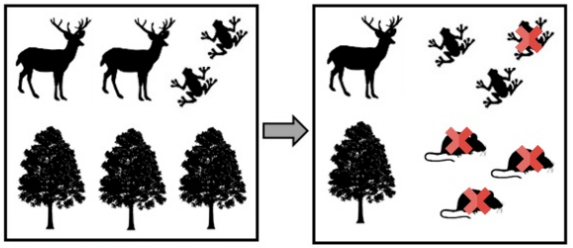
Quantitative Impact Methodology

the **Mean Species Abundance (MSA)** is used to **quantify biodiversity responses**

*"Expresses the mean abundance of original species in disturbed conditions relative to their abundance in an undisturbed habitat, as an **indicator of the degree to which an ecosystem is intact**." (Schipper et al., 2016)*

- *MSA = **100% highlights an undisturbed ecosystem** where all original species remain*
- *MSA = **0% highlights a destroyed ecosystem** with no original species left*

Reference **Impact**



Source: Adapted from Schipper et al., (2019)

- Greater abundance of original species is not considered compared to pristine reference.
- Only considers original species present in a pristine situation (not exotic species)
- MSA only measures species intactness and does not differentiate between ecological value of sites with the same type of land use

Schipper AM, Hilbers JP, Meijer JR, et al., Projecting terrestrial biodiversity intactness with GLOBIO 4. Glob change biol. 2020; 26:760-771 https://doi.org/10.1111/gcb.14848

Quantitative Impact Methodology

the **Mean Species Abundance (MSA)** considers **4 anthropogenic impacts** on biodiversity

Land Use

MSA_{LU}

Infrastructure

MSA_{I}

Habitat Fragmentation

MSA_{F}

Human Encroachment

MSA_{HE}

If $LU = cropland\ OR\ LU = urban,\ \ MSA_i = MSA_{LU,i}$

else $MSA_i = (MSA_{LU,i} \times MSA_{I,i} \times MSA_{F,i})$

$$MSA_p = \sum_{i=1}^{i=n} (MSA_i * S_i / \sum_{i=1}^{i=n} S_i) \times MSA_{HE,p}$$

Si: Surface area of patch i

Area-weighted mean of patch-level MSA values

Patch-level MSA

Project-level MSA

B-INTACT always provides a **baseline** and **with** project scenario.

Policy Indicators

One of the key objectives of the policy indicators is to transform the abstract concept of mean species abundance into more accessible and comprehensible units for decision makers.

Area of Biodiversity loss	Surface area equivalent of the MSA scores which represents the area of biodiversity loss.	MSA.ha
Added/lost social value of Biodiversity	Monetary value per hectare to the MSA indicator	SVp
Mean Species Abundance plus	MSA factored with the ecological value of the patch	MSA+

Project context
in the Northeast of Brazil

Project Objective:
This project aims to transform family farmers' productive systems in the semiarid by increasing production while simultaneously improving their capacity to face the challenges posed by ongoing climate change

ID	Project activities	Area
1	Afforestation of tropical dry forest on degraded grassland	869 ha
2	Degraded annual cropland to silvoarable systems (Intensive agroforestry)	24 062 ha
3	Farmer-managed natural regeneration of degraded grasslands to parklands (Extensive agroforestry)	24 062 ha
4	Improved pasture management through soil and water conservation	7 871 ha
5	Natural forest management of tropical dry forests and watershed protection	27 314 ha

Source: Adapted from project document.

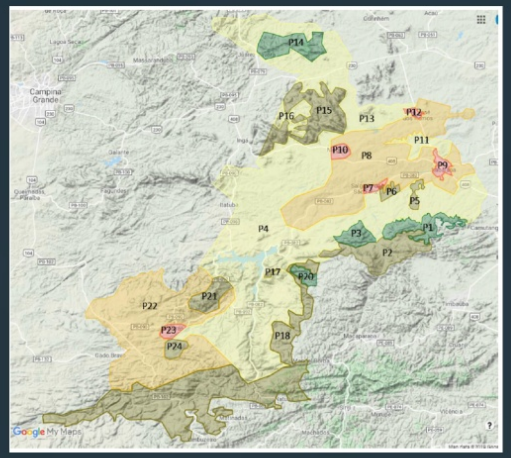
Project context
in the Northeast of Brazil

At the time of the analysis the project was on the design phase and the project managers have not yet identified the exact location of the project sites.

The present case study shows a case in which the economic and financial analysis, as well as the carbon-balance would be the same for different project sites in the same region:

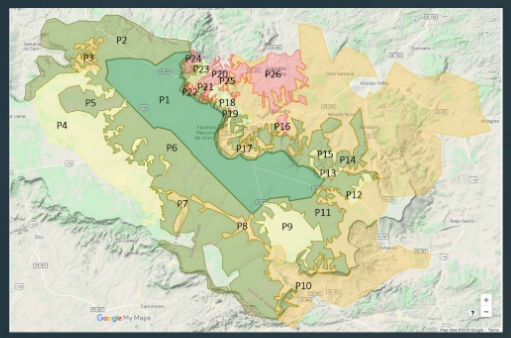
Site 1. Paraíba
Site 2. Juazeiro do Norte

Paraíba



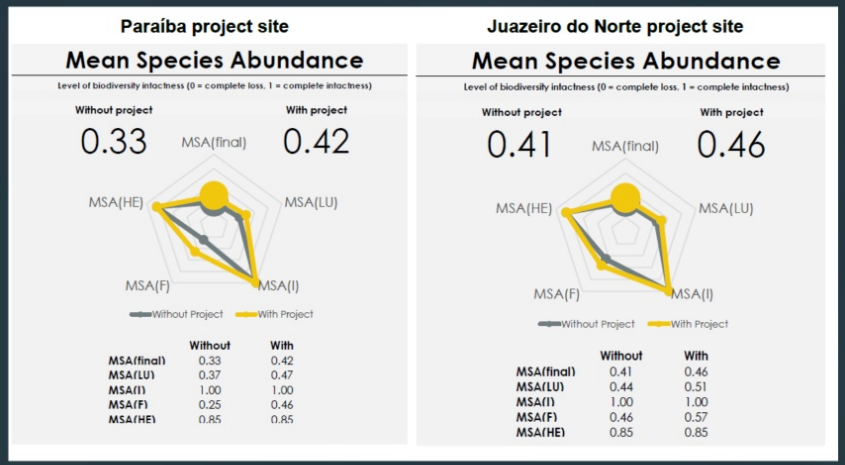
Source: Authors' own elaboration

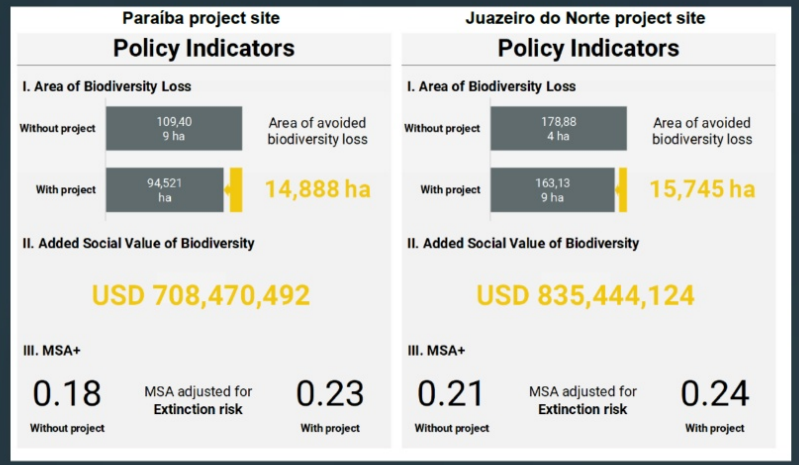
Juazeiro do Norte



Source: Authors' own elaboration

Results - Quantitative assessment



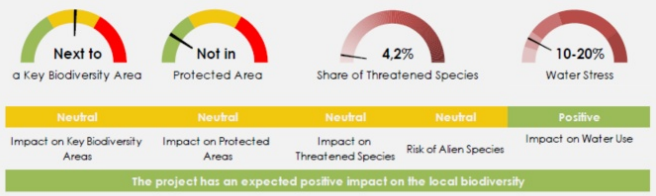


Results - Qualitative assessment

Paraíba project site

Qualitative Biodiversity Impact Summary

Biodiversity Sensitivity & Impact Analysis



Neutral	Neutral	Neutral	Neutral	Positive
Impact on Key Biodiversity Areas	Impact on Protected Areas	Impact on Threatened Species	Risk of Alien Species	Impact on Water Use

The project has an expected positive impact on the local biodiversity

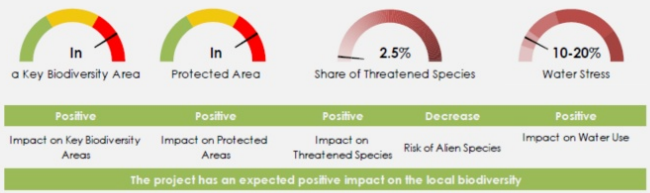
Biodiversity Management Activities & Agrobiodiversity Practices

Biodiversity Management Activities from the Project	96,070 ha	22,492,887 USD
Agrobiodiversity Practices from the Project	48,120 ha	44,985,775 USD
Improvements on the Entire Project Area	**96,070 ha**	**67,478,662 USD**

Juazeiro do Norte project site

Qualitative Biodiversity Impact Summary

Biodiversity Sensitivity & Impact Analysis



Positive	Positive	Positive	Decrease	Positive
Impact on Key Biodiversity Areas	Impact on Protected Areas	Impact on Threatened Species	Risk of Alien Species	Impact on Water Use

The project has an expected positive impact on the local biodiversity

Biodiversity Management Activities & Agrobiodiversity Practices

Biodiversity Management Activities from the Project	122,599 ha	22,492,887 USD
Agrobiodiversity Practices from the Project	24,012 ha	44,985,775 USD
Improvements on the Entire Project Area	**122,599 ha**	**67,478,662 USD**