CORDILLERA AZUL NATIONAL PARK REDD+ PROJECT MONITORING REPORT

Document Prepared By
Centro de Conservación, Investigación y Manejo de Áreas Naturales CIMA - Cordillera Azul
Lima, Peru
with technical assistance from TerraCarbon, LLC, Peoria, IL, USA

Project Title	Cordillera Azul National Park REDD+ Project
Project ID	985
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Report ID	
Date of Issue	11 July, 2022
Project Location	Peru Departments: San Martín, Loreto, Huánuco and Ucayali
Project Proponent(s)	Centro de Conservación, Investigación y Manejo de Áreas Naturales-Cordillera Azul (CIMA-Cordillera Azul) Contact: Gonzalo Varillas Email: gvarillas@cima.org.pe Phone: (51 1) 241 2291 or 241 2295
Prepared By	CIMA with technical assistance from TerraCarbon David Shoch, TerraCarbon 5901 N. Sheridan Rd., Peoria, IL 61614 david.shoch@terracarbon.com 1-434-326-1144
Validation/Verification Body	**Aster Global Environmental Solutions Inc.** Contact: Janice McMahon Email: jmcmahon@asterglobal.com Phone: (1) 330-294-1242

GHG Accounting/Crediting Period	The project crediting period is 20 years, extending from 8 August 2008 to 7 August 2028. The CCB and VCS have coincident crediting period.
Monitoring Period of this Report	August 8, 2018 to December 31, 2020. Recall that the monitoring report uses the convention that the project year is the year at the end of the interval, i.e. project year 2019 is 8 August 2018 to 7 August 2019. The 2021 project year is a partial year that starts 8 August 2020 to 31 December 2020.
History of CCB Status	The project was validated under CCB Standards Second Edition on February 19, 2013 by SCS Global Services[1] and subsequently achieved three verification processes: (1) verified on March 21, 2014 by Rainforest Alliance[2], (2) verified January 04, 2016 by AENOR, (3) verified on December 20, 2016 by AENOR[3], and (4) verified on January 15, 2018 by AENOR[4].
Gold Level Criteria	The project reached the Gold Level of Exceptional Biodiversity Benefits – Vulnerability and Irreplaceability – during validation, and has implemented protection and monitoring actions to maintain this status. The Park harbors and protects a variety of IUCN Red Listed species. As of 2020, there are no Critically Endangered (CR) species according to this categorization, but it supports healthy populations of Endangered (EN), Near Threatened (NT) and Vulnerable (VU) species, like Amphibians (*Atelopus andinus*), birds (*Heliangelus regalis*) and Mammals (*Pteronura brasiliensis*). There are 39 species in any of these IUCN Red List categories. The Park also protects more than 91 species of big and medium size mammals, 617 species of birds, 59 species of reptiles, 71 species of amphibians, 176 species of fishes and more than 1,600 species of plants. In recent years, 12 new species to science have been described. These exceptional biodiversity benefits are based on the huge area of the park, intact montane forests and other vegetation types of high conservation priority, and the broad altitudinal gradient within the park that permits migration of species adapting to a changing climate. During the monitoring period, PNCAZ qualified as one of two well-managed, well-governed and conserved protected areas in Peru, as recognized to be part of the Green List by the IUCN and where new records and new species for science are still being found.

[1] https://s3.amazonaws.com/CCBA/Projects/Cordillera_Azul_National_Park_REDD_project/CCB_CIMA_PNCAZ_Validation_Statement_022113.pdf
[2] https://s3.amazonaws.com/CCBA/Projects/Cordillera_Azul_National_Park_REDD_project/Verification/Verified/Updated/Cordillera+Azul+CCB+verif+statement+14+(1).pdf
[3] http://www.vcsprojectdatabase.org/#/project_details/985
[4] https://www.vcsprojectdatabase.org/#/project_details/985/CCB_VERIF_STA_985_8AUG2015_7AUG2016.pdf

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1 SUMMARY OF PROJECT BENEFITS

This section highlights some of this project's important benefits. Section 1.1 (Unique Project Benefits) should be aligned with a project's causal model and is specific to this project. Section 1.2 (Standardized Benefit Metrics) is the same quantifiable information for all CCB projects. This section does not replace the development of a project-specific causal model or the monitoring and reporting of all associated project-specific impacts (positive and negative) in Sections 2-5 of this document.

1.1 Unique Project Benefits

Outcome or Impact	Achievements during the Monitoring Period	Section Reference	Achievements during the Project Lifetime
1) (Obj.1) The PNCAZ remains undamaged its conservation targets and continues the recovery of degraded areas → 1.1 The PNCAZ's ecosystems remain intact.	Ensure the protection of Headwaters for 2 great Amazonian basins: • Huallaga • Ucayali With more than 45 microbasins,	• Sec. 5.1.1 • Sec. 7 • Appendix 1	Maintain the protection of the Headwaters of 2 great Amazonian basins: • Huallaga • Ucayali
(Obj.2) PNCAZ and its buffer zone have become a place of research of global importance which gathers researchers/scientists and contributes to the management of natural protected areas. 2) → 2.1. PNCAZ research priorities are known and attractive to scientists who are able to finance their own research.	3 New Species: • Plants: *Lissocarpa bracki* (Ebenaceae),*Drypetes azulensis* (Putranjivaceae) *Virola pseudosebifera* (Myristicaceae)	• Sec. 5.1.1 • Sec. 7	New Described Species: • Fishes: 4 spp • Amphibia: 1 sp • Reptiles: 2 spp • Birds: 2 spp • Plants: 3 spp

3) (Obj.1) The PNCAZ remains undamaged its conservation targets and continues the recovery of degraded areas → 2.2. Research topics respond to identified priorities, and results and recommendations are taken into account in decision making for PNCAZ management.	Protection of Kakataibo (Indigenous) People in Isolation, who live inside the park and in the buffer zone	• Sec. 2.5.2 • Sec. 4.1.1	Creation of an Indigenous Reserve Isolated Indigenous People, in the PNCAZ buffer zone
4) (Obj.5) PNCAZ conservation contributes to improving the quality of life of neighboring populations through the benefits generated, especially those located in the intervention areas established in the Master Plan → 5.3 Based on the results of the ZEE, local communities manage conservation areas according to their interests.	8 Conservation initiatives in the buffer zone communities: • Nuevo Jaén • Nuevo San Martín • Challual • Las Palma • Nuevo Trujillo • San Juan • Vista Alegre • Yamino	• Sec. 4.1.2	8 Conservation initiatives near communities and villages. A great conservation area in Boca-Pauya, Cushabatay basin (aprox. 81,000 ha)
5) (Obj5.) PNCAZ conservation contributes to improving the quality of life of neighboring populations through the benefits generated, especially those located in the intervention areas established in the Master Plan → 5.4 The local population and authorities are committed to sustainable land management and understand its link with PNCAZ's conservation	2 New Blue Agreements between 2018 and 2020. (Conservation Agreements): • 2019: Cooperativa Agraria Industrial Naranjillo Limitada - COOPAIN • 2018: CN Yamino (Etnia Kakataibo	• Sec. 4.3.3 • Appendix 1	10 Blue Agreements Approximately 10,500 beneficiaries

1.2 Standardized Benefit Metrics

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
GHG emission reductions & removals	Net estimated emission removals in the project area, measured against the without-project scenario	not applicable	---	---
	Net estimated emission reductions in the project area, measured against the without-project scenario	11,371,671 t CO2-e	Baseline tables, from PD Appendix 9 (3.2.4)	49,919,091.9 tCO2-e
Forest[5] cover	For REDD[6] projects: Number of hectares of reduced forest loss in the project area measured against the without-project scenario	29,724.5 ha (29,782.5[7]ha–58[8]ha)	Baseline tables, from PD Appendix 9	98,082.34 ha
	For ARR[9] projects: Number of hectares of forest cover increased in the project area measured against the without-project scenario	not applicable	---	---
Improved land management	Number of hectares of existing production forest land in which IFM[10] practices have occurred as a result of the project's activities, measured against the without-project scenario	not applicable	---	---

[5] Land with woody vegetation that meets an internationally accepted definition (e.g., UNFCCC, FAO or IPCC) of what constitutes a forest, which includes threshold parameters, such as minimum forest area, tree height and level of crown cover, and may include mature, secondary, degraded and wetland forests (*VCS Program Definitions*)

[6] Reduced emissions from deforestation and forest degradation (REDD) - Activities that reduce GHG emissions by slowing or stopping conversion of forests to non-forest land and/or reduce the degradation of forest land where forest biomass is lost (*VCS Program Definitions*)

[7] *Aunplanned,i,t* (ha): Deforested area according to baseline (Source: PD Appendix 9)

[8] *ADefPA,u,i,t* (ha): Project area change (Source: Monitoring Workbook 2020).

[9] Afforestation, reforestation and revegetation (ARR) - Activities that increase carbon stocks in woody biomass (and in some cases soils) by establishing, increasing and/or restoring vegetative cover through the planting, sowing and/or human-assisted natural regeneration of woody vegetation (*VCS Program Definitions*)

[10] Improved forest management (IFM) - Activities that change forest management practices and increase carbon stock on forest lands managed for wood products such as saw timber, pulpwood and fuelwood (*VCS Program Definitions*)

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
	Number of hectares of non-forest land in which improved land management has occurred as a result of the project's activities, measured against the without-project scenario	24 communities and villages (246,192ha)	4.1.2	33 communities with 246,192 ha under land use zoning
Training	Total number of community members who have improved skills and/or knowledge resulting from training provided as part of project activities	45 parkguards 3,801 head of families	2.4.2 4.1.2	At least 1 training / yr
	Number of female community members who have improved skills and/or knowledge resulting from training provided as part of project activities of project activities	219 artisans	4.1.2	300 women
Employment	Total number of people employed in of project activities,[11] expressed as number of full-time employees12	45 parkguards[13] 63 CIMA staff 20 Communal parkguards	2.4.3	45 parkguards 63 CIMA staff >20 Communal parkguards
	Number of women employed in project activities, expressed as number of full-time employees	14 women	2.4.3	15-20 women
Live liho ods	Total number of people with improved livelihoods[14] or	3,801 families from 39 villages and	4.1.2	> 4,000 families

[11] Employed in project activities means people directly working on project activities in return for compensation (financial or otherwise), including employees, contracted workers, sub-contracted workers and community members that are paid to carry out project-related work.
[12] Full time equivalency is calculated as the total number of hours worked (by full-time, part-time, temporary and/or seasonal staff) divided by the average number of hours worked in full-time jobs within the country, region or economic territory (adapted from UN System of National Accounts (1993) paragraphs 17.14[15.102];[17.28])
[13] 45 rangers were part of CIMA´s staff until 2018. In 2019, CIMA celebrated an arrangement with SERNANP, in which the rangers are part of the PNCAZ staff and CIMA donates the amount of their salaries. The communal parkguards are not considered direct staff, but are paid by CIMA.
[14] Livelihoods are the capabilities, assets (including material and social resources) and activities required for a means of living (Krantz, Lasse, 2001. *The Sustainable Livelihood Approach to Poverty Reduction*. SIDA). Livelihood benefits may include benefits reported in the Employment metrics of this table.

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
	income generated as a result of project activities	communities are supported to implement strategic plans (Quality of Life Plans and Action Plans)		
	Number of women with improved livelihoods or income generated as a result of project activities	Mothers from 3,801 families	4.1.2	> 4,000 women
Health	Total number of people for whom health services were improved as a result of project activities, measured against the without-project scenario	not applicable[15]	---	---
	Number of women for whom health services were improved as a result of project activities, measured against the without-project scenario	not applicable	---	---
Education	Total number of people for whom access to, or quality of, education was improved as a result of project activities, measured against the without-project scenario	not applicable[16]	---	---
	Number of women and girls for whom access to, or quality of, education was improved as a result of project activities, measured against the without-project scenario	not applicable	---	---
Water	Total number of people who experienced increased water quality and/or improved access to drinking water as a	not applicable[17]	---	---

[15] [16] [17] Further information in section 4.

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
	result of project activities, measured against the without-project scenario			
	Number of women who experienced increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	not applicable	---	---
Well-being	Total number of community members whose well-being[18] was improved as a result of project activities	4 new Quality Life Plans were developed and approved in 2018, accounting for >2500 community members (men, women and children), totalizing 35 QLPs so far, which continue the process of Implementation.	4.1.2	> 20,000 community members from 35 communities with Life Plans
	Number of women whose well-being was improved as a result of project activities	319 women	4.1.2	500 women
Biodiversity conservation	Change in the number of hectares significantly better managed by the project for biodiversity conservation,[19] measured against the without-project scenario	1,3 million of hectares conserved by the PNCAZ	2.1.7	Maintain the status of conservation of PNCAZ

[18] Well-being is people's experience of the quality of their lives. Well-being benefits may include benefits reported in other metrics of this table (e.g. Training, Employment, Health, Education, Water, etc.), but could also include other benefits such as empowerment of community groups, strengthened legal rights to resources, conservation of access to areas of cultural significance, etc.

[19] Biodiversity conservation in this context means areas where specific management measures are being implemented as a part of project activities with an objective of enhancing biodiversity conservation.

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
	Number of globally Critically Endangered or Endangered species[20] benefiting from reduced threats as a result of project activities,[21] measured against the without-project scenario	IUCN Red List Species: 7 endangered (EN), 15 and near threatened (NT) and 17 vulnerable (VU)[22]	7	Maintain number of species, or discover new species

[20] Per IUCN's Red List of Threatened Species
[21] In the absence of direct population or occupancy measures, measurement of reduced threats may be used as evidence of benefit
[22] The number of species has increased because several species that were DD have been assigned to one category. Also note that there is no species in critical (CR) danger.

2. GENERAL

2.1 Project Description

2.1.1 Implementation Description

Primary Goal: Prevent deforestation in the Cordillera Azul National Park by designing and implementing activities that fulfill the following secondary goals and objectives:

i. Improve Park protection to deter human encroachment.
Obj 1. The PNCAZ remains undamaged its conservation targets and continues the recovery of degraded areas

Obj. 2. PNCAZ and its buffer zone have become a place of research of global importance which gathers researchers/scientists and contributes to the management of natural protected areas.

ii. Increase local capacity for sustainable land use and improve life quality for buffer zone communities.
Obj. 3. Tourism promoted in PNCAZ's buffer zone has expanded benefits for local people without causing negative impacts to the protected area.

Obj. 4. Land-use planning is promoted in the "intervention areas" of the PNCAZ's buffer zone with the support of Regional and Local Governments

Obj. 5. PNCAZ conservation contributes to improving the quality of life of neighboring populations through the benefits generated, especially those located in the intervention areas established in the Master Plan.

iii. Strengthen relationships between park and project administrators and local, regional and national government agencies to increase effectiveness of conservation, development and livelihood efforts.
Obj. 6. Administration fee and distribution of carbon revenues

All project activities - implemented from period august 2018 to December 2020 - support these goals and are designed to work together to simultaneously achieve net positive climate, social and biodiversity benefits as discussed throughout this document, and detailed in Appendix 1.

To reduce human induced risks, like leakage, CIMA implemented the project generating positive social impacts in buffer zone populations, improving several aspects of the quality of life: *natural, social, human, physical and economic capitals*; for example, improved participation in strategic planning processes for villages (Quality of Life Plans and Action Plans), application of the land-use zoning as a tool for managing territories and community conservation areas according to their interests, and developing/improving sustainable economic activities (i.e. cacao and coffee in agroforestry systems, women handicraft and tourism), all of which have contributed to an improved standard of living of local human populations in the buffer zone; thus, 91% of the communities recognizes the work of CIMA as beneficial to its community, and 95% identifies the Park as important in terms of natural resources and ecosystem services (MUF 2016). CIMA uses tools like MUF to monitor those social aspects, uses, perceptions, and risks.

In the case of natural risks, is important to remark that the most important regional and local strategy that will favorably impact a changing global climate is to maintain the huge

area of natural forest contained in the PNCAZ intact such that ecosystem services and animal and plant communities are protected and adapted gradually.

Since November 2014, CIMA signed a Loan Agreement and Agency Agreement with Althelia Climate Fund (ACF), both are backed by the carbon credits that REDD+ PNCAZ Project has generated in 2008-2012 as well as those that were generated from 2012 to 2018. This agreement ended officially in February 10, 2021.

2.1.2 Project Category and Activity Type

Project Scope 14: Agriculture, Forest and other Land Use (AFOLU);

Project Category: Reduction Emission from Deforestation and Degradation (REDD);

Type of Activity: Avoided Unplanned Deforestation

(AUDD). The project is not a grouped project.

2.1.3 Project Proponent(s)

Organization name	Centro de Conservación, Investigación y Manejo de Áreas Naturales – Cordillera Azul (CIMA-Cordillera Azul)
Contact person	Gonzalo Varillas C.
Title	Executive Director
Address	Av. Benavides 1238/601, Miraflores, Lima 18, Peru
Telephone	+51 1 2411191
Email	gvarillas@cima.org.pe

2.1.4 Other Entities Involved in the Project

Organization name	TerraCarbon LLC
Role in the project	Provide technical assistance in the application of REDD methodologies and development of portions of the project documentation
Contact person	David Shoch
Title	Director, Forestry and Technical Services
Address	5901 N. Sheridan Road, Peoria, IL 61614, U.S.A.
Telephone	434 326 1144
Email	david.shoch@terracarbon.com

2.1.5 Project Start Date (G3.4)

Unchanged from the description in the validated PD.

The PNCAZ REDD+ Project began on **August 8, 2008** with the signing of the Total Management Contract between CIMA and the Peruvian Government (through SERNANP, previously INRENA when the contract was initially signed).

2.1.6 Project Crediting Period (G3.4)

Unchanged from the description in the validated PD.

The project crediting period is 20 years, extending from **August 8, 2008 – August 7, 2028**. This corresponds with the length of the management contract between CIMA and the Peruvian Government.

The project lifetime is likely greater than 100 years because the project area is a legally recognized national park and the government has shown a commitment to ensuring it continues to be privately managed and protected. CIMA has been able to renew its management agreement each renewal period to date since 2002. CIMA expects to be able to renew its management contract when the current one expires in 2028. Both CIMA and the government have agreed that a portion of the revenue obtained from the sale of carbon credits will be used to establish an endowment for the park's long-term protection as outlined in the PD section 4.5.3. This endowment will fund park management activities managed by CIMA or any other future management contract holders.

It is necessary to emphasize that during the first two monitoring periods (2008-2012 and 2012- 2014), the project sold a small amount of VCUs in the voluntary market; however, in November 2014 CIMA signed a Loan Agreement and Agency Agreement with Althelia Climate Fund[23] (ACF), both are supported by the carbon credits that the PNCAZ REDD+ Project had generated in 2008-2012 and 2012-2014, as well as those generated during 2014- 2015, 2015-2016, and 2016-2018. In 2019, MINAM allowed the project to be extended through December 31st, 2020.

For the first implementation period (August 2008 - August 2012), it was verified that the PNCAZ REDD+ Project avoided a total of net emissions of 6,413,412 tCO2-e (deducting the risks due to non-permanence, 5,772,701 tCO2-e were reached).

For the second implementation period (August 2012 - August 2014), the project verified a net reduction of GHG emissions of 4,606,143 tCO2-e (deducting risks due to non-permanence, the 4,145,529 available tCO2-e are reached).

For the third implementation period (August 2014 - August 2015), there has been no anthropogenic deforestation or forest degradation in the project area, and the net reduction of greenhouse gas emissions was 3,374,249 tCO2-e (deducting risks due to non-permanence reached the 3,036,824 tCO2-e available).

During the fourth monitoring period (August 2015 - August 2016), no deforestation or forest degradation occurred in the project area, and the net GHG reduction was 4,074,606

[23] https://althelia.com/ Althelia Climate Fund is investing in ecosystems conservation and sustainable agroforestry, applying best-in-class social, environmental and governance (ESG) criteria.

tCO2-e (deducting risks due to non-permanence are reached the 3,667,145 tCO2-e available).

During the fifth monitoring period (August 2016 - August 2018), no anthropogenic deforestation occurred, but the disturbance was mainly due to natural landslides and on river beaches; there is very little degradation of the forest due to the use of firewood in the project area, and the net GHG reduction was 9,576,449 tCO2-e (deducting risks due to non-permanence are reached the 8,618,804 tCO2-e available).

During the sixth monitoring period (August 2018 – December 2020) the net GHG reduction was 12,869,130 tCO2-e (deducting risks due to non-permanence are reached the 11,371,671 tCO2-e available). This information is to be found in page 60 below.

2.1.7 Project Location (G3.3)

Unchanged from the map in the validated PD.

The boundaries of the project area remain unchanged from the description in the validated PDD, and the boundaries of the project zone continue to be the park's buffer zone (Figure 2.1). Definitions of the project area, buffer zone of the park and the project zone are provided here to ensure clear understanding:

The **Project Area** is located within the boundaries of the Cordillera Azul National Park (PNCAZ); owned by the government of Peru. The limits of the park, as defined in the official Supreme Decree No. 031-2001-AG, lie between 06°29'13.3" – 08°54'07.5" South and 75°20'52.3" – 76°24'17.4" West. The Park has an area of 1,353,190.85 hectares (ha) and an approximate perimeter of 974 km. within four Departments: San Martín, Ucayali, Huánuco and Loreto. A small amount of land within the park is privately owned, so the project area is 1,351,963.85 ha. The PNCAZ is managed by CIMA under a *Total Management Contract* with the Peru's Natural Protected Areas Service (SERNANP).

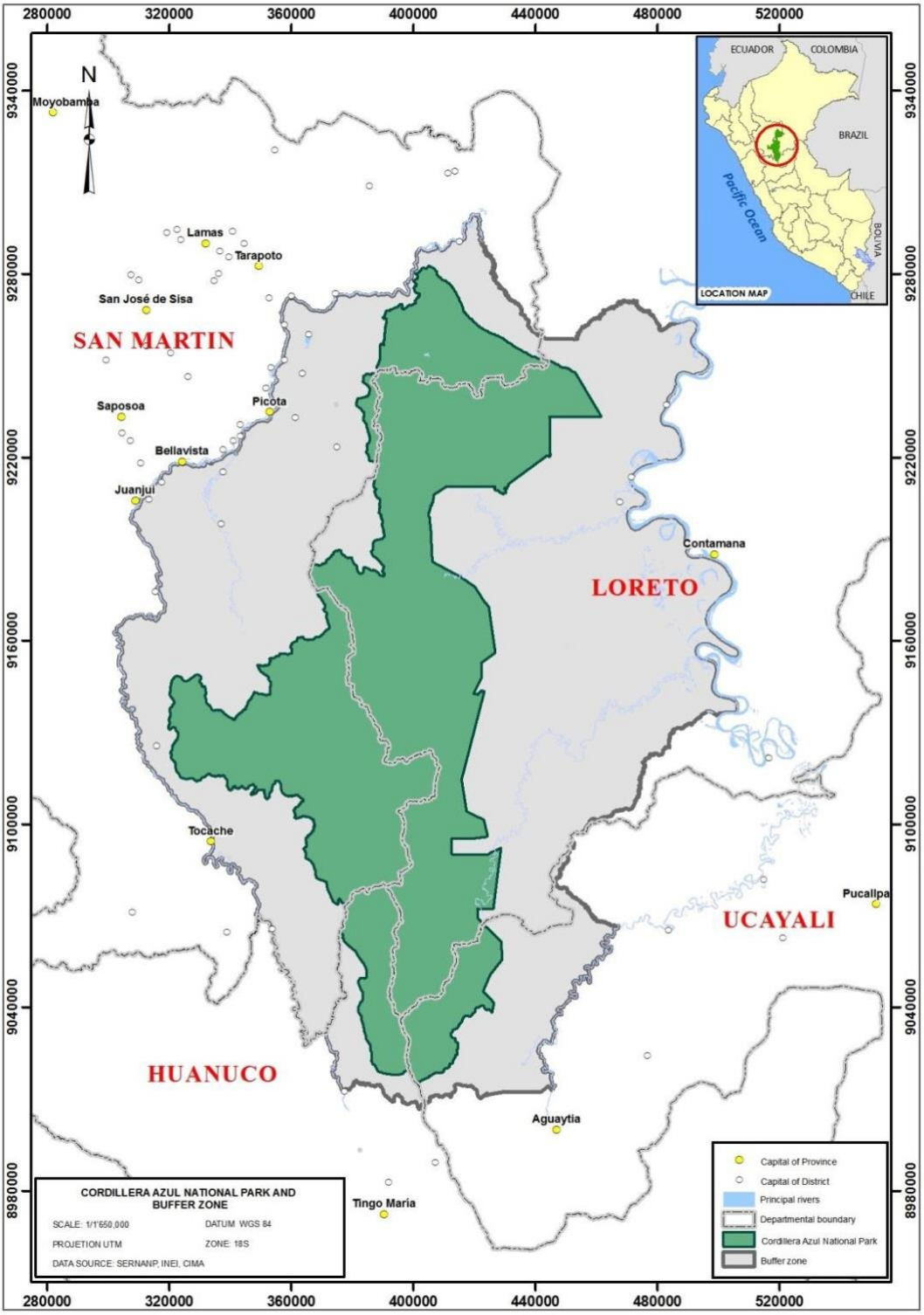
The **park's buffer zone** surrounds the park, so, local population with land within the buffer zone are most likely to be affected by the REDD+ Project and are the focus of project activities. The park's buffer zone was provisionally delineated by the Peruvian government[24] on 13 December 2001, covering 2,061,259.79 ha. In June of 2007 INRENA passed a resolution[25] amplifying the buffer zone to more than 2.3 million hectares and making official the limits proposed in the Master Plan 2003-2008[26]. Formerly, in 2011, through the resolution[27] that approved the Master Plan 2011–2016 (SERNANP 2012), the buffer zone limits were adjusted once more, now to 2,303,414.75 ha. Finally, during the updating process of the Master Plan 2017-2022, the boundaries of the buffer zone, previously approved in 2011, were ratified.

The **Project Zone** is a combination of the project area and the buffer zone. Because no human communities or villages exist within the project area, communities within the buffer zone represent all human communities within the project zone.

[24] Resolución Jefatural Nº 314-2001-INRENA
[25] Resolución Jefatural Nº 144-2007- INRENA
[26] Resolución Jefatural Nº 245-2004-INRENA
[27] Resolución Presidencial Nº 064-2011-SERNANP

The figure 2.1 shows the map of the Cordillera Azul National Park project area (shaded in green) and its buffer zone (shaded in grey). The project zone consists of the entire shaded area (project area and buffer zone). The inset map shows the park's location in central Peru.

Figure 2.1: Project Map and Location



2.1.8 Title and Reference of Methodology

The methodology used to quantify the avoided emissions is the framework and component modules of the modular REDD methodology VM0007 REDD Methodology Modules Version

1.3 approved 20 November 2012.

This project uses the following modules and tools:

- VM0007 REDD Methodology Module, REDD Methodology Framework (REDD-MF), version 1.3
- CP-AB "VMD0001 Estimation of carbon stocks in the above- and belowground biomass in live tree and non-tree pools", version 1.0;
- CP-D "VMD0002 Estimation of carbon stocks in the dead-wood pool", version 1.0;
- BL-UP "VMD0007 Estimation of baseline carbon stock changes and greenhouse gas emissions from unplanned deforestation", version 3.1;
- LK-ASU "VMD0010 Estimation of emissions from activity shifting for avoided unplanned deforestation", version 1.0;
- E-BB "VMD0013 Estimation of greenhouse gas emissions from biomass burning", version 1.0;
- M-MON "VMD0015 Methods for monitoring of greenhouse gas emissions and removals" version 2.1;
- X -STR "VMD0016 Methods for stratification of the project area" version 1.0;
- X-UNC "VMD0017 Estimation of uncertainty for REDD+ Project activities" version 2.0;
- T-ADD "VT0001 Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities", version 3.0;
- T-BAR "Tool for AFOLU non-permanence risk analysis and buffer determination", version 3.1;
- T-SIG CDM "Tool for testing significance of GHG emissions in A/R CDM project activities", version 1.0.

2.1.9 Other Programs (CL1.5)

Not applicable to this project.

2.1.10 Sustainable Development

The PNCAZ REDD+ Project is recognized as an early initiative by Regulation of the ***Law on Remuneration Mechanisms for Ecosystem Services*** (Mecanismo de Retribución de Servicios Ecosistémicos – MRSE) approved in July 21, 2016; also understand the need to integrate them into the country reduction report, considering their positive impacts on reducing emissions from the USCUSS sector through eligible activities. In the other way, the National Forest and Climate Change Strategy (Estrategia Nacional De Bosques y Cambo Climático – ENBCC) approved by MINAM, recognizes the currently trends towards increased deforestation in Loreto and Ucayali, while San Martin. The MRSE promotes and regulates the establishment of voluntary agreements that reward the efforts of various public and private actors in the maintenance and enhancement of ecosystem services, including forest ecosystems under threat.

2.2 Project Implementation Status

2.2.1 Implementation Schedule (G3.4)

The following table summarizes the milestones in the chronology of the implementation of the PNCAZ REDD+ Project between August 8, 2008 and August 8, 2020

Date	Milestone(s) in the project's development and implementation
August 8, 2008	CIMA signed a contract with the Peruvian government for Total Management of the PNCAZ, a state-owned Natural Protected Area (ANP).
September 9-11, 2013	On the recommendation of the Monitoring Committee of the PNCAZ Management Contract, a Five-Year Planning Workshop for the Total Operations Management Agreement for PNCAZ was held in Lima to review (a) the results of the five-year period 2008-2013 and (b) the proposed 2014-2018 five-year plan.
November 6, 2013	CIMA and SERNANP signed a contract addendum which modifies Annex C: "Expected Results 2008-2013" of this Service Agreement.
November 29, 2013	The executant of the Administration Contract sent to SERNANP the proposed Five-Year Work Plan and Budget for the period between January 2014 and December 2018.
March 10, 2014	The Five-Year Work Plan and Budget received approval by the Management Department for Protected Natural Areas (DGANP-SERNANP)

<table>
<tr><td>May 21, 2014</td><td>Blue Agreements (Acuerdos Azules) or Communal Conservation Agreements signed between CIMA and 3 local villages:
<table>
<tr><th>Region</th><th>Sector</th><th>Village</th><th>Population</th><th>Area</th></tr>
<tr><td rowspan="5">San Martín</td><td>Tres Unidos</td><td>San Juan</td><td>500</td><td>4,371</td></tr>
<tr><td rowspan="4">Shamboyacu</td><td>Lejía</td><td>354</td><td>1,443</td></tr>
<tr><td>Vista Alegre</td><td>660</td><td>1,272</td></tr>
<tr><td>Alto Ponaza</td><td>850</td><td>1,636</td></tr>
<tr><td>Paraíso</td><td>840</td><td>1,183</td></tr>
<tr><td colspan="3">TOTAL</td><td>3,204</td><td>9,905</td></tr>
</table>
To renew the commitment for 10 years in favor of the conservation of the park, the sustainable use of the natural resources and the improvement of the quality of life of the populations in the scope of the protected natural area</td></tr>
<tr><td>November 12, 2014</td><td>CIMA and Althelia Climate Fund (GCF), with the authorization of SERNANP, signed a contract for financing the operations of PNCAZ and its buffer zone, compromising 8 million VCUs.</td></tr>
<tr><td>November 18, 2015</td><td>Blue Agreements (Acuerdos Azules) or Communal Conservation Agreements signed between CIMA and 3 local villages:
<table>
<tr><th>Region</th><th>Sector</th><th>Village</th><th>Population</th><th>Area</th></tr>
<tr><td rowspan="2">San Martín</td><td>Pólvora</td><td>Nuevo Jaén</td><td>2,300</td><td>4,073</td></tr>
<tr><td>Shapaja</td><td>Santa Rosa de Shapaja</td><td>1,200</td><td>7,218</td></tr>
<tr><td>Huánuco</td><td>Pucayacu</td><td>Maronilla</td><td>810</td><td>1,222</td></tr>
<tr><td colspan="3">TOTAL</td><td>4,310</td><td>12,513</td></tr>
</table></td></tr>
</table>

<table>
<tr><td></td><td>To renew the commitment for 7 years in favor of the conservation of the park, the sustainable use of the natural resources and the improvement of the quality of life of the populations in the scope of the protected natural area[28].</td></tr>
<tr><td>December 2015</td><td>Through 2015, 17 plans Quality of Life Plans were well established.</td></tr>
<tr><td>March 16, 2018</td><td>Blue Agreement (Acuerdos Azules) or Communal Conservation Agreements signed between CIMA and a local native community Yamino
<table>
<tr><th>Region</th><th>Sector</th><th>Village</th><th>Population</th><th>Area (ha)</th></tr>
<tr><td>Pucallpa</td><td>Aguaytía</td><td>Yamino</td><td>163</td><td>30,537</td></tr>
<tr><td colspan="3">TOTAL</td><td>163</td><td>30,537</td></tr>
</table>
To formalize the commitment for 2 years in favor of the conservation of the park, the sustainable use of the natural resources and the improvement of the quality of life of the populations in the scope of the Park.
There are a total of 7,677 beneficiaries from the Blue Agreements, corresponding to 8 (eight) villages and 1 (one) native community, covering a
total area of 52,955 hectares.</td></tr>
<tr><td>April 2018</td><td>Until April 2018 a total of 31 villages have developed their Quality of Life Plans as well as to continue the process of Implementing.
Until August 2018 all those villages and communities ongoing implementing their Communal Strategic Planning (QLP and Action Plans).</td></tr>
<tr><td>2018</td><td>Cordillera Azul National Park was included in IUCN´s Green List, being one of the two Peruvian protected areas that are included in this elite category.</td></tr>
<tr><td>2019</td><td>4 new Quality Life Plans were developed: Alto Marona, Cahuide, Nuevo San Martín and Villa Hermosa, totalizing 35 communities that count on this tool.

Thanks to the initiative of the Park´s Management, the 10th Blue Agreement was signed with the Agrarian Cooperative Naranjillo.

PNCAZ was selected to be one of the tenth protected areas around the world to be part of IUCN´s Incubator for Innovation: Financing for the conservation of protected areas, IUCN hired an international consultant, specialist in finance and business, to be part of PNCAZ´s co-management team for six months.

In a historic event, in November of 2019, Althelia concreted the selling of almost 8 M of VCUs from the PNCAZ REDD+ project.</td></tr>
</table>

[28] http://www.cima.org.pe/es/noticias/poblaciones-firman-acuerdos-en-favor-de-la-conservacion-del-parque- nacional-cordillera-azul

2020	Amid the COVID pandemic, CIMA and SERNANP carried on with the park´s protection activities. The activities aiming for the enhancement of the Quality of Life for the populations living in the buffer zone were heavily reduced. Yet some of them were completed, such as the bungalow construction in Yamino, looking ahead for tourism. The contract with Althelia ended formally in February 2021.

2.2.2 Methodology Deviations

While it was not a deviation from the methodology, adjustments were made to the monitoring plan. So, in accordance with the PIR 2008-2012 (section 2.2) a new classification technique used to overcome sensor errors had been done. This procedure was already justified and explained in the PIR 2008-2012, section 5 (Appendix 1).

2.2.3 Minor Changes to Project Description (*Rules* 3.5.6)

Section 6.2 of the PD defined the variables selected for the community monitoring, the data source and the frequency. For most cases, the Mapping of Uses and Strengths – MUF is the main information source and this process has not been performed due to Covid delays. Due to COVID-related restrictions, the MUF could not be conducted during the current monitoring period, and all variables for community monitoring specified in Section 6.2 of the PD were gathered from information originating during the field activities(reported on in detail in Table 4.2 in this MR). In the current monitoring period, data collection involved more interactions through interviews with households from communities with and without project interventions. There are no indications that this deviation in data collection procedures would materially impact the monitoring outcome. This minor change, should be amended for the next monitoring period, where the MUF is taking place.

The main differences in data collection during the current monitoring period can be seen in the following table:

VARIABLE	INDICATOR	DATA COLLECTION METHOD	FREQ.	Current monitoring period methods
Natural Capital	# of hectares under community-generated management or used according to land-use plans	Quarterly summaries of field staff reports and MUF	Annually at time of ICC evaluation and more thoroughly every 3 years with MUF	Measured by # of hectares in ZPC (participatory communal zoning) which remains unchanged and communities protecting areas in their communities according to ZPC and QLP. No difference from what MUF could report.
Social Capital	# of communities implementing quality-of-life plans and sharing experiences with neighbors.	MUF	Every 3 years	Quarterly summaries of field staff reports. No difference from what MUF could report
Social capital (2)	# of communities with women as active participants in REDD+ Project interventions	Quarterly summaries	Annual report	Annual report
Human capital	# of REDD+ Project participants applying	Number of individuals certified	ICC maps and date base	Data base and annual report

	new technical skills in resource management, project administration and governance	in new skills and field staff report		
Physical Capital	# of communities with infrastructure improvements and mechanisms for maintaining them sustainably	MUF	Every 3 years	Quarterly and annual summaries of field staff reports. No difference from what MUF could report
Economic Capital	# of participating communities whose basic family and communal needs are satisfied through sustainable economic activities in accordance with land-use and quality-of-life	MUF (economic analysis compo-nent of MUF)	Every 3 years	Reported in QLP and quarterly reports from technical assistance. No difference from what MUF could report

Regarding HCV's, **HCV 4** on areas that provide basic ecosystem services in critical situations (eg. Watersheds protection, erosion control) is monitored through QLP implementation in natural aspects, However, forest critical to water catchment in the project area (i.e.: inside the Park) remains unchanged, thus the condition has not changed. **HCV 5,** on "areas fundamental to meeting basic needs of local communities (e.g. subsistence, health), such as food, fuel, etc,, has been monitored through the register for hunting and fishing in the park and the report on firewood consumption. **HCV 6** on areas critical local communities' cultural identity is reported on relationship to the establishment of the Kakataibo territorial community.

2.2.4 Project Description Deviations (*Rules* 3.5.7 – 3.5.10)

No deviations to the project description were applied

2.2.5 Risks to the Project (G3.5)

The predominant likely **natural risk** is the changing climate that will affect biodiversity and community and probably climate benefits as well during the project lifetime. The effect of climate change and regional mitigating activities for this global phenomenon are described here:

- Climate change: results in changes in the geographic distribution of some plant and animal species, especially those with very restricted ranges or specialization to a particular habitat. Climate change affects species distributions and would cause species extinctions.

  As well, an increased frequency and intensity of extreme climate events (*e.g.,* floods, droughts, wind storms, fires) is predicted that will affect human well-being and the provision of nature's services; Likewise, the effects of soil erosion can be increased, both in the park and in the buffer zone. An example of this was the phenomenon of heavy rains in November 2017, flooding the village of Shamboyacu, with social and economic losses[29] (INDECI

[29] According to INDECI in the districts of Shamboyacu and Tres Unidos there were more than 2 thousand affected; and more than 5 thousand in all Picota.

2017, SENAMHI 2017, GORESAM 2017) where the steep slope to the east of the area of interest and the change in land use made the marginal farms of the river more vulnerable (Lachi y Niquen 2017).

Mitigation strategy: Understanding the relevance of possible climate impacts, CIMA has developed the *Proyecto Red Regional de Observación del Clima para el Monitoreo de Cambio Climático y sus Impactos sobre los Ecosistemas de Ucayali – Red Climática Ucayali*, developed a first approximation of climate changes, which show a decrease in the number of living areas in the region, from twelve to nine due to changes in biotemperature and rainfall in the department[30].

- http://www.fondoamericas.org.pe/se-crea-el-grupo-de-trabajo-sinergias-por-el-clima- ucayali/

Thanks to this study, it is evident that in the protected natural areas (ANP) of the Ucayali region, there is a trend towards the conversion of some areas of tropical humid forests to dry forests, mainly in the Cordillera Azul National Park and the Sierra National Park of the Divisor, in a period of approximately 30 years (CIMA 2017). On the other hand, in the park there are areas of landslides fully identified that are also affected by the erosive action of heavy rains, but without affecting human populations, rather, the erosion of the soil provides nutrients for the lower areas of the basin.

In line with this, during this monitoring period, the Ministry of the Environment developed a tool for rapid identification of high risk zones in San Martin, some of which are located in the buffer zone of Cordillera Azul National Park. CIMA provided support for this initiative:

- https://www.gob.pe/institucion/minam/noticias/26341-irma-desarrollan-instrumento-de-identificacion-rapida-para-identificar-zonas-de-alto-riesgo-en-san-martin

Likewise, this tool, called IRMA, for the Spanish acronym “Rapid Identification of Action Measures” (Identificación Rápida de Medidas para la Acción), is in line with the supreme decree D.S Nº 024-2019-PCM[31], which declared in emergency several districts in San Martin: Papaplaya, El Porvenir, Chazuta, Sauce, Chipurana (San Martín province), San Cristobal, San Hilarión (Picota province) and Campanilla (Mariscal Cáceres province) in February of 2019.

In the case of PNCAZ is important to remark that the most important regional and local strategy that will favorably impact a changing global climate is to maintain the huge area of natural forest contained in the PNCAZ intact such that ecosystem services and animal and plant communities are protected. It is also very important to manage sustainably the forests in the buffer zone; to achieve this is essential to continue the sensitization processes and the land use planning for sustainability, which is the emphasis of CIMA’s work.

Avoiding fragmentation of diverse natural forests is the most effective measure to avoid species extinctions, preserve the altitudinal corridors within the park that allow vertical migration of species as temperatures rise and allowing the adaptation of the communities to the new conditions. At the end of 2017 and through 2019 CIMA, in the context of an

[30] According to the findings of the *Ucayali Climatic Network,* in the last 30 years, rainfall has decreased in Alto Purús National Park, Alto Purús Reserve, Cordillera Azul National Park and Sierra del Divisor National Park. Additionally, the temperature rises from 24°C to 26°C, has led to a decrease in the number of Holdridge life zones in Ucayali, leading to transition zones, which is a potential indicator of climate change.

[31] Included in the supporting documents.

initiative by the Convention on Biological Diversity (FERI)[32] implemented a Project of Landscape Ecological Restoration preparing to escalate the model, implemented in San Juan (Tres Unidos) and Lejía (Shamboyacu), with the development of field and restoration schools under a model of connectivity networks (Watanabe et al. 2017); this as a way to recover ecosystem services from the forest, across the landscape; please see the Project from FERI-CBD and FONDAM, from table 2 in Section 2.4.6:

- http://www.cima.org.pe/files/pdf/CIMA-2017-Folleto-Restauracion.pdf
- http://www.cima.org.pe/files/images/publicaciones/pdf/Folleto_Restauracion_2018.pdf
- https://www.facebook.com/notes/cima-cordillera-azul/sembrando-compromisos-en-la-produccion-comunal-de-plantas-en-los-viveros-locales/1096688797174020/

Also at the Panorama solutions (IUCN portal)

- https://panorama.solutions/en/solution/restauracion-ecologica-en-la-zona-de-amortiguamiento-del-parque-nacional-cordillera-azul

Also see Appendix 1, section 2.3.1: Training of Park team (CIMA and Park rangers), authorities and farmers by Field Schools, as part of the restoration project.

CIMA identified the following **human-induced risks** and has worked - and will continue to work actively - to mitigate these potential risks as detailed below:

- Natural resource concessions in the buffer zone: The Peruvian government has granted timber, mining and oil concessions in the buffer zone. Not all of these concessions are active but the concession owners do have the right to use the land. While these concessions are not inside the park, they pose a risk to the park. Threats to the park may result from illegal operations in or misuse of the concessions, resulting in potential deforestation or pollution within the park and displacement of immigrants who move closer to or into the park, increasing pressure in the project area.

  Mitigation strategy: CIMA has continued building relationships and working closely with local, regional and national governments and other strategic institutions (i.e. ACCA) to monitor concessionaries activities (i.e. main and secondary road extension to forest extraction, forest degradation and deforestation), inside and outside the concessions, and the integrity of the forest cover. All the CIMA's processes incorporate information about land use rights rather than disregarding them even if abandoned (i.e. forest and conservation concessions), in order to recognize and safeguard previous rights acquired and to avoid conflict and strengthen land use rights in the buffer zone. Additionally, CIMA has raised awareness of laws and regulations in communities to encourage members to monitor and report illegal activities to the proper authorities. CIMA has worked on strengthening forest control by supporting regular vigilance by the community (*rondas campesinas*) and park guard patrols (official and communal parkguards) in the buffer zone. (Photo: Ronda

[32] Forest Ecological Restoration Inititiave: https://www.cbd.int/restoration/feri/, https://www.feri-biodiversity.org/

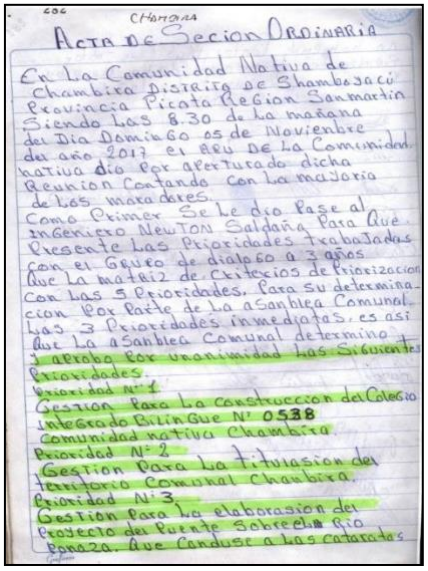
campesina from the Indigenous community of Chambira)

During 2017 and 2018, through mid-2020, CIMA was developing a project with Technoserve, in the context of the GDA Althelia – USAID, to work since September 2018 with coffee farmers in coffee without deforestation and agroforestry systems, even with those who have farms with overlap to other rights, to stop deforestation and start landscape restauration of some sites.

- Lack of land tenure in the buffer zone: As discussed, several times in the PD, most people living in the buffer zone do not own their land. This results in immigrants having only weak ties to a specific location and no motivation to remain there as erosion and soil depletion occurs. Instead, they move on to a new location. This advancing agricultural frontier presents one of the most severe threats to the park as waves of immigrants advance their deforestation and erosion-provoking practices closer to and eventually into the park.

  Mitigation strategy: CIMA has worked to train local community members in sustainable land- use practices, land-tenure processes; to ensure constant communication with as many communities as possible, and to strengthen and improve the quality of life in the communities. CIMA's process of land use zoning incorporates the border definitions of communities in order to strengthen rights of land use in the buffer zone; all of these land use zoning processes have been a key element for land use planning and recognition of the towns and communities.

  An example of this is the recognition of the territory of the native community of Chambira (Shamboyacu); which was one of the priorities in its Quality of Life Plan defined in November 2017 and was achieved in December 2018 (See Annex G5.3-G5.4 Chambira GORESAM).

  
  Acta de Seción Ordinaria
  En La Comunidad Nativa de Chambira Distrito de Shamboyacu Provincia Picota Region Sanmartin Siendo Las 8.30 de la mañana del Dia Domingo 05 de Noviembre del año 2017 en Asu De La Comunidad nativa dio Por aperturado dicha Reunion Contando Con La mayoria de Los moradores.
  Como Primer Se Le dio Pase al ingeniero NEWTON Saldaña Para Que Presente Las Prioridades Trabajadas con el Grupo de dialogo a 3 años Que La matriz de Criterios de Priorizacion Con Las 5 Prioridades. Para su determinacion Por Parte de La aSanblea Comunal. Las 3 Prioridades Inmediatas. es asi Que La aSanblea Comunal determino y aprobo Por Unanimidad Las Siguientes Prioridades.
  Prioridad N° 1
  Gestion Para La Construccion del Colegio Integrado Bilingue N° 0538 Comunidad nativa Chambira
  Prioridad N° 2
  Gestion Para La tituasion del Territorio Comunal Chambira.
  Prioridad N° 3
  Gestion Para La elaborasion del Proyecto del Puente Sobre la Rio Pongo. Que Conduse a las cataratas

  This also includes the promotion of the conservation of sites in the buffer zone of the PNCAZ, such as the Kakataibo indigenous reserve for ensuring the welfare of the uncontacted population in the Aguaytia sector; in coordination with the *Ministerio de Cultura* (MINCU).

  - https://www.facebook.com/notes/cima-cordillera- azul/consultor%C3%ADa-para-elaboraci%C3%B3n-de-los-estudios-adicionales-de-categorizaci%C3%B3n-para-/913486562160912/

- Illegal activities in the buffer zone: Illegal activities in the buffer zone place additional deforestation pressure on the park by increasing deforestation in the buffer zone and pushing immigrants closer to and eventually into the park.

Mitigation strategy: CIMA continues awareness of laws and regulations in the communities (Figure 2.2) to enable communities to also monitor and report illegal activities to the proper authorities. Because many illegal activities are driven by a need for additional resources, CIMA has worked to train local communities in sustainable land-use practices; to facilitate

Figure 2.2: CIMA 2016. Banner #7 Environmental Education

land-tenure processes (i.e. categorizing and recognizing of towns or conservation initiatives); to ensure constant communication with as many communities as possible, and to strengthen and improve the quality of life in the communities (as mentioned above).

- Increased tensions between communities that CIMA worked with initially and those that will be worked with in the future: There is a possibility that communities not located in the intervention areas will become jealous of the communities that have received priority. On the one hand, this would indicate a major success in that this situation would arise only if CIMA's activities are perceived as having value and improving the quality of life for buffer zone communities. On the other hand, increased tensions might be a negative issue and may pose a risk to the project if raids or land grabs occurred as a result. For example, some communities may become jealous of others who have been formally granted land tenure.

  Mitigation strategy: CIMA has worked to ensure constant communication with as many communities as possible to identify and address concerns as quickly as possible and to institute a strong, proactive communication program and complaint-resolution process. CIMA will never be able to work with all communities simultaneously but these measures will assist communities in understanding the priority-setting process and to voice concerns. Since 2015, CIMA has worked in a method for the prioritization of its work in the communities and scope of action, in order to have a selection of sites as objective as possible, to respond to management priorities PNCAZ and its area buffer.

  The design of the project, including the government's commitment discussed above and the project activities--emphasizing land tenure and sustainable land-use practices in the surrounding areas, and the creation of an endowment to ensure continued funding for park management activities well after the project's end--serve to ensure the project's benefits last beyond the project's lifetime. The project area is a national park so it will continue to have a SERNANP-approved Master Plan beyond the project lifetime, which will outline activities and indicators that must be monitored and reported upon. CIMA has worked diligently to ensure that community indicators are included in the Plan Maestro for PNCAZ and this provides a means for community impacts (both positive and negative) to be monitored beyond the lifetime of the project.

  For more detail about all the activities developed by the Project, including the ones mentioned in this section, see Appendix 1 and supporting documents in Goals 1, 2 and 3.

2.2.6 Enhancement of High Conservation Values (G3.6)

Unchanged from the description in the validated PDD.

The project protects a vast expanse of intact montane forest with native species, and the use of natural resources in the project is solely for traditional use and subsistence, i.e., hunting, fishing, or medicinal; also considering the park zoning. As described previously in Section 1.10.5 Biodiversity from the PDD, all species in the park are native and many are endemic and/or threatened. No invasive, non-native, or genetically modified species will be used or introduced into the park as part of this project. This diversity and the extension of the park´s territory allows for presence of HCVs 1-6, as defined in the PD Table 1.4. In this sense, the sole protection of the park maintains all existing HCVs. Some specific examples of activities that have appeared over the years of implementation and do have the potential to enhance some HCVs are:

- The protection of forested zones outside the project area.
- The indirect regulation of hunters and fishers, allowing animal populations inside the project area to thrive.
- The support provided in order to establish an Indigenous Reserve outside the project area.

Park guard patrol routes are used not only for control, but also to collect the monitoring data and these routes encompass large areas both in the park and in the buffer zone, resulting in monitoring of the entire project zone (more information in Section 5.1.1). Additionally, records of researchers show good populations of birds and large mammals (Alvarez et al. 2014), as well as amphibians endangered and sensitive to diseases such as those believed to occur by changes in weather conditions (Hörnes 2016), Likewise, the PNCAZ fulfills its function of protecting these vulnerable species (Pizarro 2016 and Moncrieff et al. 2018). More details are described in the sections 4.1.3 and 5.1.2.

2.2.7 Benefit Permanence (G3.7)

Unchanged from the description in the validated PDD.

The project crediting period is twenty years long extending from August 8, 2008 – August 8, 2028, because this is the length of the management contract between CIMA and the Peruvian government. However, the project lifetime is likely greater than 100 years because the *project area* is a legally recognized national park and the government has shown a commitment to ensuring it continues to be privately managed and protected.

The PNCAZ REDD+ Project has been recognized by the MINAM as a REDD early initiative. The Peruvian government, through SERNANP and MINAM, also proposes that the protected areas with REDD+ Projects should harmonize their project´s baselines with the forest emission reference levels built by MINAM for the national level, since 2021 onwards.

During 2018[33], SERNANP postulated the PNCAZ[34] - along with four other ANPs - to the IUCN Green List[35], which has generated an additional commitment to maintain the high standards of governance for the conservation of these areas (PNCAZ and the Amarakaeri Communal Reserve); PNCAZ has been recognized by the standard and is now a Green List park. It also need to be emphasized that CIMA put a lot of time and resources in helping prepare the necessary documentation for the Green List and paid the salaries of the consultants who led this work. The park´s inclusion in the Green List (second half of 2018: https://www.cima.org.pe/es/noticias/gestion-del-parque-nacional-cordillera-azul-reconocido-a-nivel-internacional-al-ingresar-a-lista-verde-de-la-uicn) optimizes the park´s exposure and allows opting for further funding, using the already existing park´s budget as counterpart.

This funding has allowed to work on different aspects of climate, community and biodiversity, as for example happened with the cacao and cafe projects, shortly described below.

The CAFÉ (Coffee Alliance for Excellence) project was funded by Technoserve. It provided CIMA with additional funding, employed to map the cacao and coffee farmers in the Aspuzana Valley and Tocache region, provided training for farmers and started producing and selling seedlings of native tree species to be employed in the restoration activities, also included in this project. Table 2 in section 2.4.6 shows additional projects that fell in the current monitoring period, which allowed for funding to be managed by CIMA and implement project activities.

Finally, based on the fact that Cordillera Azul is a nationally recognised protected area, if it´s funding is secured perpetually, all park´s benefits are secure. In this sense, the activity regarding REDD funding has been key over this monitoring period (See MR 2.4.6). The goal with these larger transactions if to achieve a trust fund to finance the park´s operations in perpetuity. With the current Total involvement, this will likely start happening over 2021.

2.3 Stakeholder Engagement

2.3.1 Community Consultation (G3.8)

Unchanged from the description in the validated PDD.

Two groups of stakeholders were identified for the project: (1) Primary stakeholders are those with direct involvement in the project area, with is the Peruvian government through SERNANP and MINAM. (2) Secondary stakeholders are those in the buffer zone, who may be affected by some project activities but do not reside or have rights in the project area.

SERNANP and MINAM participate to the discussions, work groups, presentations, and conferences related to the PNCAZ´s REDD+ Project. The PNCAZ Master Plan, with was approved by SERNANP in 2017, considers the REDD+ Project as a financial mechanism implemented y CIMA. CIMA and SERNANP maintain a close working relationship

[33] https://www.iucn.org/es/news/américa-del-sur/201807/se-implementa-la-lista-verde-de-áreas-protegidas-en- Perú
[34] http://www.sernanp.gob.pe/noticias-leer-mas/-/publicaciones/c/areas-naturales-protegidas-de-peru-en-camino- a-integrar-443703
[35] https://www.iucn.org/theme/protected-areas/our-work/iucn-green-list

coordination for the project implementation and any improvements that may be made over time, as new information obtained. CIMA coordinates very closely with the PNCAZ Head, in fact CIMA's Tarapoto offices are located within PNCAZ's Headquarters allowing for continuous communication. In addition, SERNANP maintains REDD+ Projects in ANP, including PNCAZ, on its website: http://www.sernanp.gob.pe/proyectos-redd-

For the population in the PNCAZ´s buffer zone, monthly visits of CIMA's technical field staff to communities provide an opportunity to present information and receive comments. CIMA works extensively with these communities to determine how the project can have the most positive impact on their lives. The desire for a participatory approach to park management is included as one of the three primary goals of the project and supporting activities have been defined. The strategies and specific tools used by CIMA for park and project management are publicly available on CIMA's web page (http://cima.org.pe); those have been explained to local populations during training and consciousness-raising sessions as well as distributed in print to local leaders, institutions, authorities and other stakeholders.

2.3.2 Public Comment Period Publicity (G3.9)

CIMA submitted letters to local and regional stakeholders, offering the chance for or any interested person or institution to submit comments within the public comment period. The PNCAZ REDD+ Project was kept on VERRA´s web for at least one month, as required by the CCB, waiting for public comments. In this period, no comments were received, neither by technical institutions, academics, or institutions involved with human / community rights. We understand from our field experience and as members of several inter-institutional working groups that it is difficult to get comments on documents (not only posted on the web, but even delivered directly), so that our work input with local population (training, decision making, news, coordination, awareness, etc.) at the community level, are given in the space of community assemblies[36], as the main space for citizen participation.

Likewise, the technical details of the PNCAZ REDD+ Project are very complex, so it is very difficult to explain beyond the basic principles of Climate Change, generalities of REDD and details of the program at the local level (main components of work in the ZA), making it as simple as possible; as when working on the PNCAZ Master Plan, where the PNCAZ REDD+ Project is also incorporated in its environmental objective (SERNANP 2017). The technical details are very difficult to explain at a level of everyday language, especially in the case of the Shipibo communities (where CIMA has a Shipibo technician) because many of the words in the detail of the PDD and the PIR have no translation into this language; but it is worth emphasizing that local people understand very well the relationship between the forest, climate and other benefits that must be maintained to ensure their quality of life.

Considering that it is very difficult for the local population to make public comments under the system currently maintained by the VCS / CCB or VERRA. On the contrary, CIMA suggests making adjustments in the public comment section, where it would be more

[36] In the case of the native communities and local population in the PNCAZ buffer zone, it would be a lack of courtesy on the part of CIMA to inform the population and local authorities (either orally or by letters) that they are expected to make public comments on the standard website, with documents based on English guides; being in addition that none of these populations counts on service of Internet, and a very low percentage counts on telephony and electrical light, at least not those that are nearer to the park.

realistic than any authority, technical-social entity, project observer, etc. that was eventually witness or take notice of any irregularity in the projects, contact and make the respective comments, providing the appropriate evidence.

2.3.3 Distribution of Project Information (G3.9)

Following PD section 7.1.2, communications have been sent by letters to authorities and jurisdictions where the project is present to publicize the CCBA public comment period for the current verification. CIMA submitted letters to the respective local and regional authorities, as well as indigenous grassroots organizations (Federaciones indígenas), SERNANP and MINAM, among others.

In previous verifications, this process included direct presentations to the different stakeholders, which in some cases resulted in discussion groups regarding the parameters used, results obtained, opportunities and future REDD options in the country. However, due to the Covid pandemic, this work was not performed in this monitoring period. Nevertheless, the technician´s work in the field, disseminates project information in a non-structured way regularly and using their own criterion about how technical the information can be. In most of the cases, a simple link between the park´s existence and the possibility to perform field work in the buffer zone is great progress.

Finally, as it is stated later on in this report CIMA has implemented a REDD section on its web page, which will be constantly improved in order to communicate the project in the clearest way: https://www.cima.org.pe/es/parque-nacional-cordillera-azul/proyecto-redd-cordillera-azul-project.

2.3.4 Conflicts and Grievances (G3.10)

Unchanged from the description in the validated PDD.

Any comment from the buffer zone communities - even in case of conflicts or grievances - goes directly to park guards or to the CIMA technical team, given their frequent interaction with the communities; if the CIMA technician is not present in the area, the ranger can do that function or call an *ad hoc* meeting to solve the problem; the community can also request additional information and unveil doubts corresponding to the program or about the intervention model. However, some comments or conflict are sent to the CIMA field offices or directly to the Head of PNCAZ; so, parkguards forward questions they cannot answer and concerns or complaints voiced by residents to the field offices. Most items are easily resolved by the field offices, but when necessary are forwarded to the Program Director or local law enforcement authorities as appropriate.

Concerns and comments are handled in a consistent manner. Depending on the issue, conference calls, in-person meetings, interviews with the commenter or CIMA personnel, and other means are used to obtain additional information as necessary, and appropriate actions are then taken. Some complaints have resulted in expanded training, new communications to buffer zone communities, and even firing of an employee. There is no formal written procedure for this process but it is applied consistently and builds on CIMA's close relationship with the buffer zone communities. CIMA’s Executive Director is ultimately responsible for the resolution of all issues but questions, complaints, and comments may be addressed by several individuals within the organization, depending on the topic.

Two events are mentioned here: the first one is rather a land clearing infraction and therefore described in section 5.3.2. The second one, a possible land tenure issue, is described below.

During the verification field visit, it was raised that a land tenure conflict may exist. In the native community of Chambira, some people mention overlapping areas between the community's territory and the Cordillera Azul National Park area. This happened due to a misreading and misinterpretation of the maps and external interests to accredit more forest to the native community for economic benefit. The basin maps were previously made by another institution (Cedisa) and they were given to the community, leading to misinterpretation of the local territory, although they were never made with that purpose. The current community´s claim is that the whole basin area would be communal territory, while, when the park was established, it covered the higher part of the basin.

CIMA has been carrying out continuous and participatory work with the community since 2002, where 4 MUFs (Mapping of Uses and Strengths) were developed in 2003, 2005, 2008, and 2016. Additionally, in 2017, the Quality of Life Plan (QLP) for Chambira was completed and in 2018, the priority “Titling of communal territory” was achieved (see Appendices G5.3-G5.4). In the MUFs, CIMA and the community leaders have jointly recognized the limits of the park and its territory. Likewise, for this year, a joint work plan was agreed to be develop. The activities for this year are: to form a community vigilance committee, provide technical support to the Allima Sacha association, and the CN Chambira tourism committee.

Following PD section 7.1.3, this is an issue that was picked up by CIMA´s team and the Cordillera Azul Programme Director was made aware immediately. CIMA has established a plan of activities to clarify the claims of overlapping areas. First, CIMA's technical team, the PNCAZ leadership team, and the community leaders of Chambira will conduct a field visit to corroborate and reaffirm the limits of both territories together. On the other hand, a work meeting will be held in the community to explain the maps and boundaries of both sectors. Finally, a formal written response has to be handed to the community´s authorities. Among Appendices G5.3-G5.4 is also included a very recent meeting in Chambira.

2.4 Management Capacity and Best Practices

2.4.1 Required Technical Skills and Expertise (G4.2)

The project proponent is the Centro de Conservación, Investigación y Manejo de Áreas Naturales-Cordillera Azul (CIMA-Cordillera Azul). CIMA was created to provide institutional, technical and financial support to the Peruvian government for the administration and management of the PNCAZ.

CIMA’s success in its initial pre-project pilot efforts led the Peruvian government to sign a 20- year management contract with the non-governmental organization for full management of the park, ranging from field activities to strategic planning. CIMA’s headquarters in Lima oversees the activities of all field offices and coordinates directly with the relevant offices of the national government. Although CIMA has had the PNCAZ management contract since 2008, all park guards in Peru are part of the national park system overseen by SERNANP. CIMA has been providing funding for park guards and control infrastructure and activities, working closely with SERNANP to design annual work

plans as well as monitoring all park guard operations. In coordination with SERNANP, CIMA has also been responsible to design and implement the park management strategies outlined in the Master Plan.

The governance structure for the PNCAZ REDD+ Project is illustrated by the organizational diagram (Figure 2.3). The Cordillera Azul Program, led by the Program Director, consists of three areas led by the PNCAZ Director: (1) Protection, led by the Head of the PNCAZ, (2) Territorial Zoning and SIG Area and (3) Extension, which is the most active area of work inthe buffer zone; these latter two areas were combined in 2013 as a result of the evolution of CIMA's Model for Activity Implementation in the buffer zone. Ecological and Economic Land-Use Zoning (ZEE) was part of the physical diagnostic phase prior to community strategic planning.

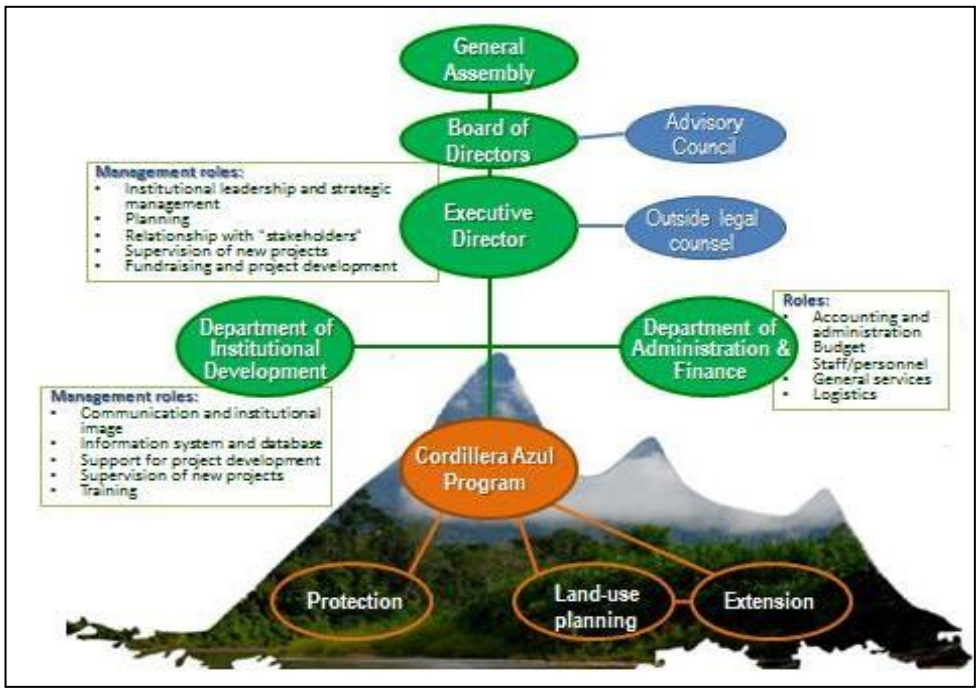


Figure 2.3. The governance structure and organization of the PNCAZ REDD+ Project

The only changes in key personnel since the last verification period was in the Program Director, and the executive director of CIMA, without change in the organigram; therefore, CIMA's management team, and their advisors, maintain their extensive experience in a variety of fields and key technical skills required by the project including finance, administration, law, anthropology, communication, education, biology, forestry, agronomy, mapping and GIS. The personnel directly responsible for the project has been maintained, a brief summary of their responsibilities is listed below:

2.4.1.1 Executive Director – Gonzalo Varillas Cueto

- Reviews project progress through quarterly and annual reports and internal meetings covering the budget, programs, and communications;
- Ensures the resources needed for the project are obtained either through hiring or training of CIMA employees or through collaborations with, or retention of, outside organizations;

- Represents CIMA in high-level discussions and contracting with SERNANP, other governmental agencies, media, stakeholders and supporting organizations or contractors;
- Ensures CIMA operates in accordance with all applicable regulations.

2.4.1.2 Director of Finance and Administration – Jorge Aliaga

- Oversees all aspects of project finances;
- Ensures revenue distribution is in accordance with the agreed upon revenue-sharing plan
- Monitors the annual project budget;
- Oversees accounting and financial audits;

2.4.1.3 Program Director – Karina Santos Galindo

- Oversees the implementation of the 20-year park management contract;
- Oversees strategy and project activity development and implementation;
- Oversees programmatic activities of all regional offices and interfaces with local and regional partners; Implements activities supporting the park management contract.
- Tracks project progress through personal involvement and review of quarterly and annual reports and internal meetings covering the budget, programs, and communications;
- Represents CIMA in discussions regarding the project with SERNANP, other governmental agencies, media, stakeholders and supporting organizations or contractors;
- Ensures coordination and communication among regional offices and with Lima office;
- Provides local contact for SERNANP's Park Director;
- Ensures coordination of park guard activities, including scheduling, acquisition of supplies and safety procedures;
- Manages programs supporting the REDD+ Project reviewing the schedule, budget and effectiveness of the programs;
- Ensures that project field activities operate in accordance with all applicable regulations.

2.4.1.4 Director of Institutional Development – Lily O. Rodriguez

- Oversees collection, mapping, analysis and storage of project data
- Manages programs supporting the projects reviewing the schedule, budget and effectiveness of the programs;
- Coordinates training for park guards and CIMA personnel as needed, including the development of training tools and programs, obtaining funds for training, and securing qualified trainers;
- Works with the GIS group responsible for interpreting satellite imagery, mapping information, conducting analyses and providing reports;
- Represents CIMA in technical discussions regarding the project with SERNANP, other

governmental agencies, media, stakeholders and supporting organizations or contractors;

- Participates in the Mesa REDD network and the National Climate Change Commission's REDD Technical Group;

Additionally, CIMA has been collaborating with a wide range of institutions that bring a complementary set of skills to implement management activities in PNCAZ and the buffer zone. CIMA works with these diverse institutions through a variety of relationships, including some collaborative agreements and contracts. The range of CIMA collaborators includes:

- **Academic institutions**: local, national and international universities and museums, such as Universidad Nacional Agraria La Molina (UNALM), Universidad Peruana Cayetano Heredia (UPCH) and the Museo de Historia Natural (MUSM) of the Universidad Nacional Mayor de San Marcos (UNMSM), Universidad Nacional Agraria de la Selva (UNAS), Pontificia Universidad Católica del Perú (PUCP); and international universities, like University of Bonn (Germany); University of Duke, University of Texas (USA), Universidad de Cambridge, University of Sussex (UK); University of Hamburg (Germany) with several other academic institutions and non-governmental organizations in Latin America.
- **Schools and training centers**: Administrative educational units (Unidades de Gestión Educativa Locales-UGEL), Centro Los Tacarpos (Maronilla) elementary and high schools and technical institutes.
- **Community-based organizations**: Indigenous federations, parents and teachers' association (APAFA), local vigilance groups (*rondas campesinas*) and community committees (*I.e.* associations, cooperatives, mother clubs and other interest groups).
- **Authorities and different government organizations** at the national, regional and local levels (including institutions that review and approve CIMA's initiatives such as master plans for the park and zoning efforts for the buffer zone); Provincial and District Municipalities; and the Regional Governments of Loreto, Huánuco, Ucayali and San Martín.

TerraCarbon (Peoria, Illinois, USA) has provided essential support CIMA in the measurement and monitoring of forest carbon The TerraCarbon team of forestry and modelling experts quantified the amount of avoided deforestation by measuring the park's carbon stock and properly documenting the process. TerraCarbon also provided advanced training to CIMA's information management and GIS team so that CIMA can be a full participant in the methodologies used in the project proposal and complete future monitoring and project documentation activities. In addition, Terra Carbon trained PNCAZ park guards on the prism methodology used to measure carbon stocks (Shoch *et al.* 2009). This technical knowledge enabled park guards to participate in the initial carbon stock assessment, validation and verification processes in 2012 and 2013, and will allow them to engage in future monitoring as needed. The trained park guards can now train others in measuring carbon stock with prisms, thus build capacity in Peru for accurate REDD data collection and monitoring. TerraCarbon also provided expertise in developing the revised VCS baseline module used for this project and assisting in the double validation process. TerraCarbon will continue to support CIMA in the future.

2.4.2 Worker Training (G4.3)

Unchanged from the description in the validated PDD.

Constant training for PNCAZ staff (parkguards and CIMA team); during the period 2 training Courses for Parkguards and CIMA technicians were developed:

2016:

- *Leadership and Survivor Course for Parkguards*; were 2 parkguards attended the field course
- *Course Climate Change, Adaptation and Mitigation on Protected Areas; were 2 parkguards attended the field course in Pucallpa*
- *Workshop-course about Climate Change and the Protected Areas, a were 4 parkguards attended the course*
- *Applicative Management of SMART capacitation, were 4 parkguards attended the course in Tocache*

2017:

- *First Course of Camera Traps for PNCAZ Parkguards and CIMA technicians in Aspuzana valley where 7 rangers participated. This training was given at the request of the PNCAZ Headquarters in order to standardize in a simple and practical way the general knowledge about fauna and the practices of data collection by the park rangers. The basis for this presentation is the Monitoring Guide for wildlife (Fine Filter Conservation Objects - OCFF) prepared by CIMA with information from the park rangers themselves and pertinent recommendations.*
- *Workshop-course for Geographic Information System (GIS) Management*
- *attended by the PNCAZ specialist of SERNANP and CIMA technical team, in Tarapoto.*
- *PNCAZ parkguards participated in the IV Encounter of Peruvian Parkguards and in the Provincial Platform for Civil Defense – Aguaytía.*

2018:

- *Second Course of Camera Traps for PNCAZ Parkguards in Tarapoto, were 16 parkguards attended, as well as the Urku´s technical team. This course was to refine the knowledge generated in the first course of trap cameras for park rangers, and to generate a schedule and route of installation of the equipment. Details on the application of this monitoring methods are detailed in section 5.1.1.*
- *Field Training for Restauration Project, in San Juan and Lejia villages (Tarapoto sector), 3 parkguards from sectors of Shamboyacu and Tres Unidos took part in different field schools in the topics of species identification, greenhouse management and planting design. 2019*
- *Field Training for Restauration Project, in San Juan and Lejia (Tarapoto). Several training sessions were imparted in the framework of the restoration project. This time, not only rangers were included, but also technical CIMA personnel and specialists from the*

GORESAM – Regional Government of San Martín.

- *Training for the implementation of SMART – Spatial Monitoring and Reporting Tool. SERNANP and WCS imparted a workshop aiming to personnel of the Peruvian protected areas. CIMA was invited for being part of the co-management of the PNCAZ.*
- *PNCAZ team training reinforcement. CIMA´s GIS team designed a workshop with the goal of reinforcing GIS tools used in CIMA´s processes and to show the current trends in mobile devices.*
- *PNCAZ team took part in a fellowship in the Bosque de Protección Altomayo. The objective was to build capacities in the development of tourism economic activities, agroforestry and market entry for products.*

2020

- *Virtual training in digital tools for remote work. This course was organized by CIMA and a consultant was hired in order to adapt to the current world order amid the COVID pandemic. The study load was 8 hours and it had 23 participants.*
- *Field schools on seed trees identification and silvo-pastoral practices, for farmers from San Juan and Lejía, in the buffer zone, as the second part of FERI/CBD project.*

CIMA´s pursuit in the park´s protection has been able to maintain the personnel and the people involved in project activities along the years. The estimated average time of permanence in the institution (staff and rangers) is 10 years and the people in communities involved with activities are recognised as local leaders.

Another aspect to be mentioned is the work stability CIMA has been able to maintain and the permanent presence in the communities, which acts as local capacity retention strategy. The comparative difference with other projects is the permanence of 20 years so far, which currently is secured at least until 2028 by the Administration Contract with SERNANP. Rodriguez et al. 2018 (attached) article, emphasizes the importance of CIMA´s long term engagement and presence in the area.

2.4.3 Community Employment Opportunities (G4.4)

Unchanged from the description in the validated PDD.

CIMA employs almost 100 people including professional staff, technicians and park guards located in five offices and 21 guard posts and centers (Table 2.1). Staff turnover is relatively low; CIMA has technicians and park guards who have spent more than 15 years in the institution. However, when new staff is needed, open calls are made particularly in the area where the personnel is required.

Table 2.1. PNCAZ Project staff by offices in Lima, Tarapoto, Tocache, Contamana and Aguaytía.

Headquarters	PNCAZ Project Staff	
	Total	women

CIMA staff	Lima	12	7
	Tarapoto field office	23	5
	Tocache field office	7	3
	Contamana field office	7	2
	Aguaytía field office	3	2
SERNANP	PNCAZ Chief and specialists	(1+3)	
	Parkguards (PNCAZ boundaries)	45[37]	1
Total staff paid by CIMA (REDD+ Project)		**56+45**	**19+1**

Park management activities are led from field offices in Tarapoto, Tocache, Contamana and Aguaytia. Decentralizing project activities into the field offices allows CIMA to hire individuals from the different regions that surround the project area, promoting greater knowledge of, and better interactions with, local and regional communities and governments. Decentralization also allows CIM A to tailor programs and communications to reflect the needs of the communities and reduce travel times and cost.

2.4.4 Relevant Laws and Regulations Related to Worker's Rights (G4.5)

For this period, the following labor laws and regulations continue in force:

- **Ley N°30222**, issued in July 2014, and amending the **Ley N°29783** ***Ley de Seguridad y Salud en el trabajo***, promulgated in August 2011. About security responsibilities of the employer.
- **Decreto Supremo N° 007-2012-TR**, which it sets the Minimum remuneration increased for worker.
- **Reglamento de Ley N°29783** approved by DS N^{O} 005-2012-TR and modified by **Ley N°30222**.

According to the statement in law presented above, CIMA applies principles of risk prevention and has a system of risk prevention, implemented through adequate training and provision to the field staff with necessary equipment to conduct their activities safely.

Besides, CIMA has an HR responsible since 2021 and counts with the following institutional documents (Appendix G4.5):

1. Institutional policy on human rights
2. HSE policy
3. Sexual harassment prevention policy
4. Internal regulation on security and safe at work

2.4.5 Occupational Safety Assessment (G4.6)

[37] Due to a fund shortage at the end of 2017, SERNANP had agree to transfer the parkguards, 42 of them, to be paid directly by SERNANP. This was effective starting in 2019 through 2020. Once the trust fund is established, the entire SERNANP personel will be also paid by the REDD project.

Unchanged from the description in the validated PDD.

Since 20013, CIMA has a *Safety and Health Management System at Work*, within the framework of Law No. 29783. This document, already mentioned as support in the previous Verification, states that the protection of the physical integrity and occupational health of its workers is the main concern of CIMA. Thus, in matters of Health and Safety at Work, it is committed to:

- Safety and occupational health are an essential and integrated part of all processes, aimed at the prevention of damage and the deterioration of health.
- Oriented to reduce the greatest possible number of risks through the establishment of adequate control systems.
- Ensure compliance with legal regulations on occupational safety and health
- Disseminate and promote the objectives of occupational safety and health in workers, obtaining their commitment to its implementation, review and permanent updating.
- Guarantee consultation and participation of workers.
- Create awareness about the right to security, and the duties that arise from it.

2.4.6 Financial Health of Implementing Organization(s) (G4.7)

Unchanged from the description in the validated PDD.

CIMA's financial plan since 2010 - as part of the Master Plan 2011-2016 – has included different strategies to achieve financial sustainability and ensure sufficient funds for the management of the PNCAZ; the financial plan has been used successfully to manage the project and reach objectives. Operating costs and "pre-carbon credit" project funding have both been in line with projections and funding has remained stable.

The last PNCAZ Master Plan - updated for second time in 2017 – identifies, as part of the environmental objective, the PNCAZ REDD+ Project as a means by which the financial sustainability of the park is assured at least until 2018, using the first period of the PNCAZ REDD+ Project baseline.

In November 2014, CIMA signed a future sale agreement for 8,173,000 PNCAZ VCUs with Althelia Climate Fund (ACF) that ensured the financing of operations for the period Nov.2014-Dec.2018 of the PNCAZ Management Agreement that CIMA has signed with the Peruvian State, based on the guarantee of the carbon credits generated by the PNCAZ REDD+ Project. Table 2.2 lists CIMA's funding sources for the period 2018-2020, all of which have contributed to financing the management of the PNCAZ Administration Contract during the financing period received from the sale of PNCAZ REDD+ Project credits.

During 2019 and 2020, CIMA negotiated 8,417,000 PNCAZ VCUs through Ecosphere+, that revenues from these sales used to cover the five-year period 2019-2023 of the operations of the PNCAZ Administration Contract.

In 2020, CIMA started negotiations for a sale of 16,88 Mi VCUs with TOTAL Nature-Based Solutions TNBS, which included vintages from 2015-2018 and 2018-2020. This negotiation also included the VCU purchase option for 2021-2028. The revenues generated by this

negotiation with TNBS are intended to achieve the financial sustainability of PNCAZ in perpetuity, and its surpluses to support the Natural Areas National System.

To the correction date of this MR (February 2022), a new summary report about all carbon credit sales until December 2021 has been finalized and is included as supporting documentation. This document evidences CIMA´s current and future financial health.

Table 2. Funding sources for the PNCAZ REDD+ Project between August 2018-December 2020

Funding source	Time period	Project name and objectives
Althelia Climate Fund	Nov 2014 – Nov. 2018	"Proyecto REDD+ del PNCAZ" • Protect the PNCAZ and its biodiversity; • Strengthen local capacity for sustainable use and improved standard of living; • Financial sustainability of the PNCAZ.
ISA – REP	Sept. 2017 - Sept. 2019	"Cordillera Azul REP Project": 1. Jaguar connection 2. Support for sustainable cocoa 3. Route to *Otorongo* Waterfall
IUCN Incubator	2018-2020	"Incubator for Nature Conservation": Technical assistance to develop innovative financing instruments from a team of specialists hired by IUCN
Andes Amazon Fund	Nov. 2017 – Nov. 2018	"Promoting legal protection for high biodiversity, culturally important areas around Cordillera Azul National Park", promoting: - Concession for conservation on Pauya-Cushabatay - Conservation area for the Yamino native community - Indigenous Reserve for Isolated Indigenous Kakataibo People
Andes Amazon Fund	April 2019-June 2021	"Promoting legal protection for high biodiversity, culturally important areas around Cordillera Azul National Park", promoting: - Concession for conservation on Pauya-Cushabatay Indigenous Reserve for Isolated Indigenous Kakatiabo People
Technoserve	August 2018-June 2020	CAFÉ project Mapping coffee producers in the Tocache and Aspuzana regions Provide training in environmental education, climate smart agriculture and associativity Ecological restoration
SERFOR-CAF	Nov – Dec 2018	Project for the strengthening of land governance in the Aspuzana Valley through CUSAF (transfer for use arrangements for agroforestry uses)

FERI - CBD FONDAM	Dic. 2017 – Feb. 2019	"Scalable strategies for landscape conservation ecological restoration activities in the buffer zone of the Cordillera Azul National Park"
FONDAM	April-Sept 2019	"Developing restoration strategies in the indigenous community of Chambira"; and "spreading restoration strategies across the Aspuzana landscape"
University of Sussex	Nov 2019.-April 2021	*Sustainable livelihoods, deforestation, and supply chains: Analysis of environmental and socio-economic data from the frontier of the Peruvian Amazon*
FERI-CBD 2	Sept 2020 – April 2021	An extension of the project "Scalable strategies for landscape ecological restoration in the buffer zone of the Cordillera Azul National Park" was granted by FERI/CBD, due to outstanding performance.

Internal financial responsibility

CIMA places great emphasis on the efficient and responsible use of financial and other resources. Budgets are carefully monitored and reviewed, whether at the organization or project level. The Director of Finance and Administration monitors spending against approved budgets using a series of spreadsheets, regularly meets with project managers, and provides reports to the Executive Director. Spreadsheet data and other information support the identification of spending trends and suggestions for improvements throughout the organization. Administrative procedures that are in place guide employees on financial matters, including procedures on managing funds, expenses, cash advances and reimbursements.

Yearly financial audits of CIMA have been carried out by an accredited auditor. If there were any negative findings, CIMA corrected identified issues and implemented measures to prevent any inaccuracy from occurring again. This procedure has been successful to date. CIMA's financial audits through 2019 received a favorable report, and a summary of 2020´s financial status is attached (Appendices G4.7).

2.5 Legal Status and Property Rights

2.5.1 National and Local Laws (G5.1)

Relevant national and local laws and regulations and international treaties and agreements are unchanged from the list provided in the validated PD (Dec 20, 2012), with the exception of:

- Ley Forestal y de Fauna Silvestre (Ley N° 29763), enacted in 2011. Regulates the management of forest ecosystem services, recognizing its importance, the need for conservation and responsible and sustainable management of forest ecosystems, to counteract the negative effects of climate change.

  Including its respective regulations, enacted in September 2015 (afterward the verification period):

- Reglamento para la Gestión Forestal, (D.S. Nº 018-2015-MINAGRI).
- Reglamento para la Gestión de Fauna Silvestre (D.S. Nº 019-2015-MINAGRI).
- Reglamento para la Gestión e las Plantaciones Forestales y los Sistemas Agroforestales (D.S. Nº 020-2015-MINAGRI).
- Reglamento para la Gestión Forestal y de Fauna Silvestre en Comunidades Nativas y Comunidades Campesinas (D.S. Nº 021-2015-MINAGRI).

- Ley de Mecanismos de Retribución por Servicios Ecosistémicos, from June 2014. It provides relevant definitions and the different types of mechanisms that can be applied. It also presents the National Register of Compensation Mechanisms for Ecosystem Services (*Registro Único de Mecanismos de Retribución por Servicios Ecosistémicos*).

The Regulation for this law was under discussion through the end of 2015, and finally approved in July 2016. It promotes and regulates the establishment of voluntary agreements that reward the efforts of various public and private actors in the maintenance and enhancement of ecosystem services, including forest ecosystems under threat

- Resolución N° 26-2014-SERNANP, published on March 2014[38]. Establishes procedures for the marketing of carbon credits from REDD+ Projects in protected areas.
- Resolución Presidencial N° 150-2015-SERNANP, published on Julio 2015, where SERNANP establishes the principles of participatory management in protected natural areas
- Resolución Directoral Nº 045 -2017-SERNANP-DGANP, published on June 28 2017, were SERNANP approves the Terms of Reference for the Quarterly, Annual and Five-Year Evaluation, Work Plan and Annual Budget; and format of the minutes of the Session of the Commissions for monitoring the Administration Contracts in Natural Protected Areas of the national administration.

CIMA is committed to meeting or exceeding any regulation, standard, treaty or international agreement that may cover its activities. The only regulation that affects the project area is the regulation establishing the national park and appropriate uses (Supreme Decree No. 031-2001- AG). The project exists to enforce these regulations and is therefore in compliance with them. CIMA continues to monitor new or changing regulations to identify any that may affect the project area.

Within the PNCAZ, CIMA has authorization over management of the park and the role of the park guards is to alert appropriate authorities in the case of an illegal activity. CIMA does not have the authority to enforce any regulations outside the park. Many laws exist that govern activities of organizations and communities in the buffer zone but the enforcement of these laws by the proper authorities is rare.

More details about Legal Regulations are in the PD (section 1.11 Compliance with Laws, Statutes, Property Rights and Other Regulatory Frameworks).

2.5.2 Free, Prior and Informed Consent (G5.3)

[38] http://legislacionanp.org.pe/wp-content/uploads/2014/03/SERNANP-norma2.pdf

Unchanged from description in the validated PD.

There is a possibility that an uncontacted group of Kakataibo[39] resides in or near the park (FENACOCA/IBC 2005, CIMA 2011) though there has never been an event of meeting with an uncontacted indigenous person in all the years that CIMA and SERNANP have been working in the PNCAZ and its buffer zone. This possibility led CIMA to the development of the intangible zone that permits no entry or use by anyone other than the Kakataibo in isolation.

CIMA also worked extensively with Kakataibo tribal leaders and the Peruvian government to identify the greatest possible range of these people when defining this intangible zone[40]. Park guards, communal park guards and extension team personnel all received training regarding how to respect the rights of these people to remain uncontacted and the best ways to react if contact accidentally happens in the buffer zone.

Records of *Indigenous People in Isolation and Initial Contact* (Pueblos Indígenas en Situación de Aislamiento y en Situación de Contacto Inicial - PIACI) enable to register preventively as *Reservas Indígenas* (formerly *Reservas Territoriales*, which must be adequate) in order to be assessment by the Multisectoral Commission created by Law Nº 28736, *'Ley para la Protección de Pueblos Indígenas u Originarios en Situación de Aislamiento y en Situación de Contacto Inicial'*. In this regard, should be mentioned that the records are subject to constant updates according to official information that is generated. Also, in accordance with the Directiva Nº 001- 2013-VMI / MC " *Normas, Pautas y Procedimientos para el Registro de los Pueblos Indígenas en Situación de Aislamiento y en Situación de Contacto Inicial y el Registro de Reservas Indígenas* ", approved by RVM No. 008-2013-VMI / MC, already has the Memorandum Nº 189- 2013-VMI / MC which gives "favorable qualification for the recognition of indigenous people Kakataibo in situation of isolation, and the categorization of Indigenous Reserve Kakataibo Sur and Indigenous Reserve Kakataibo Norte"[41]; however requires more information to define the geographic scope. CIMA has been supporting efforts to have more information about these peoples in isolation, without disturbing in any way your current lifestyle.

PIACI are characterized by their immunological, social and cultural vulnerability; thus, it is necessary for the State to adopt and implement specific protection policies for these populations, with the creation of intangible indigenous reserves, for the exclusive use of these populations and the traditional use (for subsistence) of native communities around these reserves. To date, the Kakataibo North (corresponding to the PNCAZ buffer zone) and South Indigenous Reserve proposal has completed the first stage of the categorization process. On August 9, 2017, the Kakataibo people in isolation obtained their recognition of existence (Supreme Decree Nº 0 -2017-MC). Now, requires the second stage of categorization, which will end in the delimitation of the perimeter and area of the indigenous reserve. Indigenous reserves acquire such status by supreme decree, based on an Additional Categorization Study (EAC).

[39] http://www.cultura.gob.pe/es/interculturalidad/dpiaci/registro/piaci
[40] http://www.cultura.gob.pe/sites/default/files/paginternas/tablaarchivos/2014/03/07-solicituddereservaindigenacacataibosurycacataibonorte.pdf
[41] http://www.cultura.gob.pe/sites/default/files/paginternas/tablaarchivos/2014/03/12-pueblocacataibo.pdf

It should be noted that any attempts to locate these people in voluntary isolation, to ask them for permission to develop a REDD+ Project, would directly violate their right to remain uncontacted under Peruvian laws and the international agreements signed by Peru (see

PD Section 3.1.2). In this context, CIMA and SERNANP (parkguards) activities in this region are designed specifically to allow the uncontacted peoples to conduct their lives as they wish, with zero interference from outsiders.

More information in the section CM1.1.

Regarding the issue arisen during the verification field visit about land tenure in Chambira Native Community, this is dealt with in section 2.3.4 as a possible conflict. Yet, in this section it need to be emphasized that in December 2018, Chambira´s priority about land titling was achieved and this is supported by the attached documents "G5.3-G5.4 Chambira-GRSM" and there are current actions being implemented to address this issue (February 2022) (Appendix G5.3-G5.4 Acta reunion Chambira).

2.5.3 Property Rights Protection (G5.4)

Unchanged from description in the validated PD

2.5.3.1 Titled land inside the PNCAZ

In late 2000, when CIMA's predecessor organization APECO and The Field Museum were preparing the documents necessary to establish Cordillera Azul National Park, they partnered with Conservational International (CI). CI retained a law firm in Peru to research land ownership and claims in the area so that boundaries for the park could be designed to avoid any private properties inside. Due to an oversight, ownership claims filed in the district of Loreto were not investigated. As a result, the park was established with some private parcels acquired prior to the park's formation, 1,227 ha, inside the park boundaries. CIMA reached agreements with all 21 landowners to limit land-clearing activities in the park.

Although there are no permanent residences in the park, the privately-held parcels are not included in the project area and CIMA will not claim any avoided deforestation credits for these areas.

In late 2020, CIMA hired a lawyer to evaluate the current status of these plots belonging to 21 landowners. CIMA´s intent is to evaluate the option to buy these plots from the landowners and donate them to SERNANP. It was concluded that, although this figure is possible, SERNANP has the first buying option and a mutual agreement would need to take place before actually incurring in the transaction.

2.5.3.2 Titled land and other rights in the buffer zone

Sections 4.1 and 4.2 of this document make extensive mention of the positive impacts of the Project in the communities of the buffer zone (ZA) of the PNCAZ, and in addition to the non- generation of negative impacts on these same communities.

Regarding the treatment of rights beyond the Project area, that is, in the ZA of the PNCAZ:

a. Indigenous peoples: The delimitation of the PNCAZ has respected the recognized indigenous territories, including those areas that were considered as proposals for

titling or expansion at the time of the creation of the park. i.e. the area corresponding to the native community of Nuevo Eden, where the park shows a clearly cut silhouette, which corresponds to the proposed area of expansion to the native community of the Shipibo ethnic group.

It is worth mentioning that CIMA has been supporting processes of expansion and titling of native communities long before the Project began its implementation, through funds from the Spanish Agency for International Cooperation for Development - AECID; and subsequently with the Project, it has supported other indigenous communities and indigenous peoples in isolation according to the national legislation and OIT on the matter (section 2.4.6, 2.5.2, 4.1.1).

Consistent with its support to indigenous peoples, during 2018 through 2020, CIMA invested great efforts trying to secure indigenous rights for indigenous people in voluntary isolation in the Aguaytía sector (more details in section 4.1.1 and Appendix 1).

b. Settlers in the ZA: Through the REDD+ Project, CIMA has been supporting many population centers to achieve formalization of tenure or their titling, as part of their Quality of Life Plans (PCV). For example, categorization of villages like Fernando Belaúnde, San Juan, El Paraíso, Maronilla, Nuevo Jaen, Vista Alegre, among others; CIMA supports in the generation of its dossiers and bring help with the procedures with the respective authorities. Since 2018, CIMA is trying to implement pilot areas for the new rules for agroforestry uses (CUSAF), established in the latest Forestry Law, still adjusting for implementation, as well as the ongoing Forestry Zoning process.

c. Forest concessions and other rights of use: During the process of establishing the PNCAZ and to define its limits, previously existing rights were respected, as required by the Law. Since their first master plan, these rights have been recognized, although many these concessions were outdated or abandoned.

In this context, it should be mentioned that the REDD+ Project not only respect, but also promote rights both within the Project area and in the Project zone, which corresponds at the same time to its wide ZA of the 2.3 million hectares. In addition, given the large area of the ZA and a large number of local population and population centers, since 2015 CIMA has a protocol for the identification and prioritization of the populations with which it will work, by identifying those areas that are critical to comply with the objectives of forest conservation.

Regarding the issue with land tenure in Chambira Native Community, arisen during the verification field visit, please refer to section 2.5.2 and section 2.3.4.

2.5.4 Identification of Illegal Activity (G5.5)

Unchanged from description in the validated PD

One illegal cattle ranch was within the project area. When the project began in 2008, only one area inside the park continued to be incompatible with conservation: an estimated 220 ha cattle ranch on the southwest corner of the park that had not been detected when the park was established. Once it was detected, the cattle rancher was asked to leave the park since he did not own the land. In his response, the rancher offered not to expand his

operations and to help keep watch for illegal uses of land within the park since he was there prior to its establishment. SERNANP and CIMA agreed to this and allowed the rancher to remain under these terms. Just prior to the start of the project, monitoring demonstrated that the cattle rancher had expanded his operations in violation of his agreement. This resulted in legal proceedings (Section 2.2.3 of the PD).

It's important to highlight that in August 25, 2016, the Mixed Court of Bellavista of the Superior Court of Justice of San Martín passed judgment No. 37 in which Mr. Suarez and others were ordered to evict the lands located in PNCAZ.

All the cows were removed and parkguards install a perimeter fence; so, this activity is finished, parkguards only make routine patrols to the site.

An infraction (deforestation) event was detected during this monitoring period and is dealt with in section 5.3.2. The response, besides what is described in the latter section was an increase in the number of ranger patrols over 2021, which falls off the monitoring period.

3.CLIMATE

3.1 Monitoring GHG Emission Reductions and Removals

3.1.1 Data and Parameters Available at Validation

Details on data and parameters are provided below. Note that:

- The project proponent has been granted an extension from Verra & MINAM to use existing baseline and carbon stock estimates for this monitoring period. See letters included "958_Baseline Extension Letter" and "Carta N 00011-2019-MINAM-VMDERN_Autorización extensión de Linea Base_Proy Redd.pdf" in the Supporting Documents or G3.4 - MR 3.1.3 Revision of the baseline in the Appendices Round 1 findings.
- The monitoring report uses the convention that the project year is the year at the end of the interval, i.e. project year 2019 is 8 August 2018 to 7 August 2019. The 2021 project year is a partial year that starts 8 August 2020 to 31 December 2020.

Data / Parameter	$\Delta C_{BSL,PA,unplanned}$
Data unit	t CO_2-e
Description	Net CO_2 emissions in the baseline from unplanned deforestation in the project area
Source of data	Derived in Section 3.1 of PD
Value applied:	5,362,137.3 t CO_2-e (2019) 5,362,137.3 t CO_2-e (2020) 2,144,854.9 t CO_2-e (2021)
Justification of choice of data or description of measurement methods and procedures applied	Derived and justified in Section 3 of PD in which baseline is set
Purpose of the data	Calculation of baseline emissions
Comments	The value corresponds to the existence of carbon above and below ground

Data / Parameter	$\Delta C_{BSL,LK,unplanned}$
Data unit	t CO_2-e
Description	Net CO_2 emissions in the baseline from unplanned deforestation in the leakage belt
Source of data	Derived in Section 3.1 and 3.2 of PD
Value applied:	20,062,507.4 t CO_2-e (2019) 20,062,507.4 t CO_2-e (2020) 8,025,017.7 t CO_2-e (2021)

Justification of choice of data or description of measurement methods and procedures applied	Derived and justified in Section 3 of PD in which baseline is set
Purpose of the data	Calculation of baseline emissions
Comments	The value corresponds to the existence of carbon above and below ground

Data / Parameter	C_{OLB}
Data unit	t CO_2-e ha^{-1}
Description	Area-weighted average aboveground tree carbon stock for forests available for unplanned deforestation outside the Leakage Belt
Source of data	2010 FAO FRA Peru Country Report
Value applied:	376.3 t CO_2-e ha^{-1}
Justification of choice of data or description of measurement methods and procedures applied	Derived above in Section 3.3 of the Project Description
Purpose of the data	Calculation of baseline emissions
Comments	

Data / Parameter	C_{LB}
Data unit	t CO_2-e ha^{-1}
Description	Area weighted average aboveground tree carbon stock for forests available for unplanned deforestation inside the Leakage Belt
Source of data	Stocks were derived by first delineating three high order forest classes from Natureserve (Josse et al. 2007; and Ferreira et al. 2007), *humedales-vegetacion inundable* and *tierra firme* (corresponding roughly with aguajal/alluvial forest and hill/mountain forest, respectively, from the project area) and anthropogenic forest. For each of the three classes, spatially-explicit aboveground biomass data were obtained from Saatchi et al. 2009, from which an area-weighted mean live aboveground tree carbon stock was estimated.
Value applied:	358.8 t CO_2-e ha-1
Justification of choice of data or description of measurement methods and procedures applied	Derived above in Section 3 of the Project Description
Purpose of the data	Calculation of baseline emissions

Comments	
Data / Parameter	*CF*
Data unit	t C t d.m.$^{-1}$
Description	Carbon fraction of dry matter in t C t^{-1} d.m.
Source of data	Default value of from IPCC 2006GL
Value applied:	0.47 t C t^{-1} d.m
Justification of choice of data or description of measurement methods and procedures applied	As permitted by methodology VM0007 module CP-AB "Values from the literature (e.g. IPCC 2006 INV GLs AFOLU Chapter 4 Table 4.3) shall be used if available, otherwise default value of 0.47 t C t^{-1} d.m. can be used"
Purpose of the data	Calculation of project emissions
Comments	

Data / Parameter	*D:RAD*
Data unit	Dimensionless
Description	Ratio of DBH to plot radius, specific to prism Basal Area Factor (BAF) employed in point sampling
Source of data	Avery, T.E. and H.E. Burkhart. 1994. Forest Measurements. Fourth Edition. McGraw Hill, Boston, Massachusetts, USA. 408 pp.

Value applied:

	BAF gauge				
ft^2/acre	5	10	15	20	40
m^2/ha	1.15	2.29	3.44	4.59	9.18
ratio dbh/plot radius	1:46.7	1:33	1:26.9	1:23.3	1:16.5

Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	Calculation of project emissions
Comments	

Data / Parameter	$f_j(X,Y)$
Data unit	t d.m. tree^{-1}
Description	Allometric equation for species *j* linking measured tree variable(s) to aboveground biomass of living trees, expressed as t d.m. tree^{-1}

Source of data	Chave, J., Andalo, C., Brown, S., Cairns, M.A., Chambers, J.Q., Eamus, D., Folster, H., Fromard, F., Higuchi, N., Kira, T., Lescure, J.P., Nelson, B.W., Ogawa, B., Puig, H., Riera, B. and T. Yamakura. 2005. Tree allometry and improved estimation of carbon stocks and balance in tropical forests. Oecologia 145:87-99. Freitas Alvarado, L., Otarola Acevedo, E., del Castillo Torres, D., Linares Bensimon, C., Martinez Davila, P. and G.A. Malca Salas. 2006. Servicios ambientales de almacenamiento y secuestro de carbono del ecosistema aguajal en la Reserva Nacional Pacaya Samiria, Loreto, Perú. Instituto de Investigaciones de la Amazonía Peruana. Documento Técnico Nº 29. Iquitos, Perú.
Value applied:	Detailed in PNCAZ 2009 forest inventory report
Justification of choice of data or description of measurement methods and procedures applied	Both equations validated in PNCAZ 2009 forest inventory report
Purpose of the data	Calculation of project emissions
Comments	
Data / Parameter	*R*
Data unit	t root d.m. t^{-1} shoot d.m.
Description	Root to shoot ratio appropriate to species or forest type / biome; note that as defined here, root to shoot ratio is applied as belowground biomass per unit area: aboveground biomass per unit area (not on a per stem basis).
Source of data	Cairns, M. A., S. Brown, E. H. Helmer, and G. A. Baumgardner. 1997. Root biomass allocation in the world's upland forests. Oecologia 111, 1-11. Freitas Alvarado, L., Otarola Acevedo, E., del Castillo Torres, D., Linares Bensimon, C., Martinez Davila, P. and G.A. Malca Salas. 2006. Servicios ambientales de almacenamiento y secuestro de carbono del ecosistema aguajal en la Reserva Nacional Pacaya Samiria, Loreto, Perú. Instituto de Investigaciones de la Amazonía Peruana. Documento Técnico Nº 29. Iquitos, Perú.
Value applied:	Detailed in PNCAZ 2009 forest inventory report
Justification of choice of data or description of measurement methods and procedures applied	Note that rather than using a constant root to shoot ratio to estimate belowground biomass, belowground biomass was estimated using an allometric equation, where the relationship varies continuously with aboveground biomass. The equation is derived from 151 observations from a global dataset of upland forests. For *Mauritia flexuosa* root biomass (lowland palm swamps) a fixed root: total biomass ratio of 0.276 derived from in-country empirical data was used.
Purpose of the data	Calculation of project emissions
Comments	

Data / Parameter	D_{DWdc}
Data unit	t d.m. m^{-3}
Description	Mean wood density of dead wood in the density class (dc) – sound (1), intermediate (2), and rotten (3); t d.m. m^{-3}
Source of data	Measured from dead wood samples, 30 from each decomposition class, collected in the project area. Density of dead wood was determined through sampling and laboratory analysis as follows. Discs were collected in the field and decomposition class and green volume determined as per standard protocols (Appendix 2). Discs were then transferred to a laboratory (Laboratorio de Análisis de Suelos del Instituto Nacional de Investigación Agraria, INIA) in Tarapoto and oven-dried at 80°C, conducting continuous weight measurements until reaching constant weight. The resulting dry weight was recorded and used to calculate dead wood density as oven-dry weight (g) / green volume (cm^3) for each sample.
Value applied:	Detailed in PNCAZ 2009 forest inventory report
Justification of choice of data or description of measurement methods and procedures applied	Measurements follow procedures as outlined in methodology VM0007 module CP-D
Purpose of the data	Calculation of project emissions
Comments	

Data / Parameter	*Regional Forest Cover / Non-Forest Cover Benchmark Map*
Data unit	Ha
Description	Map showing the location of forest land within the reference region at the beginning of the crediting period
Source of data	Classified satellite imagery
Value applied:	3,271,261 ha (at beginning of first baseline period)
Justification of choice of data or description of measurement methods and procedures applied	Detailed procedures provided below under monitoring plan description.
Purpose of the data	Calculation of baseline emissions
Comments	Updated every 10 years at baseline revision

Data / Parameter	*Project Forest Cover Benchmark Map*
Data unit	Ha
Description	Map showing the location of forest land within the project area at the beginning of each monitoring period. If within the Project Area some forest land is cleared, the benchmark map must show the deforested areas at each monitoring event

Source of data	Classified satellite imagery
Value applied:	1,347,548.03 ha (at beginning of 2019 monitoring period)
Justification of choice of data or description of measurement methods and procedures applied	Detailed procedures provided below under monitoring plan description
Purpose of the data	Calculation of baseline emissions
Comments	Updated at each monitoring/verification event
Data / Parameter	*Leakage Belt Forest Cover Benchmark Map*
Data unit	Ha
Description	Map showing the location of forest land within the leakage belt area at the beginning of each monitoring period. Only applicable where leakage is to be monitored in a leakage belt
Source of data	Classified satellite imagery
Value applied:	1,787,904.27 ha (at beginning of 2019 monitoring period)
Justification of choice of data or description of measurement methods and procedures applied	Detailed procedures provided below under monitoring plan description.
Purpose of the data	Calculation of leakage
Comments	Updated at each monitoring/verification event
Data / Parameter	$COMF_i$
Data unit	dimensionless
Description	Combustion factor for stratum *i* (vegetation type)
Source of data	Default values in Table 2.6 of IPCC 2006 (Annex 2)
Value applied:	Not applied, $A_{burn,i,t} = 0$ for 2017 - 2018 monitoring period
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	Calculation of project emissions
Comments	
Data / Parameter	G_{gi}
Data unit	g kg^{-1} dry matter burnt
Description	Emission factor for stratum *i* for gas *g*,

Source of data	Defaults in Volume 4, Chapter 2, of the IPCC 2006 Inventory Guidelines in table 2.5 (Annex 2: emission factors for various types of burning for CH_4 and N_2O).
Value applied:	Not applied, $A_{burn,i,t}$ = 0 for 2019 - 2021 monitoring period
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	Calculation of project emissions
Comments	

3.1.2 Data and Parameters Monitored

Details on data and parameters monitored are provided below. Note that:

- Where a parameter is calculated from a methodology equation (i.e. not raw data), the methodology module and equation number is specified and "Description of measurement methods and procedures to be applied" and "QA/QC procedures to be applied" are left blank.
- To avoid repetition and maintain an economical use of space in the summary tables, "Description of measurement methods and procedures to be applied" and "QA/QC procedures to be applied" for monitored (not calculated) parameters reference detailed accounts of procedures provided in the monitoring plan description below.

Data / Parameter	$\Delta C_{P,Def,i,t}$
Data unit	t CO_2-e
Description	Net carbon stock change as a result of deforestation in the project case in the project area in stratum *i* at time *t*
Source of data	Calculated
Description of measurement methods and procedures to be applied	
Frequency of monitoring/recording	Every ≤ 5 years
Value monitored:	2019: 13,282.7 2020: 13,282.7 2021: 5,060.1 Total 2019-21: 31,625.4
Monitoring equipment	

QA/QC procedures to be applied	
Purpose of the data	Calculation of project emissions
Calculation method	Equation 3, VMD0015
Comments	

Data / Parameter	$\Delta C_{P,DefLB,i,t}$
Data unit	t CO_2-e
Description	Net carbon stock change as a result of deforestation in the project case in the leakage belt in stratum *i* at time *t*
Source of data	Calculated
Description of measurement methods and procedures to be applied	
Frequency of monitoring/recording	Every ≤ 5 years
Value monitored:	2019: 8,862,260.5 2020: 8,862,260.5 2021: 3,376,099.2 Total 2019-21: 21,100,620.2
Monitoring equipment	
QA/QC procedures to be applied	
Purpose of the data	Calculation of leakage
Calculation method	Equation 4, VMD0015
Comments	

Data / Parameter	$\Delta C_{P,DistPA,i,t}$
Data unit	t CO_2-e
Description	Net carbon stock change as a result of natural disturbance in the project case in the project area in stratum *i* at time *t*
Source of data	Calculated
Description of measurement methods and procedures to be applied	
Frequency of monitoring/recording	Every ≤ 5 years

Value monitored:	2019: 84,971.83 2020: 84,971.83 2021: 32,370.22 Total 2019-21: 169,943.7
Monitoring equipment	
QA/QC procedures to be applied	
Purpose of the data	Calculation of project emissions
Calculation method	Equation 20, VMD0015
Comments	
Data / Parameter	$A_{DefPA,u,i,t}$
Data unit	Ha
Description	Area of recorded deforestation in the project area stratum *i* converted to land use *u* at time *t*
Source of data	Monitored at each monitoring/verification event through analysis of classified satellite imagery
Description of measurement methods and procedures to be applied	Detailed procedures provided below under monitoring plan description. Minimum Mapping Unit (MMU) of 0.81 ha, corresponding to 3 pixels by 3 pixels Landsat resolution (90m by 90m), providing closest conformance possible to 0.5 ha Peru DNA forest definition with Landsat.
Frequency of monitoring/recording	Every ≤ 5 years
Value monitored:	2019: *24.4* 2020: *24.4* 2021: *9.3* Total 2019-21: **58.0**
Monitoring equipment	Image processing, classification and assessment work was conducted using IDRISI, TerrSet, Eastman, J.R., 2014. I (Worcester, MA: Clark University). Some steps in accuracy assessment were conducted using: Arc GIS 10.0 ESRI 2011. ArcGIS Desktop: Release 10. Redlands, CA: Environmental Systems Research Institute.
QA/QC procedures to be applied	Detailed procedures provided below under monitoring plan description
Purpose of the data	Calculation of project emissions
Calculation method	
Comments	
Data / Parameter	$A_{DefLB,u,i,t}$

Data unit	ha
Description	Area of recorded deforestation in the leakage belt stratum *i* converted to land use *u* at time *t*
Source of data	Monitored at each monitoring/verification event through analysis of classified satellite imagery
Description of measurement methods and procedures to be applied	Detailed procedures provided below under monitoring plan description. Minimum Mapping Unit (MMU) of 0.81 ha, corresponding to3 pixels by 3pixels Landsat resolution (90m by 90m), providing closest conformance possible to 0.5 ha Peru DNA forest definition with Landsat.
Frequency of monitoring/recording	Every ≤ 5 years
Value monitored:	2019: 20,069.7 2020: 20,069.7 2021: 7,645.6 **Total 2019-21: 47,785.1**
Monitoring equipment	Image processing, classification and assessment work was conducted using IDRISI, Selva edition, Eastman, J.R., 2012. IDRISI Selva (Worcester, MA: Clark University). Some steps in accuracy assessment were conducted using: Arc GIS 10.0 ESRI 2011. ArcGIS Desktop: Release 10. Redlands, CA: Environmental Systems Research Institute.
QA/QC procedures to be applied	Detailed procedures provided below under monitoring plan description
Purpose of the data	Calculation of leakage
Calculation method	
Comments	River migration occurs throughout this region, and 1,763 ha of new river areas were detected in image classification. These areas were identified and removed from the benchmark map but are not included as a source of leakage since they are unrelated to activity shifting.

Data / Parameter	$A_{DistPA,q,i,t}$
Data unit	ha
Description	Area impacted by natural disturbance in post-natural disturbance stratum *q* in stratum *i,* at time *t*
Source of data	Monitored at each monitoring/verification event through analysis of classified satellite imagery

Description of measurement methods and procedures to be applied	Detailed procedures provided below under monitoring plan description. Minimum Mapping Unit (MMU) of 0.81 ha, corresponding to3 pixels by 3 pixels Landsat resolution (90m by 90m), providing closest conformance possible to 0.5 ha Peru DNA forest definition with Landsat.
Frequency of monitoring/recording	Every ≤ 5 years
Value monitored:	
Monitoring equipment	Image processing, classification and assessment work was conducted using IDRISI, Selva edition, Eastman, J.R., 2012. IDRISI Selva (Worcester, MA: Clark University). Some steps in accuracy assessment were conducted using: Arc GIS 10.0 ESRI 2011. ArcGIS Desktop: Release 10. Redlands, CA: Environmental Systems Research Institute.
QA/QC procedures to be applied	Detailed procedures provided below under monitoring plan description
Purpose of the data	Calculation of project emissions
Calculation method	2019: 193.5 2020: 193.5 2021: 73.7 **Total 2019-21**: 460.6
Comments	Accounts for all areas outside of defined exclusion areas which were not included in baseline modeling. Total area of natural disturbance that occurred within exclusion zones totaled 490.65 ha which are removed from the benchmark map but not included in accounting.

Data / Parameter	$C_{BSL,i}$
Data unit	t CO_2-e ha^{-1}
Description	Carbon stock in all pools in the baseline case in stratum *i*
Source of data	Estimated from forest carbon inventory. For strata identified in the leakage belt from vegetation maps from NatureServe (Josse et al. 2007), but not represented in the project area inventory, stock estimates specific to each stratum will be obtained from peer-reviewed values from Peru.
Description of measurement methods and procedures to be applied	Detailed procedures provided below under monitoring plan description
Frequency of monitoring/recording	Every ≤ 10 years. First re-measurement in 2018.

Value monitored:	Detailed in PNCAZ 2009 forest inventory report
Monitoring equipment	Detailed in PNCAZ 2009 forest inventory report
QA/QC procedures to be applied	Detailed procedures provided below under monitoring plan description
Purpose of the data	Calculation of project emissions
Calculation method	
Comments	

Data / Parameter	$C_{P,post,u,i}$
Data unit	t CO_2-e ha^{-1}
Description	Carbon stock in all pools in post-deforestation land use *u* in stratum *i*
Source of data	Post deforestation carbon stocks are set as the historical area-weighted average carbon stock for pasture and cultivation land uses, derived from historical land use survey data and stocks estimates from regional studies in PD Section 3.
Description of measurement methods and procedures to be applied	None
Frequency of monitoring/recording	Every $\leq$ 10 years. Value to be re-assessed in 2018.
Value monitored:	41.3 t CO_2-e ha^{-1}
Monitoring equipment	none
QA/QC procedures to be applied	
Purpose of the data	Calculation of project emissions
Calculation method	
Comments	

Data / Parameter	$C_{P,Dist,q,i}$
Data unit	t CO_2-e ha^{-1}
Description	Carbon stock in pools in post-natural disturbance strata *q* in stratum *i*
Source of data	Conservatively assumed to be zero post disturbance
Description of measurement methods and procedures to be applied	
Frequency of monitoring/recording	Not monitored and conservatively assumed to be zero post disturbance.
Value monitored:	0 t CO_2-e ha^{-1}

Monitoring equipment	none
QA/QC procedures to be applied	
Purpose of the data	Calculation of project emissions
Calculation method	
Comments	

Data / Parameter	$A_{DegW,i,t}$
Data unit	ha
Description	Area potentially impacted by degradation processes in stratum *i*
Source of data	Delineated based on survey results indicating general area of project potentially accessed and typical depth of penetration of illegal harvest activities from points of access
Description of measurement methods and procedures to be applied	Detailed procedures provided below under monitoring plan description.
Frequency of monitoring/recording	Repeated each time the PRA indicates a potential for degradation. PRA conducted every $\leq$ 2 years
Value monitored:	Not estimated. Emissions from degradation de minimis.
Monitoring equipment	
QA/QC procedures to be applied	Detailed procedures provided below under monitoring plan description.
Purpose of the data	Calculation of project emissions
Calculation method	
Comments	

Data / Parameter	$C_{DegW,i,t}$
Data unit	t CO_2-e
Description	Biomass carbon of trees cut and removed through degradation process from plots measured in stratum *i* at time *t*
Source of data	Estimated from diameter measurements of cut stumps in sample plots
Description of measurement methods and procedures to be applied	Detailed procedures provided below under monitoring plan description.
Frequency of monitoring/recording	Every $\leq$ 5 years where surveys and limited sampling continue to indicate possibility of illegal logging in the project area

Value monitored:	Not estimated. Emissions from degradation de minimis.
Monitoring equipment	
QA/QC procedures to be applied	Detailed procedures provided below under monitoring plan description.
Purpose of the data	Calculation of project emissions
Calculation method	
Comments	

Data / Parameter	AP_i
Data unit	Ha
Description	Total area of degradation sample plots in stratum *i*
Source of data	Calculated as 3% of $A_{DegW,i,t}$
Description of measurement methods and procedures to be applied	Detailed procedures provided below under monitoring plan description.
Frequency of monitoring/recording	Every ≤ 5 years where surveys and limited sampling continue to indicate possibility of illegal logging in the project area
Value monitored:	Sampling not carried out. Emissions from degradation de minimis.
Monitoring equipment	
QA/QC procedures to be applied	Detailed procedures provided below under monitoring plan description.
Purpose of the data	Calculation of project emissions
Calculation method	
Comments	

Data / Parameter	$\Delta C_{P,DegW,i,t}$
Data unit	t CO_2-e
Description	Net carbon stock changes as a result of degradation in stratum *i* in the project area at time *t*
Source of data	Calculated
Description of measurement methods and procedures to be applied	
Frequency of monitoring/recording	Every ≤ 5 years where surveys and limited sampling continue to indicate possibility of illegal logging in the project area
Value monitored:	Sampling not carried out. Emissions from degradation de minimis.
Monitoring equipment	

QA/QC procedures to be applied	
Purpose of the data	Calculation of project emissions
Calculation method	Equation 8, VMD0015
Comments	

Data / Parameter	$PROP_{IMM}$
Data unit	Proportion
Description	Estimated proportion of baseline deforestation caused by immigrating population
Source of data	Calculated based on results of 2015 survey of communities within 2 km of the PNCAZ boundary.
Description of measurement methods and procedures to be applied	Detailed procedures provided below under monitoring plan description. Questions will be structured as: how long have you lived here and where did you come from prior? Immigrants are defined as someone who has lived in the area less than 5 years and came from an area outside the leakage belt. As there are sensitivities to assessing responsibility for deforestation in an interview context, the proportion of baseline deforestation caused by immigrating population will be assumed to be equal to the proportion of immigrants in the surrounding population.
Frequency of monitoring/recording	Every $\leq$ 5
Value monitored:	19.7%
Monitoring equipment	
QA/QC procedures to be applied	
Purpose of the data	Calculation of leakage emissions
Calculation method	
Comments	

Data / Parameter	*MANFOR*
Data unit	Ha
Description	Total area of forests under active management nationally
Source of data	Official data, peer reviewed publications and other verifiable sources
Description of measurement methods and procedures to be applied	

Frequency of monitoring/recording	Every ≤ 5 years
Value monitored:	
Monitoring equipment	
QA/QC procedures to be applied	
Purpose of the data	Calculation of leakage emissions
Calculation method	
Comments	May be conservatively set to zero

Data / Parameter	*PROTFOR*
Data unit	Ha
Description	Total area of fully protected forests nationally
Source of data	Official data, peer reviewed publications and other verifiable sources
Description of measurement methods and procedures to be applied	
Frequency of monitoring/recording	Every ≤ 5 years
Value monitored:	0
Monitoring equipment	
QA/QC procedures to be applied	
Purpose of the data	Calculation of leakage emissions
Calculation method	
Comments	May be conservatively set to zero A demonstration is required that areas will be protected against deforestation. Such a demonstration shall include either: **1.** Designation as a UNESCO World Heritage Site, or **2.** Management by an international NGO, or **3.** Evidence that the government has immediately acted to evict any and all illegal squatters

Data / Parameter	*TOTFOR*
Data unit	ha
Description	Total available national forest area

Source of data	Official data, peer reviewed publications and other verifiable sources, including Peru FAO FRA reports, e.g. FAO. 2015. Global Forest Resources Assessment 2015, Peru Country Report. Forestry Department, Food and Agriculture Organization of the United Nations, Rome.
Description of measurement methods and procedures to be applied	
Frequency of monitoring/recording	Every ≤ 5 years
Value monitored:	73,973,000 ha
Monitoring equipment	
QA/QC procedures to be applied	
Purpose of the data	Calculation of leakage emissions
Calculation method	
Comments	

Data / Parameter	$PROP_{RES}$
Data unit	Proportion
Description	Estimated proportion of baseline deforestation caused by population that has been resident for ≥5 years
Source of data	Calculated based on results of 2015 survey of communities within 2 km of the PNCAZ boundary.
Description of measurement methods and procedures to be applied	Equals 1 - $PROP_{IMM}$ Detailed procedures provided under monitoring plan description below.
Frequency of monitoring/recording	Every ≤ 5 years
Value monitored:	80.3%
Monitoring equipment	
QA/QC procedures to be applied	
Purpose of the data	Calculation of leakage emissions
Calculation method	
Comments	

Data / Parameter	*N*
Data unit	Dimensionless
Description	Number of samples (i.e. clusters of 5 variable radius plots)

Source of data	Detailed in PNCAZ 2009 forest inventory report
Description of measurement methods and procedures to be applied	
Frequency of monitoring/recording	Every ≤ 10 years
Value monitored:	64 clusters of 5 variable radius plots
Monitoring equipment	N/A
QA/QC procedures to be applied	
Purpose of the data	Calculation of project emissions
Calculation method	Detailed in PNCAZ 2009 forest inventory report
Comments	

Data / Parameter	*DBH*
Data unit	cm
Description	Diameter at breast height of a tree in cm
Source of data	Measured in the field
Description of measurement methods and procedures to be applied	Detailed in PNCAZ 2009 forest inventory report
Frequency of monitoring/recording	Every ≤ 10 years
Value monitored:	Detailed in PNCAZ inventory analysis database and field data sheets
Monitoring equipment	Detailed in PNCAZ 2009 forest inventory report
QA/QC procedures to be applied	Detailed in PNCAZ 2009 forest inventory report and in description of monitoring plan below
Purpose of the data	Calculation of project emissions
Calculation method	
Comments	

Data / Parameter	$Dia_{n,i,t}$
Data unit	cm
Description	Diameter of piece *n* of dead wood along the transect in stratum *i*, at time *t* in *cm*
Source of data	Measured in the field
Description of measurement methods and procedures to be applied	Detailed in PNCAZ 2009 forest inventory report

Frequency of monitoring/recording	Every ≤ 10 years
Value monitored:	Detailed in PNCAZ inventory analysis database and field data sheets
Monitoring equipment	Detailed in PNCAZ 2009 forest inventory report
QA/QC procedures to be applied	Detailed in PNCAZ 2009 forest inventory report and in description of monitoring plan below
Purpose of the data	Calculation of project emissions
Calculation method	
Comments	

Data / Parameter	*BDia*
Data unit	cm
Description	Basal diameter of standing dead tree in cm
Source of data	Measured in the field
Description of measurement methods and procedures to be applied	Detailed in PNCAZ 2009 forest inventory report
Frequency of monitoring/recording	Every ≤ 10 years
Value monitored:	Detailed in PNCAZ inventory analysis database and field data sheets
Monitoring equipment	Detailed in PNCAZ 2009 forest inventory report
QA/QC procedures to be applied	Detailed in PNCAZ 2009 forest inventory report and in description of monitoring plan below
Purpose of the data	Calculation of project emissions
Calculation method	
Comments	

Data / Parameter	TD_{SDW}
Data unit	cm
Description	Top diameter of standing dead tree in cm
Source of data	
Description of measurement methods and procedures to be applied	Not measured
Frequency of monitoring/recording	
Value monitored:	

Monitoring equipment	
QA/QC procedures to be applied	
Purpose of the data	Calculation of project emissions
Calculation method	
Comments	Standing dead wood volume calculations assume volume of a paraboloid, i.e. volume = cross sectional area * height * ½ (no need for top diameter)

Data / Parameter	H_{SDW}
Data unit	m
Description	Height of standing dead tree in m
Source of data	Measured in the field
Description of measurement methods and procedures to be applied	Detailed in PNCAZ 2009 forest inventory report
Frequency of monitoring/recording	Every ≤ 10 years
Value monitored:	Detailed in PNCAZ inventory analysis database and field data sheets
Monitoring equipment	Detailed in PNCAZ 2009 forest inventory report
QA/QC procedures to be applied	Detailed in PNCAZ 2009 forest inventory report and in description of monitoring plan below
Purpose of the data	Calculation of project emissions
Calculation method	
Comments	

Data / Parameter	*Project Forest Cover Monitoring Map*
Data unit	ha
Description	Map showing the location of forest land within the project area at the beginning of each monitoring period (= updated *Project Forest Cover Benchmark Map).*
Source of data	Classified satellite imagery
Description of measurement methods and procedures to be applied	Detailed procedures provided below under monitoring plan description.
Frequency of monitoring/recording	Updated at each monitoring/verification event every ≤ 5 years
Value monitored:	1,346,538.7 ha (at end of monitoring period)

Monitoring equipment	Image processing, classification and assessment work was conducted using IDRISI, TerrSet edition, Eastman, J.R., 2014. (Worcester, MA: Clark University). Some steps in accuracy assessment were conducted using: Arc GIS 10.0 ESRI 2011. ArcGIS Desktop: Release 10. Redlands, CA: Environmental Systems Research Institute.
QA/QC procedures to be applied	Detailed procedures provided below under monitoring plan description.
Purpose of the data	Calculation of project emissions
Calculation method	
Comments	

Data / Parameter	*Leakage Belt Forest Cover Monitoring Map*
Data unit	ha
Description	Map showing the location of forest land within the leakage belt area at the beginning of each monitoring period (= updated *Leakage Belt Forest Cover Benchmark Map).*
Source of data	Classified satellite imagery
Description of measurement methods and procedures to be applied	Detailed procedures provided below under monitoring plan description.
Frequency of monitoring/recording	Updated at each monitoring/verification event every $\leq$ 5 years
Value monitored:	1,738,356.03ha (at end of monitoring period)
Monitoring equipment	Image processing, classification and assessment work was conducted using IDRISI, TerrSet edition, Eastman, J.R., 2014. (Worcester, MA: Clark University). Some steps in accuracy assessment were conducted using: Arc GIS 10.0 ESRI 2011. ArcGIS Desktop: Release 10. Redlands, CA: Environmental Systems Research Institute.
QA/QC procedures to be applied	Detailed procedures provided below under monitoring plan description.
Purpose of the data	Calculation of project emissions
Calculation method	
Comments	

Data / Parameter	$A_{burn,i,t}$
Data unit	ha
Description	Area burnt in stratum *i* at time *t*
Source of data	GPS coordinates and/or Remote Sensing data

Description of measurement methods and procedures to be applied	Remote sensing analysis detailed below under monitoring plan description
Frequency of monitoring/recording	Areas burnt shall be monitored at least every five years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value monitored:	0 ha (2019 - 2021, all strata)
Monitoring equipment	
QA/QC procedures to be applied	
Purpose of the data	Calculation of project emissions
Calculation method	
Comments	

3.1.3 Monitoring Plan

3.1.3.1 Revision of the baseline

The project proponent has been granted an extension from Verra & MINAM to use existing baseline and carbon stock estimates for this monitoring period. See letters included "958_Baseline Extension Letter" and "Carta N 00011-2019-MINAM-VMDERN_Autorización extensión de Linea Base_Proy Redd.pdf" The baseline as outlined here in the Project Description was initially valid for 10 years, through August 7, 2018, but extended for use through December 31, 2020, thus valid for this monitoring period.

3.1.3.2 Monitoring of actual carbon stock changes and greenhouse gas emissions

For accounting purposes the project conservatively assumes stable stocks and no biomass monitoring is conducted in areas potentially undergoing carbon stock enhancement, as permitted in the methodology monitoring module VMD0015, hence ΔCP,Enh,i,t is set to 0.

Monitoring of actual emissions in the project area focuses on:

- Emissions due to deforestation and natural disturbance;
- Emissions due to biomass burning;
- Emissions due to illegal degradation.

Procedures and responsibilities for monitoring each of the above sources of emissions are detailed below.

3.1.3.3 Emissions due to deforestation and natural disturbance

Forest cover change due to deforestation and natural disturbance is monitored through periodic assessment of classified satellite imagery covering the project area. Emissions ($ÄC_{P,Def,i,t}$ and $ÄC_{P,DistPA,i,t}$ for deforestation and natural disturbance, respectively) are estimated by multiplying area of forest loss detected ($A_{DefPA,u,i,t}$ and $A_{DistPA,q,i,t}$, for

deforestation and natural disturbance, respectively) by average forest carbon stock per unit area (conservatively assuming $\Delta C_{P,Dist,q,i,t}$ and $\Delta C_{pools,Def,u,i,t} = C_{BSL,i}$). Stock estimates from the initial field inventory completed in 2009, are valid for 10 years (per VM0007), minimally through 2018. Post 2018, the previous carbon stock values have been granted an extension.

Monitoring changes in forest cover

The project boundary, as set in the PD, will serve as the initial "forest cover benchmark map" against which changes in forest cover will assessed over the interval of the first monitoring period; the entire project area has been demonstrated to meet the forest definition at the beginning of the crediting period. For subsequent monitoring periods, change in forest cover will be assessed against the preceding classified forest cover map marking the beginning of the monitoring interval.

Data collection and analysis to determine forest cover change at each monitoring event will follow the procedures detailed below. The resulting classified image is compared with the preceding classified image (forest cover benchmark map marking the start of the monitoring interval) to detect forest cover change over the monitoring interval, and subsequently becomes the updated forest cover benchmark map for the next monitoring interval. Thus, the forest benchmark map is updated at each monitoring event. All changes in forest cover detected for the monitoring interval will be annualized (to produce estimates of ha for each year) by dividing the area by the number of years in the period.

For each monitoring/verification date, satellite imagery for that year will be acquired and interpreted to produce a classified forest cover map in which forest and non-forest are distinguished. A Minimum Mapping Unit (MMU) of 0.81 ha, corresponding to 3 pixels by 3 pixels Landsat resolution (90m x 90m) will be used throughout the duration of the project crediting period. The general work flow for monitoring forest cover change is shown in Figure 4.

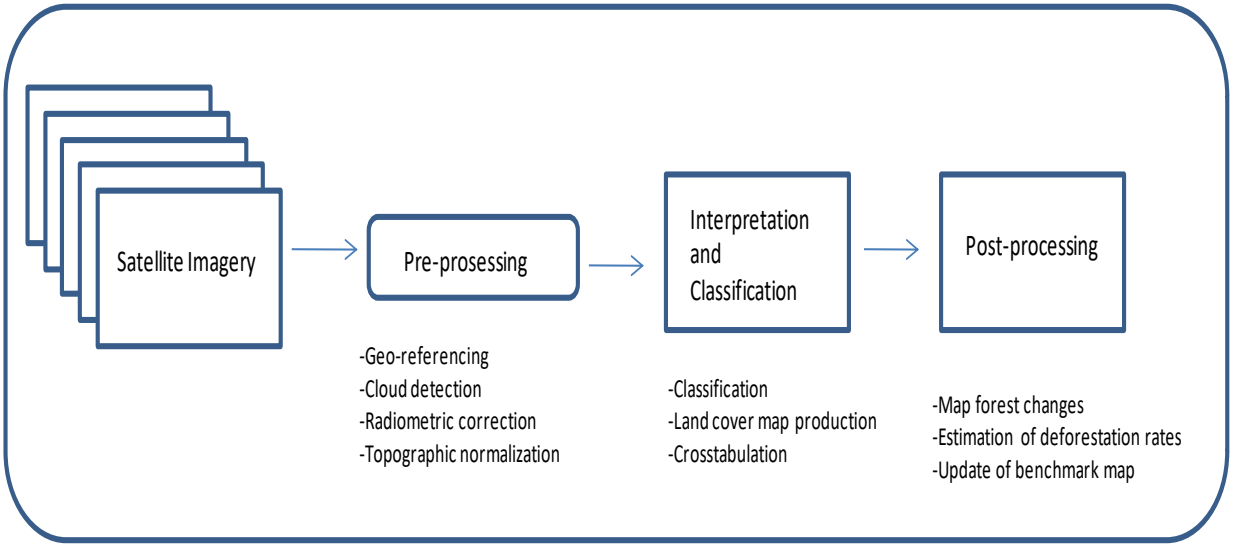


Figure 4. General workflow for monitoring forest cover change in the project area

and leakage belt

The forest cover benchmark map for the project in August 2018 (Figure 5) establishes the extent and location of forest and non-forest at the beginning of the monitoring interval.

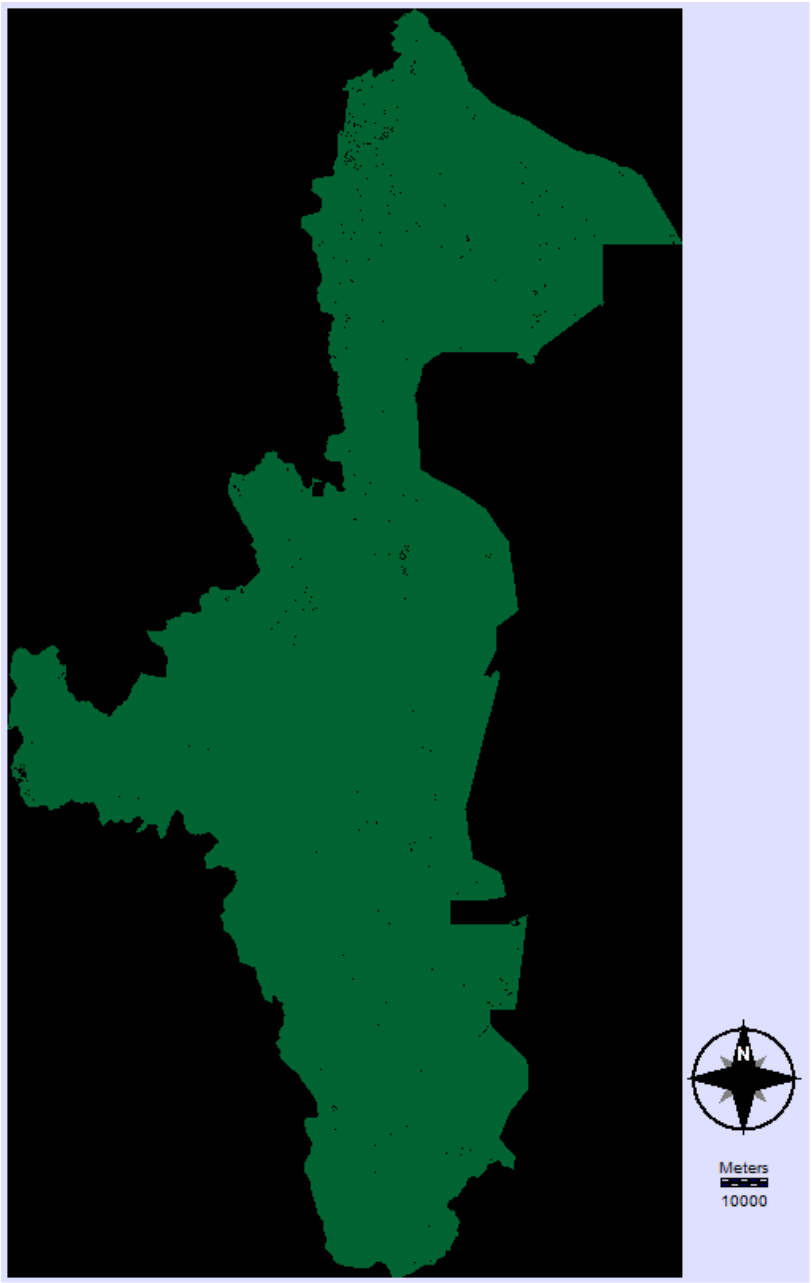


Figure 5: Forest cover benchmark map for project area, August 2018

Data collection and analysis to determine forest cover change at each monitoring event will follow the procedures detailed below. The resulting classified image is compared with the preceding forest cover benchmark map to detect forest cover change for the monitoring period, and becomes the updated forest cover benchmark map for the subsequent monitoring period. Thus, the forest benchmark map is updated at each monitoring event.

Data acquisition

To estimate the change of forest cover within the project area, the benchmark map generated at the previous monitoring event (or at project start August 2008 for the first monitoring event) will be compared with a newly-generated classified forest cover map for the monitoring date. The new forest cover map for the project area will comply with the following requirements.

Base satellite imagery will cover both the project area and leakage belt (i.e. monitoring of project area and leakage belt will use the same data source) and will be from a single year, though it may include a mosaic of scenes over several months. Landsat imagery has been used in historical analysis, and will likely be used in the future, but with the failure of Landsat 5 in 2011, and the sensor error with Landsat 7, a final determination of the which sensor will be used will hinge on the continuity of the Landsat program. Landsat 8 was launched successfully in 2013 and continues to collect data along with Landsat 7. In the case that both of these sensors fail before their replacement, other medium resolution remotely sense data will be used that can calibrate to acceptable levels with the previous imagery.

Imagery will be 90% cloud free. This typically can be achieved by mosaicking multiple scenes from the same year together. In the case that imagery alone cannot achieve 90% classified area, where possible, clouded areas will be classified on the basis of other data sources (e.g. ground surveys in the year of interest, radar, over-flights or classified imagery from a year subsequent to the monitored year).

Per module M-MON, “If the areas with 10% cloud cover in either date in question do not overlap exactly, then the rate [will] come from areas that were cloud free in both dates in question.... estimated in % per year. Then, a maximum possible forest cover map [will] be made for the most recent time period [i.e. monitoring date]. The historical rate in % [will] be multiplied by the maximum forest cover area at the start of the period for estimating the total area of deforestation during the [monitoring] period.”

The following cartographic data has also been collected to aid in geo-referencing and delineation of project area and leakage belt (all projected in UTM WGS 84 Zone 18 S):

- Carta Nacional 1:1 000,000 IGN (Hojas 13L, 14K, 14L, 19M, 15J, 15K, 15L, 15M, 16J, 16K, 16L, 16M, 17J, 17K, 17L, 17M, 18K, 18L, 18M)
- Rivers and roads - CIMA Cordillera Azul.
- Project area
- Leakage belt area

Pre-processing

As stated above Landsat moderate resolution imagery will be used preferentially. Landsat imagery is 30m multispectral data that is composed of 7 -11 bands. Some of these bands are not used in image classification since they are designed for collection of other data (i.e thermal bands or aerosols) The other 6 bands will be included in image analysis.

Collected imagery will be prepared for processing and analysis to ensure that the imagery displays and overlays accurately. The following pre-processing tasks will be conducted and are detailed below: geo-referencing, cloud and shadow removal. Each scene will be pre-processed and classified separately, eliminating need for radiometric corrections or topographic normalization where scenes must be puzzled together.

The majority of Landsat imagery from USGS is obtained from EROS (Earth Resource Observation Systems) with multiple pre-processing steps completed. These processing steps are summarized below and more detail information can be found from NASA[42].

The 1G product available to users is both radiometrically and geometrically corrected. The correction algorithms employed model the spacecraft and sensor using data generated by onboard computers during imaging events and ground control points and a digital elevation model are also used to improve the overall geometric fidelity. The geometric correction process utilizes both ground control points (GCP) and digital elevation models (DEM) to attain absolute geodetic accuracy. The WGS84 ellipsoid is employed as the Earth model for the Universal Transverse Mercator (UTM) coordinate transformation. Associated with the UTM projection is a unique set of projection parameters that flow from the USGS General Cartographic Transformation Package. The end result is a geometrically rectified product free from distortions related to the sensor (*e.g.,* jitter, view angle effects), satellite (e.g. altitude deviations from nominal), and Earth (*e.g.,* rotation, curvature, relief).

When landsat data is imported in the image processing software, it is converted from raw digital numbers to reflectance values. For this conversion a dark-object subtraction method is applies using the module in Idrisi, For Landsat data reflectance rescaling coefficients and the solar elevation angle parameter which are found in the metadata are applied, and a haze digital number is automatically determined. The results are ground reflectance images which are used in all further image processing steps

When using Level 1G processed imagery, pre-processing success must be confirmed, but frequently few extra pre-processing steps are necessary. The potential additional steps are detailed below.

Radiometric correction

Since change detection is conducted after classification, the only time additional radiometric correction is required is if severe atmospheric distortions are present in the only available imagery, or extreme topographic relief makes cloud shadows problematic. In these cases a haze reduction algorithm using a dark object subtraction may be used or a topographic normalization using a digital elevation model may be used.

Geo-referencing

For this procedure the August 2008 benchmark map will be used as a reference image from which all subsequent images will be geo-referenced. At least seven well distributed ground control points (GCP) will be identified for the geo-referencing procedure. Each GCP will be known and recognizable in the source image and the reference image. A resampling operation using the nearest neighbor interpolation method and a linear polynomial function will be used to ensure minimal distortion. The average geo-location error will not exceed one pixel. In the case that multiple images are mosaicked, a final image may be geo-

[42] http://landsathandbook.gsfc.nasa.gov/level/

referenced to ensure accurate location. In the case that imagery is obtained with geo-rectification conducted by the image producer or provider, secondary geo-referencing is not necessary.

Cloud and shadow detection and removal

Detection of clouds and shadows will be accomplished through visual inspection or combining automated cloud identification techniques and visual inspection. An unsupervised clustering technique and a post classification assessment will be used to identify all areas affected by clouds and cloud shadow. Other imagery from with 12 months of the image date may be used to fill in these cloud areas.

Interpretation and classification

In this step, the scenes are interpreted by applying a classification algorithm to identify forest and non-forest categories. A two-step approach to classification will be used. In the first step, an unsupervised clustering algorithm technique will be used to classify each scene. Visual interpretation of clusters by an image analyst with knowledge of the land cover and/or with the assistance of high resolution imagery will be conducted to identify and then group all clusters into forest, non-forest, fire or fire scars, cloud and cloud-shadow and water classes. In the case of mixed classed, a second stage clustering may be employed on just the areas of confusion to see if clear classes may be identified. If clear categorization has been obtained (tested through the accuracy assessment) then step 2 can be skipped. If the classification accuracy using the unsupervised technique is not sufficient, or if the analyst prefers the use of supervised techniques, then a maximum likelihood algorithm will be used for supervised classification using samples of known areas selected for training areas (AOI, Areas of Interest) for a minimum of the following classes: "non-forest," "forest," “fire scars,” “water”. A final land use map with 2 categories (forest and non-forest) will be created to assess forest loss against the previous benchmark map. In the case of fire evidence, as can be detected through the distinct spectral signature of burn scars, typically for >18 months, or naturally shaped (as opposed to more typically geometrically shaped anthropogenic disturbance) patches of re-growth, or from field reports of fires that have been investigated and substantiated through remote sensing evidence, these areas will be maintained as a separate category to calculate parameter $A_{burn,i,t}$; and for estimation of biomass burning emissions using the module E-BB, calculated emissions from biomass burning will be incorporated in project accounting only where they are not determined to be insignificant applying T-SIG. As mentioned above, each scene will be classified separately.

The following guidelines will be taken into consideration for the imagery classification process:

Each scene will be classified separately using a hard classification method. The geospatial analyst performing the classification will take into consideration the variety of features in the scene and reference training sites representing a range of categories (from within forest and non-forest) sufficient to facilitate the identification of forested locations from locations with no forest. Special attention will be given to grasslands or herbaceous wetlands, and especially old fallows and shade crops like coffee (which can be confused with forest) to avoid classification errors. Where necessary, corrections to the supervised classification will be made from visual interpretation of imagery.

Areas of natural disturbance are important to separate from anthropogenic deforestation. This can be done through visual inspection and identification of areas of know disturbances, such as landslides, that are remote and outside of areas of human influence. Specific exclusion zones that are both remote and within areas of natural disturbance were identified during project development and excluded from baseline modeling and change analysis (see change detection below). Once the classified map is produced, categories will be merged into two categories for change assessment: forest and non-forest. Following classification, classified scenes will then be joined to produce a final map that will be compared against the benchmark map.

Post classification

To ensure that the minimum forest definition is met, the final classification will be filtered using a 3 x 3 mode filter. This will increase the MMU to 90m x 90 m to most closely meet the national forest definition. It will also improve any "speckle" in the classification due to small error.

Change detection

Post-classification change detection techniques will be implemented for identifying forest cover change.

Basic cross-tabulation techniques will be used to identify changes from forest to non-forest. Area data from the two maps (benchmark map at beginning of monitoring interval and newly-generated map for current monitoring year) will be cross-tabulated to identify locations that change from forest to non-forest during the monitoring period, which represent deforestation in the actual with-project case.

The project area has many extreme topographic features- Including very steep slopes, and areas at high elevation that have minimal tree cover. These areas were removed from the spatial modeling due to their inaccessibility, and will also be removed from the change detection analysis since any land cover change in these areas is due to non-anthropogenic sources. GIS files that delineate these masked areas are archived so that each analysis will maintain the same masks.

Quality Assurance/Quality Control

To ensure consistency and quality results, spatial analysts carrying out the imagery processing, interpretation, and change detection procedures will strictly adhere to the steps detailed above. All data sources and analytical procedures will be documented and archived (detailed under data archiving below).

Accuracy of the classification will be assessed by comparing the classification with ground truth points or samples of high resolution imagery (*e.g.,* SPOT or Rapideye imagery). Any data collected from ground-truth points will be recorded (including GPS coordinates, identified land-use class, and supporting photographic evidence) and archived. Any sample points of high resolution imagery used to assess classification accuracy will also be archived. Samples used to assess classification accuracy should be well-distributed throughout the project area (as far as is possible considering availability of high resolution imagery and/or logistics of acquiring ground truth data), with a minimum sampling intensity of 50 points each for the forest and non-forest classes.

Results of the accuracy assessment will be presented and analyzed in a matrix in the format elaborated in the example below (Table 3), such that the following errors are presented:

- Overall classification accuracy;
- Error of omission of each land-use category (forest and non-forest);
- Error of commission of each land-use category (forest and non-forest).

Table 3: Example accuracy assessment results

Land-use class as determined from ground-truth points	Classification		Total	Accuracy (%) *User's accuracy (# correct/ row total)*	Error of Commission (%)
	Forest	Non-forest			
Forest (100)	95	5	100	95.0	5.0
Non-forest (100)	9	91	100	91.0	9.0
Total	104	96	200		
Accuracy (%) *Producer's accuracy (# correct/ column total)*	91.3	94.8			
Error of Omission (%)	8.7	5.2			

The classification will only be used in the forest cover change detection step if the overall classification accuracy, calculated as the total number of correct samples/ the total number of samples, is equal to or exceeds 90%.

Data Archiving

All data sources and processing, classification and change detection procedures will be documented and stored in a dedicated long-term electronic archive maintained by CIMA at its main office in Lima as described in Section 3.3.8.

Information related to monitoring deforestation maintained in the archive will include:

- Base (raw) imagery used (specifying type, source, resolution, imagery date, acquisition date);
- Any cartographic data used to geo-reference the image (source, base data);
- Data used for training classification;
- Definition of land cover classes assessed;
- Documentation of software type and procedures applied (including all pre-processing steps and corrections, spectral bands used in final classifications, and classification methodologies and algorithms applied);
- Classified images;

- Data used in accuracy assessment, ground-truth points (including GPS coordinates, identified land-use class, and supporting photographic evidence) and/or sample points of high resolution imagery;
- Accuracy assessment matrix with minimally the following errors presented: overall classification accuracy, error of omission of each land-use category (forest and non-forest), and error of commission of each land-use category (forest and non-forest).

Data archived will be maintained through at least two years beyond the end of the project crediting period, through July 2030. Given the extended time frame and the pace of production of updated versions of software and new hardware for storing data, electronic files will be updated periodically or converted to a format accessible to future software applications, as needed.

Updating forest carbon stock estimates

Forest carbon stock estimates used to calculate emissions from deforestation and natural disturbance will use estimates derived from field measurements less than or equal to 10 years old. In the event that any deforestation is discovered in the project area, forest carbon stock estimates older than 10 years will be updated for any strata where deforestation is detected. Initial above- and belowground biomass and dead wood stock estimates from the 2009 inventory are valid and treated as constant through 2018, after which they will be re-estimated from new field measurements. For this monitoring period, the previous carbon stock values have been granted an extension.

To re-assess forest carbon stocks, twenty (20) point samples (four clusters of five points) will be randomly located in each forest strata and measured (following field protocols in Appendix 8) in 2018. Biomass will be estimated applying the allometric equations of Chave et al. 2005 and otherwise maintain consistency with analytical procedures applied in the original 2009 inventory. For each strata, where the re-measured estimate of total forest biomass carbon (live and dead) is within the 90% confidence interval of the 2009 estimate, the 2009 stock estimate will continue to be used in the next 10 year baseline period. If the re-measured estimate is outside (i.e., greater than or less than) the 90% confidence interval of the 2009 estimate, then the 2018 stock estimate will be used in the next 10 year baseline period.

3.1.3.4 Quality Assurance /Quality Control and Data Archiving Procedures

The following steps will be taken to control for errors in field sampling and measurements and data analysis:

1. Field crews with prior training in forest inventory will carry out all field data collection and adhere to field measurement protocols outlined in PD Appendix 8. Pilot sample plots shall be measured before the initiation of formal measurements to train and appraise field crews and identify and correct any errors in field measurements. Field crew leaders will be responsible for ensuring that field protocols are followed to ensure accurate and consistent measurement. During the course of implementation, field crews were periodically apprised of measurement errors to assess progress. To ensure accurate measurements, the height of diameter at

breast height (1.3 m) will be periodically re-assessed by personnel during the course of the inventory. Field crews will have fine scale forest strata maps for use in the field to precisely interpret strata/forest boundaries and identify potential areas of plot overlap.

2. Calibration of prisms will be confirmed prior to formal field measurements. All borderline trees will be measured and assessed against prism plot radius factor, which is standardized as distance to the center of the tree: diameter at breast height.

3. An opportunistic sample of plots will be re-measured to assess measurement errors. Re-measurement for this purpose will be done by a different field crew. Measurement error will be assessed as 1/2 of the mean (absolute) percent difference between re-measured plot level biomass estimates (a valid assumption where teams are equally experienced and there are no systematic errors in measurement, which will also be appraised from the re-measurement results). Target measurement error is < 5%.

4. Field measurement data will be recorded on standard field data sheets (PD Appendix 8) and transferred to electronic media ("entrada de datos PNCAZ inventario.xls") following each return from the field. Original data sheets will be permanently archived at the CIMA office in Tarapoto and Lima, and the electronic database of all field measurements will be housed in the dedicated long-term electronic archive maintained on the CIMA server at its main office in Lima. The electronic database will also archive GIS coverage detailing forest and strata boundaries and plot locations.

5. Checks will be run for unusual (high or low) values to identify and correct any errors in recorded field data or transcription. Personnel involved in data analysis will consult with personnel involved in measurement to clarify any ambiguities in recorded field data.

6. For laboratory analysis of dead wood specific gravity, all balances for measuring dry weights will be calibrated against known weights prior to use. All calibration results will be documented and archived along with sample analysis results. 10% of samples will be re-analyzed/re-weighed to produce an error estimate

3.1.3.5 Emissions due to illegal degradation

Emissions due to illegal logging will be tracked by conducting MUF surveys in communities with access to the project area at least every three years. If necessary to make the assessment more frequently, then *ad hoc* surveys may be made to gather information on specific parameters.

Communities surveyed will include, but not necessarily be limited to those listed in Table 4.

Table 4: Communities to be surveyed

Reference region (District)	Population center
Huimbayoc	Pongo Isla
Huimbayoc	Pucallpa
Chazuta	Ricardo Palma
Chazuta	Callanayacu
Shamboyacu	Porvenir
Pampa Hermosa	Tahiti
Pampa Hermosa	Playa Hermosa
Alto Biavo	Los Cedros
Bajo Biavo	Selva Andina
Alto Biavo	Challual
Alto Biavo	Juanita
Padre Abad	Yamino
Contamana	La Cumbre

Surveys will produce information on wood consumers (fuel wood and wood for construction and charcoal production) in the surroundings areas, as well as general indications on the areas where wood is sourced from and maximum depth of penetration of harvest activities from access points.

In the event that any potential of illegal logging occurring in the project area is detected from the surveys (*i.e.* ≥10% of those interviewed/surveyed believe that degradation may be occurring within the project boundary), temporary sample plots will be allocated and measured in the area of the project indicated by the surveys as a potential source area for illegally-harvested wood. The potential degradation area within the project area ($A_{DegW,i}$) will be delineated based on survey results, incorporating general area information and maximum depth of penetration. Rectangular plots 10 meters by 1 kilometer (1 ha area) will be randomly or systematically allocated in the area, sufficient to produce a 1% sample of the area, and any recently-cut stumps or other indications of illegal harvest will be noted and recorded. Diameter at breast height or diameter at height of cut, whichever is lower, of cut stumps will be measured.

In the event that the sample plot assessment indicated that illegal logging is occurring in the area, supplemental plots will be allocated to achieve a 3% sample of the area. Biomass will be estimated from measured diameters (conservatively assuming that diameters of stumps cut below breast height are equivalent to diameter at breast height) applying the allometric equation of Chave et al. 2005 and otherwise maintain consistency with analytical procedures applied in the original 2009 PNCAZ inventory. Emissions due to illegal logging ($\Delta C_{P,DegW,i,t}$) are estimated by multiplying area ($A_{DegW,i}$) by average biomass carbon of trees cut and removed per unit area ($C_{DegW,i,t} / AP_i$).

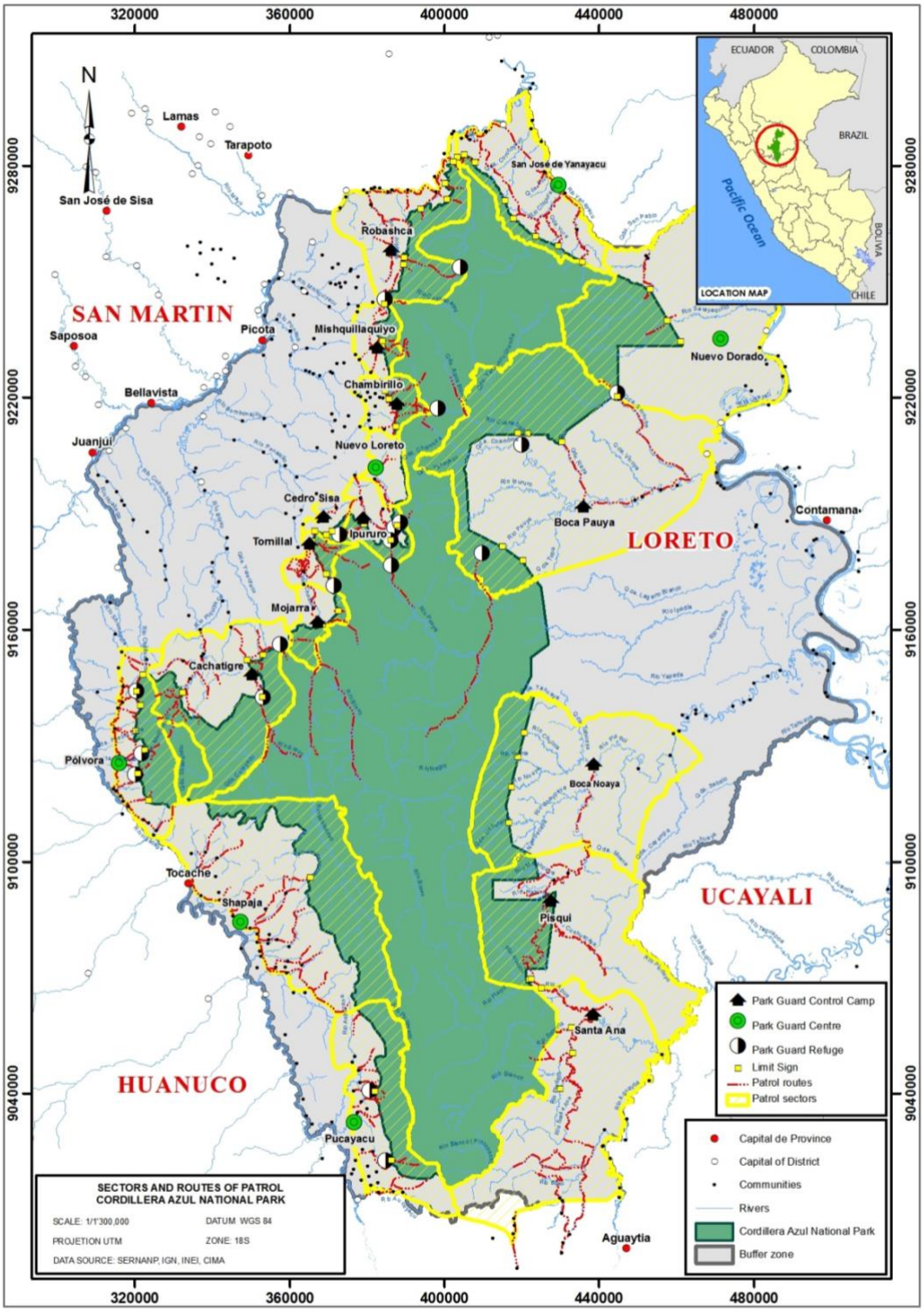
The more intensive 3% sample will be carried out once every 5 years where surveys and limited sampling continue to indicate possibility of illegal logging in the project area to produce an estimate of emissions resulting from illegal logging ($\Delta C_{P,DegW,i}$). Estimates of

emissions will be annualized (to produce estimates in t CO_2-e per year) by dividing the emission for the monitoring interval by the number of years in the interval.

The same quality assurance/quality control and archiving procedures as detailed above for updating estimates of forest carbon stocks will be adhered to in the field surveys of potential degradation areas.

Within the project area and area bordering the park (PNCAZ buffer zone), routine patrols will be carried out throughout the year by park guards. Patrols will identify, and resolve where possible, any illegal wood harvest taking place in the PNCAZ and project area. There are 18 control posts and park guard centers on or near the border of the project area, from which guards will be routinely fielded on patrol routes totaling 2,041 km distance (544.6 km within PNCAZ). The total area to be routinely patrolled is located closest to communities with potential access to the park (i.e. highest potential pressure area for illegal harvest) and totals 1,779,984.7 ha (507,364.2 ha within PNCAZ). The density of patrol trails in the monitored area within PNCAZ is 1 km per 10 km^2. The location of patrol areas and park control posts are shown in Figure 6.

Figure 6. Location of patrol areas and park control posts



3.1.3.6 Monitoring of leakage carbon stock changes

Activity-shifting leakage in the leakage belt will be monitored by tracking forest cover change in the leakage belt (ADefLB,u,i,t), using classified satellite imagery produced following the same procedures outlined above in Section 3.3.3, referencing the 2018 forest cover benchmark map for the leakage belt (Figure 7). All changes in forest cover detected for the monitoring interval will be annualized (to produce estimates of ha for each year) by dividing the area by the number of years in the period.

Note that the leakage belt includes private inholdings and ineligible areas (without forest >10 years old) within PNCAZ as well as planned deforestation areas for oil palm production in the northeast.

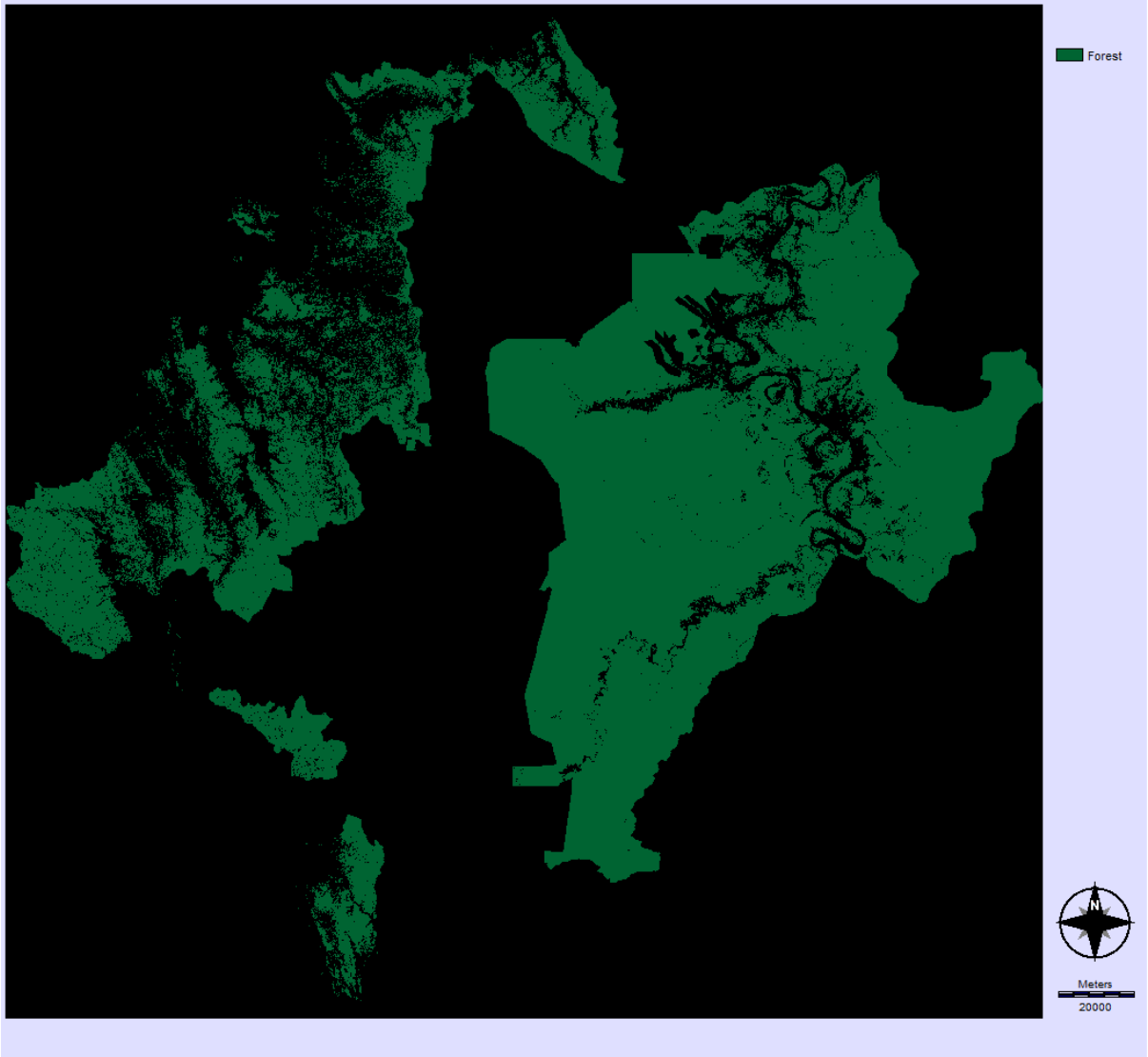


Figure 7. Benchmark map of forest cover in 2018 in the leakage belt

Parameter, $\Delta C_{pools,Def,u,i,t}$, is derived from estimates of $C_{BSL,i}$ (forest carbon stock in all pools in the baseline case in stratum *i*) from PNCAZ forest inventory measurements, or for strata identified in the leakage belt but not represented in the PNCAZ inventory from peer-reviewed regional literature sources, as for initial estimates derived in PD Section 3.

Parameter, $C_{P,post,u,i}$ (carbon stock in all pools in post-deforestation land use *u* in stratum) is assigned as the historical area-weighted average carbon stock for the converted (non-forest) baseline land-use(s), the initial estimate derived in PD Section 3. Stock estimates will be re-assessed every ≤10 years.

Monitored parameters will be entered into the table format (Table 5, following page) to complete calculations of activity shifting leakage occurring in the leakage belt in the with-project case ($\Delta C_{LK\text{-}ASU\text{-}LB}$).

Activity shifting leakage outside the leakage belt (Table 6, following page) will be tracked by monitoring deforestation in the project area ($A_{DefPA,i,t}$) and leakage belt ($A_{DefLB,i,t}$).

The value for the first verification period was 32.5%. For the 2014-2015, 2015-2016, and current (2017-2021) verification periods, we updated the value of PROPImm referencing new data collected in January/February 2015, the new value is derived in Section 3.2.3, see Table 23, and is 19.7%. Subsequently, the parameter, $PROP_{IMM}$, will be derived from the results of surveys conducted among neighboring communities every ≤5 years. The same communities identified above for assessing potential for illegal degradation in the project area will be surveyed to determine for each interviewee how long the person has lived there and where did they come from prior to moving to the area. As there are sensitivities to assessing responsibility for deforestation in an interview context, the proportion of baseline deforestation caused by immigrating population will be assumed to be equal to the proportion of immigrants in the surrounding population. Immigrants are defined as someone who has lived in the area less than 5 years and came from an area outside the leakage belt.

3.1.3.7 Estimation of ex-post net carbon stock changes and greenhouse gas emissions.

Estimates of GHG credits eligible for issuance as VCUs will be calculated entering data into the table format (Table 7, following page), where:

Estimated GHG emission reduction credits =

- Baseline emissions, fixed for 10 years at validation *minus*
- Project emissions *minus*
- Leakage *minus*
- Non-permanence Risk Buffer withholding (calculated as a percent of net change in carbon stocks prior to deduction of leakage).

Table 5: Calculation format for area subject to activity shifting leakage in the leakage belt

Equation	Derived in PD Sections 3.1 and 3.3		Derived from forest inventory estimates	M-MON 4	LK-ASU 1
Year	$\Delta C_{BSL,LK,unplanned}$ t CO_2	$A_{DefLB,u,i,t}$ ha	$\Delta C_{pools,Def,u,i,t}$ t CO_2/ha	$\Delta C_{P,DefLB,i,t}$ t CO_2	$\Delta C_{LK\text{-}ASU\text{-}LB}$ t CO_2
2009	6,910,840.7				
2010	7,497,174.1				
2011	9,658,074.5				
Etc…	Etc...				

Table 6: Calculation format for area subject to activity shifting leakage outside the leakage belt

Equation		Derived in PD Section 3.1	LK-ASU 7			LK-ASU 8	LK-ASU 9	Derived in PD in Section 3.3	LK-ASU 11
Year	$PROP_{IMM}$	$A_{BSL,PA,unplanned,t}$ ha	$A_{LK\text{-}IMM,t}$ ha	$A_{DefPA,i,t}$ ha	$A_{DefLB,i,t}$ ha	$A_{LK\text{-}ACT\text{-}IMM,t}$ ha	$A_{LK\text{-}OLB,t}$ ha	$PROP_{CS}$	$\Delta C_{LK\text{-}ASU,OLB}$ t CO_2
2009	32.5%	4,256.82						1.049	
2010	32.5%	5,420.34						1.049	
2011	32.5%	3,216.33						1.049	
Etc…	Etc...	Etc.						Etc.	

Table 7: Calculation format for estimates of GHG credits eligible for issuance as VCUs

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO2e)	Risk buffer (%)	Deductions for AFOLU pooled buffer account	Estimated net GHG emission reductions or removals (tCO_2e)
2009	1,834,510.1					
2010	1,960,580.9					
2011	1,337,026.1					
Etc…						

3.1.3.8 Organization and Responsibilities

For all aspects of project monitoring, CIMA will ensure that data collection, processing, analysis, management and archiving are conducted in accordance with the monitoring plan.

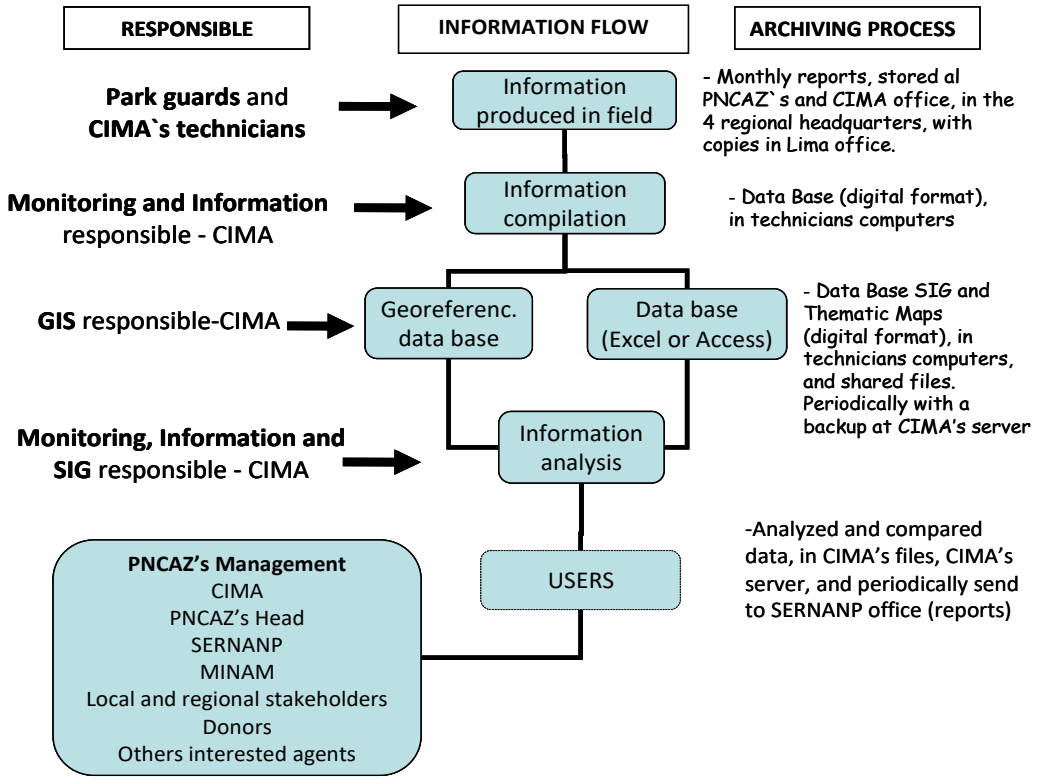
Remote sensing image analysis is conducted by CIMA's GIS team periodically according to the procedures discussed in PD Appendix 4.

Field data is the result of CIMA technicians' trips and the park guard's routine and special patrols as part of their planning activities. Technicians and park guards are the key personnel in the generation of information – threats, social and environmental aspects of PNCAZ and buffer zone – and are trained to ensure that they are aware of the importance of the data they are generating. They are the first link in the chain of information flow (Figure 8).

This data is recorded in the monthly reports of the technicians and park guards at the offices of the Head of PNCAZ and CIMA, and copies of the park guards' reports are sent to CIMA office in Lima headquarters. This information is analyzed by the CIMA Information and Data Specialists to provide quarterly and annual technical reports to SERNANP (or donors) about the progress in PNCAZ's management activities, to report results and impacts of management to SERNANP, and for review by CIMA Management as appropriate. This critical information is systematized and analyzed annually by the technical staff of CIMA.

Hard copies of all of the data is stored in Lima or Tarapoto. The most important information and data is converted to electronic format and placed on the server for sharing between the Lima and Tarapoto offices. This server is periodically backed up.

Figure 8: Data flow in CIMA



3.1.4 Dissemination of Monitoring Plan and Results (CL3.2)

The results of the PNCAZ's deforestation analysis have been reported according to the monitoring procedures for PNCAZ's management, in the corresponding quarterly and annual reports to SERNANP, under the framework of the Administration Agreement which CIMA performs.

The information has also disseminated in different meetings in the framework of the REDD board of the San Martin region.

For the Communications between CIMA and the communities neighboring the park, the best space for continuous and massive participation is the community assemblies (*Asambleas comunales)*, where the technicians participate on average 1 time per month according to their calendar of visits in coordination with each town. The assemblies are communal spaces where CIMA takes the chance to hold awareness sessions, trainings, take communal decisions, provide and exchange news, make work coordination, and inform of events, information, complaints, requirements, etc. from both sides. For this, CIMA has developed a series of informative materials (Annex F6.1 Poster on REDD and PNCAZ), so that technicians can have the basis on which they explain the REDD+ Project, linked to the Program and its expected results.

CIMA has a Non-Formal Environmental Education program, which includes a series of 11 modules or sessions and their respective work material; among these modules is Session N ° 2 corresponding to Ecosystem Services, which take place in the space that the community provides to CIMA within the framework of the communal assembly. These non-formal environmental education events in communities are permanent, massive and represent the most basic level of intervention, to include populations where CIMA has little intervention; In very remote villages where CIMA cannot reach, it is the park rangers who directly implement these sessions under the advice of CIMA.

Eventually, CIMA can arrange general meetings outside of the communities, as was done during the Master Plan process, where all stakeholders were required to contribute and validate simultaneously on PNCAZ management issues; These processes of mobilization of people are very expensive and take a long time (as confirmed by verifiers in field), so this mechanism is not ideal; although, the advantage is that we can get the minutes or agreements with almost everyone involved in the process. The Master Plan process was an ideal and exceptional scenario (it takes place every 5 years) where it was used to talk massively about conservation and management issues of the PNCAZ, including the REDD issue as an essential part of the environmental aspect, and as a mechanism to achieve economic sustainability until 2018.

It is worth mentioning that CIMA is very respectful of the participation spaces in the management of PNCAZ, which is why the Regional Government of San Martin (GRSM), one of the most advanced in terms of REDD, sends to CIMA an expression of thanks in August 2015 for its extensive work and contribution provided in the topics of safeguards for REDD in the region (Annex F6.5 Letter GRSM). The one that has been an incentive to continue his work maintaining the highest standards of participative management, and his support in the following years to the GRSM.

Information on REDD+ Projects in protected areas and in particular that of Cordillera Azul used varied mechanisms, such as the written press and media on the web to communicate their achievements.

An example is the web Panorama Solutions, which published an article titled "Social participation contributions as a driver of innovation in the management of the Cordillera Azul National Park, Peru", The article states as one of the key impacts the consolidation of a financial sustainability mechanism through negotiation of carbon credits in the international market. This allowed CIMA to garner a key financial partner that was crucial for selling the carbon credits and thus financing the park´s activities[43].

Another good example is the IUCN Incubator for Nature Conservation, a programme designed to enhance financing of spectacular protected areas. In the pilot phase, 10 areas worldwide were chosen, among which is Cordillera Azul National Park. The site mentions the potential of the area, such as the avoidance of 2.5M tCO2 per year, which allows for key funding through a REDD+ project[44].

Once the verified information is obtained, the dissemination of the final results of the monitoring of actual changes in carbon stocks and GHG emissions will proceed in the REDD and carbon section in CIMA´s website, bouncing the news on the website SERNANP as it has been made on previous periods.

- http://cop20.minam.gob.pe/24314/presentaciones-del-webinar-negocios-de-carbono-y-conservacion-de-areas-naturales-protegidas/ (Estudio de caso: Parque Nacional Cordillera Azul: Presentaciones del webinar "Negocios de carbono y conservación de Áreas Naturales Protegidas")
- http://www.iai.int/?p=8421
- http://www.iai.int/wp-content/uploads/2015/08/CIMA-IAI-2015.pdf (Experiencia del Proyecto REDD+, in: Regional Training Workshop on tools for climate-smart conservation: vulnerability assessments, ecosystem services and structured adaptation planning toward conservation goals. IAI, Quito, Ecuador)
- https://portals.iucn.org/library/sites/library/files/documents/2016-030.pdf (Arguedas, S.; Vides, R. y Castaño, L. (Eds). 2015. Lecciones aprendidas y buenas prácticas para la gestión de áreas protegidas amazónicas. UICN-Fundación Gordon y Betty Moore. Quito, Ecuador. 264 pp.)
- http://cima.org.pe/files/images/publicaciones/pdf/CIMA-2013-Experiencia-REDD-PNCAZ.pdf (Experiencia del Proyecto REDD+ PNCAZ - CIMA)
- http://cima.org.pe/files/images/publicaciones/pdf/UICN-2014-Enfoque-Ecosistemico-en-Cordillera-Azul-pag-41.pdf (Planificación y gestión de Áreas Protegidas en América del Sur: avances en la aplicación del enfoque ecosistémico – UICN, página 41)
- http://www.bosques.gob.pe/archivo/libro_carbono.pdf (Estimación de los contenidos de carbono de la biomasa aérea en los bosques de Perú)

[43] https://panorama.solutions/en/solution/social-participation-contributions-driver-innovation-management-cordillera-azul-national

[44] https://www.iucn.org/theme/environmental-law/our-work/protected-areas-pas/incubator-nature-conservation-inc/cordillera-azul

- http://theforestsdialogue.org/publication/country-report-considerations-redd-benefit-sharing-peru (Country Report: Considerations for REDD+ benefit sharing in Peru – The Forest Dialogue)
- http://pdf.usaid.gov/pdf_docs/PA00JJSR.pdf (Plan Regional de Fortalecimiento de Capacidades en Cambio Climático y REDD+ para la Región San Martin – TNC/USAID/GORESAM)
- http://www.cima.org.pe/es/noticias/parque-nacional-cordillera-azul-logra-acuerdo-historico (Noticia PNCAZ y acuerdo de CIMA-Althelia Cimate Fund).
- https://althelia.com/wp-content/uploads/2017/07/Althelia_impact-report_2017.pdf (Althelia Impact Report)
- http://www.fondoamericas.org.pe/iniciativa-del-fondam-sernanp-y-senamhi-que-permitira-generar-medidas-de-adaptacion-al-cambio-climatico-en-cuatro-areas-naturales-protegidas/

3.2 Quantification of GHG Emission Reductions and Removals

3.2.1 Baseline Emissions

Baseline emissions for the project activities for project years 2019-2021 is shown in Table 8 below (derived from Section 3.1 of the VCS PD). Recall that the monitoring report uses the convention that the project year is the year at the end of the interval, i.e. project year 2019 is 8 August 2018 to 7 August 2019. The 2021 project year is a partial year that starts 8 August 2020 to 31 December 2020. The extension of the baseline and carbon stock estimates for this crediting term has been approved by Verra and MINAM as expressed in the letters included with submission " 958 Baseline Extension Letter" Carta N 00011-2019-MINAM-VMDERN_Autorización extensión de Linea Base_Proy Redd.pdf"

Table 8. Calculation of baseline emissions

Year	$C_{BSL\ PA}$	$C_{BSL\ LB}$
2019	5,362,137.30	20,062,507.39
2020	5,362,137.30	20,062,507.39
2021	2,144,854.92	8,025,002.96
Total 2019-21	12,869,129.53	48,150,017.75

3.2.2 Project Emissions

Project emissions from deforestation are calculated as the total area deforested multiplied by the emission per unit area.

Table 9. Parameters used to calculate $\Delta CP,DefPA,i,t$

$ADefPA,u,i,t$ (ha)	Area of recorded deforestation in the project area stratum *i* converted to land use *u* at time *t*; ha	Calculated in imagery analysis
$\Delta Cpools,Def,u,i,t$	Net carbon stock changes in all pools in the project case in land use *u* in stratum *i* at time *t*; t CO_2-e ha^{-1}	Calculated below

Landslides have occurred in the project area and have been delineated in the image classification from other deforestation. This determination was based on distinguishing deforestation that occurred on very steep slopes in areas of known susceptibility to landslides based on previous landslide events and expert knowledge.

Figure 9. Project area

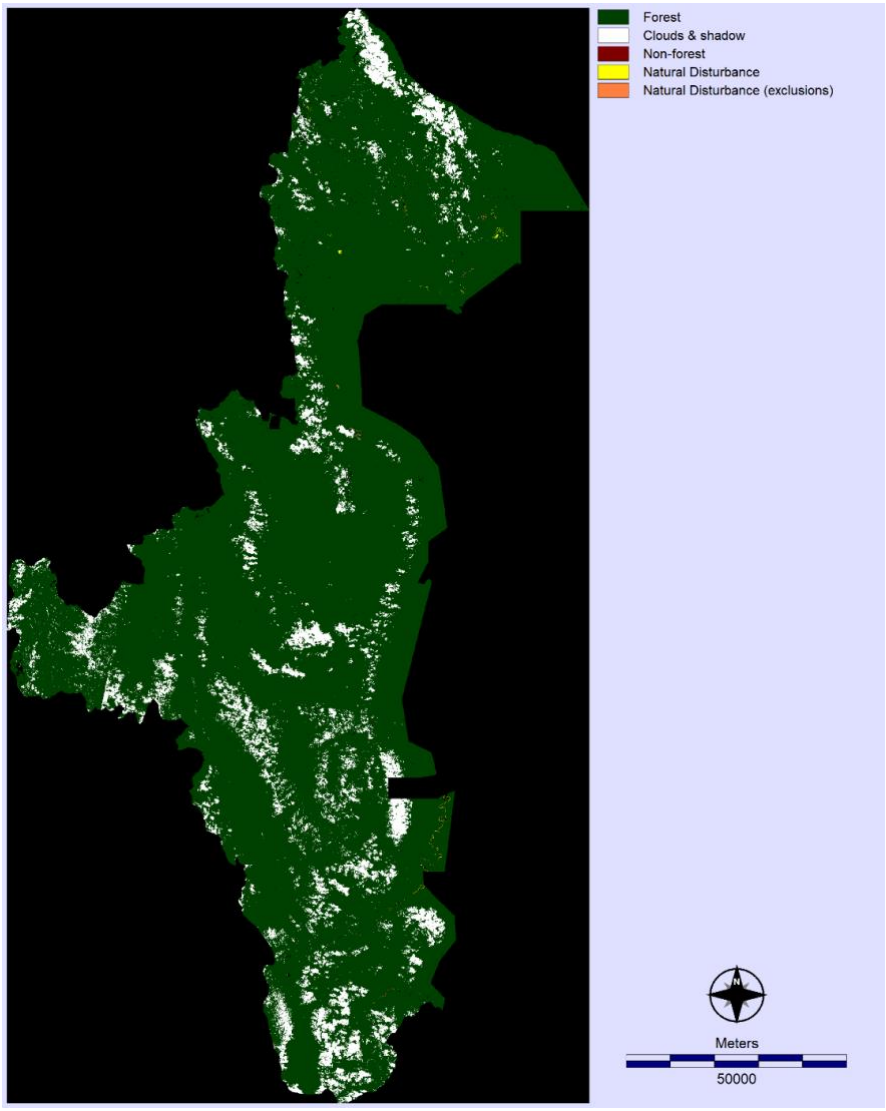


Table 10: Components of *ADefPA,u,i,t (ha)*

	ADefPA,u,i,t (ha)				
	Alluvial	Collinsos (Hill forest)	Montanosos	Humedales (Aguajal)	*TOTAL*
2019	1.5	6.8	15.6	0.4	*24.4*
2020	1.5	6.8	15.6	0.4	*24.4*
2021	0.6	2.6	6.0	0.1	*9.3*
Total 2019-21	**3.6**	**16.3**	**37.3**	**0.9**	**58.0**

Calculation of emission per unit area is equal to the difference between the stocks before and after deforestation. There are no indications of any commercial wood products recovery associated with the forest clearance process.

Table 11. Parameters used to calculate *ΔCpools,Def,u,i,t*

Parameter	Description	Calculation	Value
CBSL,i	Carbon stock in all pools in the baseline case in stratum	Calculated in forest inventory (PD section 3)	Varies by stratum
CP,post,u,I	Carbon stock in all pools in post-deforestation land use u in stratum i; t CO_2-e ha-1	Historical area-weighted average carbon stock for the converted (non-forest) baseline, cultivation and pasture (derived in PDD section 3)	41.3

Table 12. Components of *ΔCP,DefPA,i,t*

	Alluvial	Collinsos (Hill forest)	Montanosos	Humedales (Aguajal)	*ΔCP,DefPA,i,t*
2019	383.7	2,910.2	9,863.4	125.3	13,282.7
2020	383.7	2,910.2	9,863.4	125.3	13,282.7
2021	146.2	1,108.7	3,757.5	47.7	5,060.1
Total 2019-21	**913.7**	**6,929.1**	**23,484.2**	**298.4**	**31,625.4**

Monitoring areas undergoing natural disturbance

Per module M-MON, "For unplanned deforestation the sum of $A_{DistPA,q,i,t}$ shall be equal to the area of overlap between the delineated area of the disturbance and the summed area of unplanned deforestation in the project area ($A_{BSL,PA,unplanned,t}$), summed to the year in which the disturbance occurred." Thus emissions from natural disturbance that are accounted for are only those taking place in the area of projected deforestation in the baseline. Because the baseline incorporates topographic features (elevation) in the spatial modeling, which assign higher probabilities of deforestation in lower elevation and more level areas suitable for settlement and agriculture, risk of landslides (that tend to occur on higher elevation, steeper sites less suitable for settlement and agriculture) that produce reversals in project accounting is expected to be low.

Some landslides have occurred in the project area during the monitoring period and have been delineated in the image classification (Figure 9) For this monitoring period, the area of unplanned deforestation ($A_{BSL,PA,unplanned,t}$) was not spatially explicit, and therefore all landslides that occurred outside of the specific exclusion zones were conservatively included as emissions. Exclusion zones were defined in project development to identify areas that are very remote and have high likelihood of landslide or natural disturbances. These were excluded from the original baseline modeling and therefore cannot be included in the area of unplanned deforestation in the project area ($A_{BSL,PA,unplanned,t}$). The total areas of natural disturbance within exclusion zones for this monitoring period was 490.65 ha. All areas of natural disturbance that were outside of the exclusion zones are included in project accounting. Some small areas of disturbance were not included in the original stratification. These areas have been assigned to the strata with the highest sticking values, Montanosos.

Table 13. Components of *ADistPA,q,i,t (ha)*

Year	*ADistPA,q,i,t (ha)*				
	Alluvial	Collinsos (Hill forest)	Montanosos	Humedales (Aguajal)	*TOTAL*
2019	63.3	103.2	27.0	0	193.5
2020	63.3	103.2	27.0	0	193.5
2021	24.1	39.3	10.3	0	73.7
Total 2019-21	150.6	245.7	64.2	0	460.6

Table 14. Parameters used to calculate ΔCP,Dist,q,i,t

Parameter	Description	Value
CBSL,i	Carbon stock in all pools in the baseline case in stratum t CO_2-e ha-1	Calculated in forest inventory (PD annex)

CP,Dist,q,i	Carbon stock in all pools in post-natural disturbance strata *q,* in stratum i; t CO_2-e ha-1	Conservatively assumed to be 0
CDist, WP,q,i	Carbon stock sequestered in wood products from harvests following natural disturbance in post-natural disturbance stratum *q,* in stratum i; t CO_2-e ha-1	0

Table 15. Components of ΔCP,Dist,q,i,t

Stratum	CBSL,i	CP,Dist,q,i	CDist, WP,q,i	ΔCP,Dist,q,i,t
Alluvial	295.2	0.0	0.0	295.2
Colinosos (Hill forest)	466.8	0.0	0.0	466.8
Montanosos	671.7	0.0	0.0	671.7
Humedales (Aguajal)	372.9	0.0	0.0	372.9

Table 16. Components of *ΔCP,DistPA,i,t*

	ΔCP,DistPA,i,t				
Year	Alluvial	Collinsos (Hill forest)	Montanosos	Humedales (Aguajal)	*TOTAL*
2019	18,672.9	48,173.7	18,125.2	0.0	84,971.8
2020	18,672.9	48,173.7	18,125.2	0.0	84,971.8
2021	7,113.5	18,351.9	6,904.9	0.0	32,370.2
Total 2019-21	**44,459.2**	**114,699.3**	**43,155.3**	**0.0**	**169,943.7**

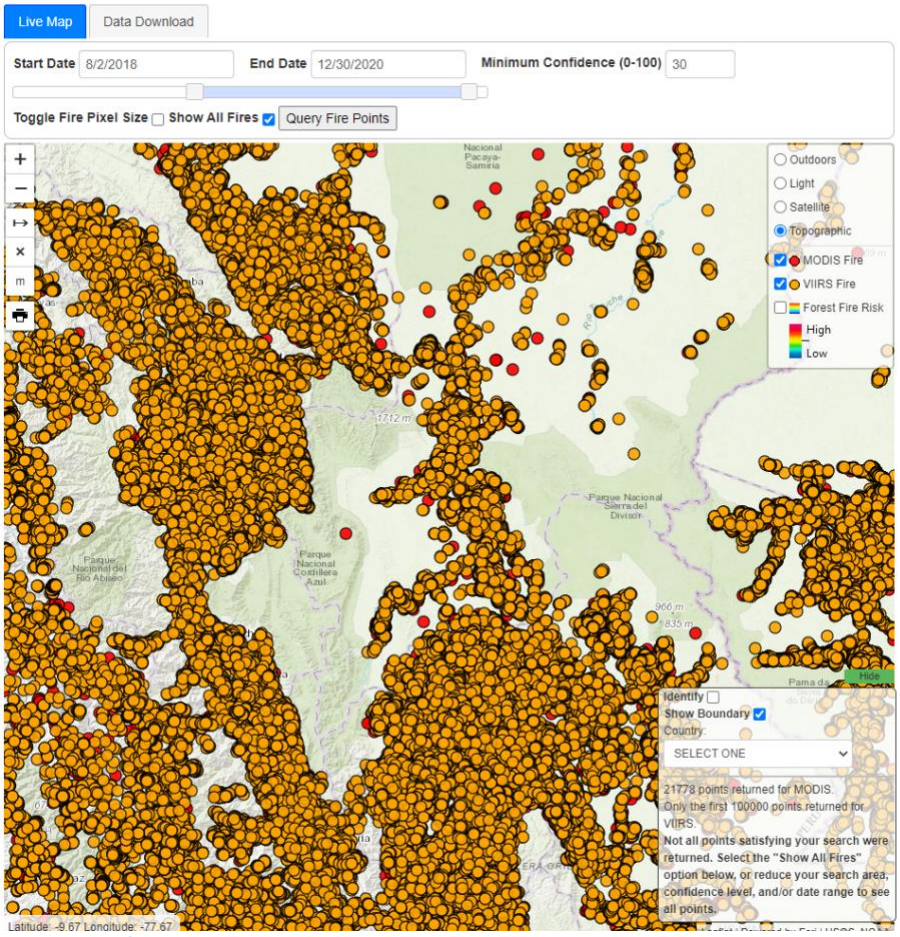
Monitoring biomass burning

Park guards reported no forest fires during the monitoring period from August 2018 to December 2020. Likewise, Firecast detected few fires in the project area during the same period (Figure 10). Firecast[45] is a MODIS-based fire monitoring system developed by Conservation International, NASA and ESRI, with highly precise detection of fires ≥50m^2. One apparent fires were detected in the central area of PNCAZ, however, in the classification

45

process, no evidence of fire scars was detected (i.e. no visible loss of forest cover or structural loss), and therefore $A_{burn,i,t}$ was set equal to 0.

Figures 10. Firecast report for the monitoring period August 2018 to December 2020.



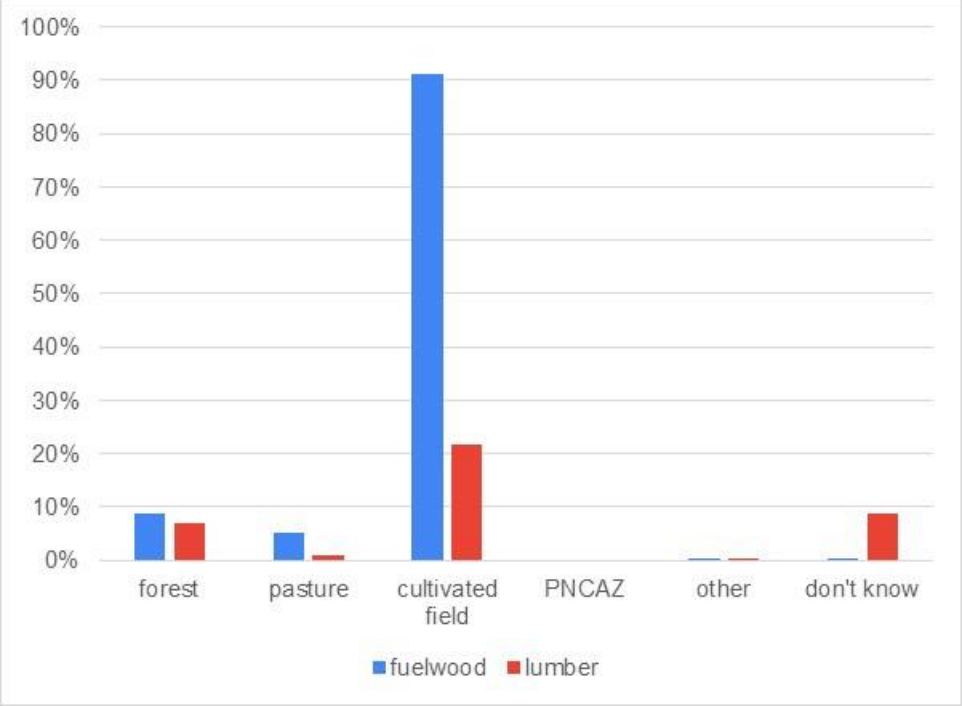
http://firecast.conservation.org

Monitoring illegal logging

From January to February 2021, surveys were carried out in 24 communities in the buffer zone of PNCAZ by CIMA to determine the potential of degradation occurring in the project area as a result of illegal logging of fuel wood and lumber for construction. In each community, 10 to 40 households were surveyed, depending on the size of the community (i.e. number of surveys was proportional to the size of the community). Communities were selected based on their relative dependence on the forest in the project area, and hence targeted those communities most likely to include baseline agents of degradation.

With respect to fuel wood/lumber use and collection, a total of 523 persons were interviewed. Most of the wood was collected from within community forests, and from remnant timber in cultivated fields outside the project area (Figure 11). Among those respondents, none mentioned sourcing fuelwood or lumber from within the project area. However, emissions from fuelwood and lumber collection within the project area were *de minimis*[46], and therefore not accounted. In fact, even if it is assumed that all households identifying "forest" as a source area for fuel wood and lumber are extracting from within PNCAZ, emissions due to degradation do not exceed 0.2% of the total GHG benefits generated this monitoring period.

Figure 11. Results of 2021 wood collection surveys, source areas of wood collection by respondents (percentages represent % of respondents identifying a given source area; percentages do not sum to 100% across source areas as multiple source areas may be identified by a single respondent).



[46] PNCAZ Deg De Minimis Calc 2018_2020.xlsx

The methodology module M-MON requires that "If ≥ 10% of those interviewed/surveyed believe that degradation may be occurring within the project boundary then the limited on-the-ground degradation survey shall be triggered." Since less than 10% of respondents reported collecting either fuelwood or lumber from the project area, no further surveys are warranted.

Among respondents giving information on the maximum distance travelled to collect wood, the average maximum distance stated was 1.9 km for fuel wood (min: 0 km, max: 10 km) and 8.6 km for lumber (min: 1 km, max: 12 km). There are only 21 communities located within 10 km of the project area (Figure 12), thus the potential for degradation from fuel wood and lumber collection is small. Further, many respondents to the degradation surveys noted the lack of a local commercial market for fuel wood or timber.

Figure 12. Communities identified within 2 km of the project area/leakage belt interface

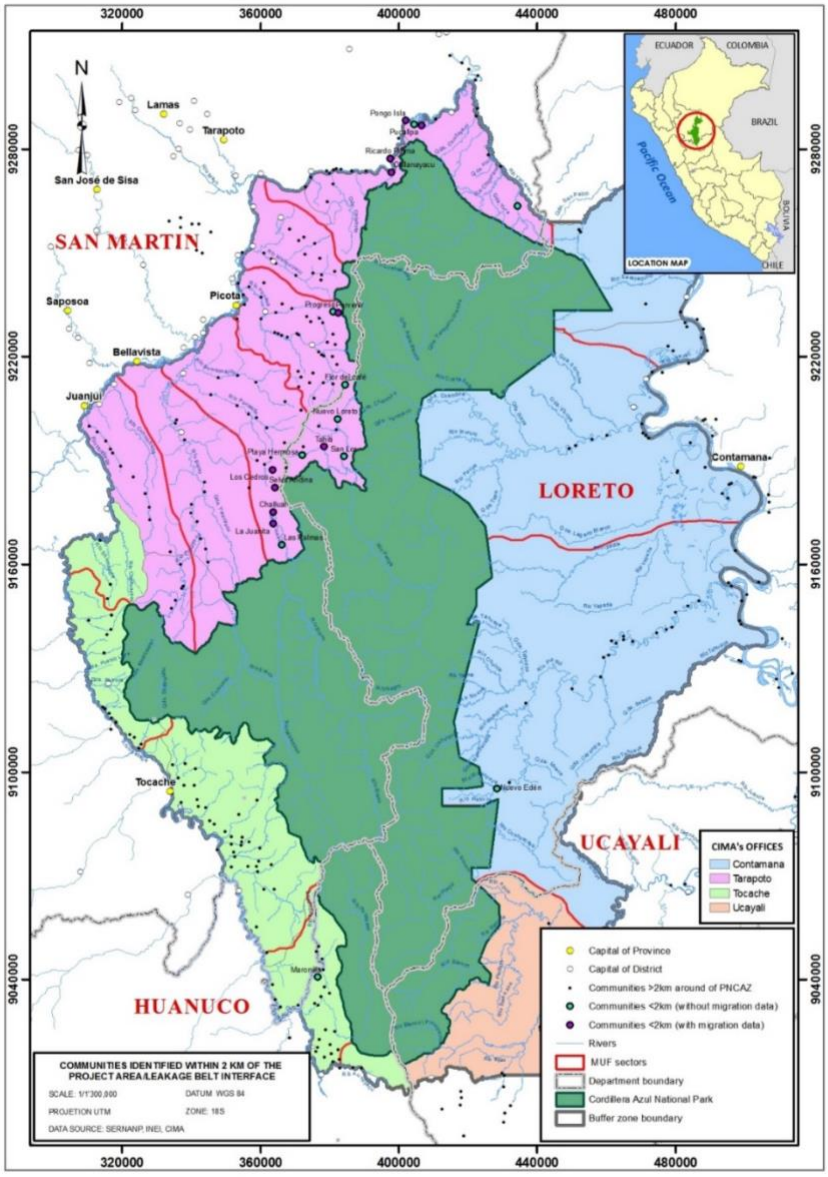


Table 18. Net project emissions with the project area ΔCP (t CO_2-e)

	ΔCP,DefPA,i,t	ΔCP,Deg,i,t	ΔCP,DistPA,i,t	ΔCP
2019	13,282.7	0.0	84,971.8	98,254.5
2020	13,282.7	0.0	84,971.8	98,254.5
2021	5,060.1	0.0	32,370.2	37,430.3
Total 2019-21	31,625.4	0.0	202,313.9	233,939.3

3.2.3 Leakage

Leakage monitored in the project case is related to activity shifting of local and immigrant agents. Activity shifting from local agents (in the leakage belt) was tracked by monitoring deforestation and stock changes in the leakage belt in 2019 - 2021. River migration occurs throughout this region, and 1,763 ha of new river areas were detected in image classification. This represents less than 0.1 % of the total area of the leakage belt. These areas were identified and removed from the benchmark map but are not included as a source of leakage since they are unrelated to activity shifting.

Table 19. Area deforested in the leakage belt in 2019 - 2021 ADefLB,u,i,t (ha)

Year	*ADefLB,u,i,t* (ha)			TOTAL
	Anthropogenic (forest)	Humedales – vegetacion inundable	Vegetacion de tierra firme	
2019	2,601.47	2,818.56	14,649.69	20,069.7
2020	2,601.47	2,818.56	14,649.69	20,069.7
2021	991.04	1,073.74	5,580.84	7,645.6
Total 2019-21	**6,194.0**	**6,710.9**	**34,880.2**	**47,785.1**

Emissions were calculated as the difference between stocks before and after deforestation, as for project emissions.

Table 20. Emissions from deforestation in the leakage belt in 2019 - 2021 (t CO2e)

	ΔCP,DefLB,i,t (tCO2)			Total
	Anthropogenic (forest)	Humedales – vegetacion inundable	Vegetacion de tierra firme	*ΔCP,DefLB,i,t*
2019	1,163,114.5	1,587,790.4	6,111,355.6	**8,862,260.5**
2020	1,163,114.5	1,587,790.4	6,111,355.6	**8,862,260.5**
2021	443,091.2	604,872.5	2,328,135.5	**3,376,099.2**
Total 2019-21	**2,769,320.3**	**3,780,453.3**	**14,550,846.6**	**21,100,620.2**

The net greenhouse gas emission in the project case for the leakage belt, parameter *ΔCP,LB*, is equal to the sum of stock changes due to deforestation in 2019 - 2021, equal to 23,198,214.4 t CO_2e. Calculations of activity shifting leakage occurring in the leakage belt in the with-project case ($\Delta C_{LK\text{-}ASU\text{-}LB}$) are consolidated in Table 21 below.

Table 21. Calculations of area subject to activity shifting leakage in the leakage belt

equation	Derived in PD Sections 3.1 and 3.3		Derived from forest inventory estimates	M-MON 4	LK-ASU 1
Year	$\Delta C_{BSL,LK,unplanned}$ t CO_2	$A_{DefLB,u,i,t}$ ha	$\Delta C_{pools,Def,u,i,t}$ t CO_2/ha	$\Delta C_{P,DefLB,i,t}$ t CO_2	$\Delta C_{LK\text{-}ASU\text{-}LB}$ t CO_2
2019	20,062,507.39	20,069.72	Varies by strata	8,862,260.48	-11,200,246.91
2020	20,062,507.39	20,069.72	Varies by strata	8,862,260.48	-11,200,246.91
2021	8,025,002.96	7,645.61	Varies by strata	3,376,099.23	-4,648,903.73
Total 2019-20	48,150,017.75	47,785.05		21,100,620.20	-27,049,397.55

Emissions from deforestation in the leakage belt were less than the projected emissions from deforestation in the leakage belt, and thus no leakage from activity shifting within the leakage belt is accounted.

Activity shifting leakage outside the leakage belt was tracked by monitoring deforestation in the project area ($A_{DefPA,i,t}$) and leakage belt ($A_{DefLB,i,t}$) and carrying out community surveys on the proportion of recent immigrants in the population within the proximity of the project area bounds.

Derivation of $PROP_{IMM}$ parameter

From January to February 2015, surveys were carried out in 13 communities in the buffer zone of PNCAZ by CIMA to determine the percentage of recent immigrants (i.e. arrived after 2009, within less than or equal to 5 years of the survey). In each community, 20 to 40 households were surveyed depending on the size of the community (*i.e.* number of surveys was proportional to the size of the community). Communities were selected based on their relative dependence on the forest in the project area, and hence targeted those communities most likely to include baseline agents of deforestation. A total of 493 households and 1,721 persons were interviewed in total.

Persons who had immigrated to the community after 2009 (i.e. having arrived less than or equal to 5 years ago), and older than five years, were identified as recent immigrant potential deforestation agents. Per VM0007, the parameter $PROP_{IMM}$ is defined as "the proportion of area deforested by population that has migrated into the area in the last 5 years ($PROP_{IMM}$)." As it is extremely sensitive to ask explicit questions regarding responsibility for deforestation, interviewed persons were instead asked where they were originally from and when they had moved to the area. Thus, the percentage of recent immigrants among local population with potential access to the project area was used to infer "the proportion of area deforested by population that has migrated into the area in the last 5 years" (i.e. without directly asking if they are deforestation agents).

Results are detailed in Table 22. The resulting $PROP_{IMM}$ parameter is 19.7%, which is the average percent recent immigrant (potential deforestation agents) among the survey participants.

Table 22. Immigrant survey results 2015

Zone	Community	Number of surveyed households	Number of surveyed persons	Recent imm arrived > 2009 and >5 yrs ago	% recent immigrants
Tocache	Alto Marona	20	103	9	8.7%
Tarapoto	El Dorado	22	78	33	42.3%
Pampa Hermosa	Flor de Café	40	186	26	14.0%
Tarapoto	Flor de Selva	40	159	46	28.9%
Alto Biavo	Las Palmas	40	164	40	24.4%
Contamana	Nuevo Dorado	112	131	41	31.3%
Huimbayoc	Pongo Isla	12	48	5	10.4%
Shamboyacu	Porvenir	28	124	12	9.7%
Huimbayoc	Pucallpa	40	172	5	2.9%
Bajo Biavo	Selva Andina	40	179	47	26.3%
Tarapoto	Siambal	37	118	10	8.5%

Zone	Community	Number of surveyed households	Number of surveyed persons	Recent imm arrived > 2009 and >5 yrs ago	% recent immigrants
Pampa Hermosa	Tahiti	40	158	64	40.5%
Aguaytia	Yamino	22	101	1	1.0%
	TOTAL	493	1721	339	19.7%

Leakage outside of the leakage belt is calculated in Table 23.

Table 23: Emissions calculations for activity shifting leakage outside the leakage belt

equation		Derived in PD Section 3.1	LK-ASU 7			LK-ASU 8	LK-ASU 9	Derived in PD in Section 3.3	LK-ASU 10
Year	$PROP_{IMM}$	$A_{BSL,PA,unplanned,t}$ ha	$A_{LK\text{-}IMM,t}$ ha	$A_{DefPA,i,t}$ ha	$A_{DefLB,i,t}$ ha	$A_{LK\text{-}ACT\text{-}IMM,t}$ ha	$A_{LK\text{-}OLB,t}$ ha	$PROP_{CS}$	$\Delta C_{LK\text{-}ASU,OLB}$ t CO_2
2019	19.70%	12409.4	2,444.6	24.4	20,069.7	3,958.5	-1,513.9	1.049	0
2020	19.70%	12409.4	2,444.6	24.4	20,069.7	3,958.5	-1,513.9	1.049	0
2021	19.70%	4963.8	977.9	9.3	7,645.6	1,508.0	-530.2	1.049	0
Total 2019-21		29782.5	5867.2	58.0	47785.1	9425.1	-3557.9	3.1	0.0

3.2.4 Net GHG Emission Reductions and Removals

Uncertainty

Deductions for uncertainty in carbon stock estimates and baseline deforestation projections were calculated applying module X-UNC. Total error in stock estimates (including live and dead above and belowground biomass C) from the 2009 PNCAZ forest inventory was +/-7.5% of the mean at the 95% confidence level (Table 24).

Table 24. Overall forest carbon density (live and dead above and belowground biomass C)

Mean Forest Carbon Density (t C/ha)	151.0
Standard Error (t C/ha)	5.68
90% Confidence Interval (t C/ha)	9.5
95% Confidence Interval (t C/ha)	11.4
90% Confidence Interval as percentage of mean	6.3%
95% Confidence Interval as percentage of mean	7.5%

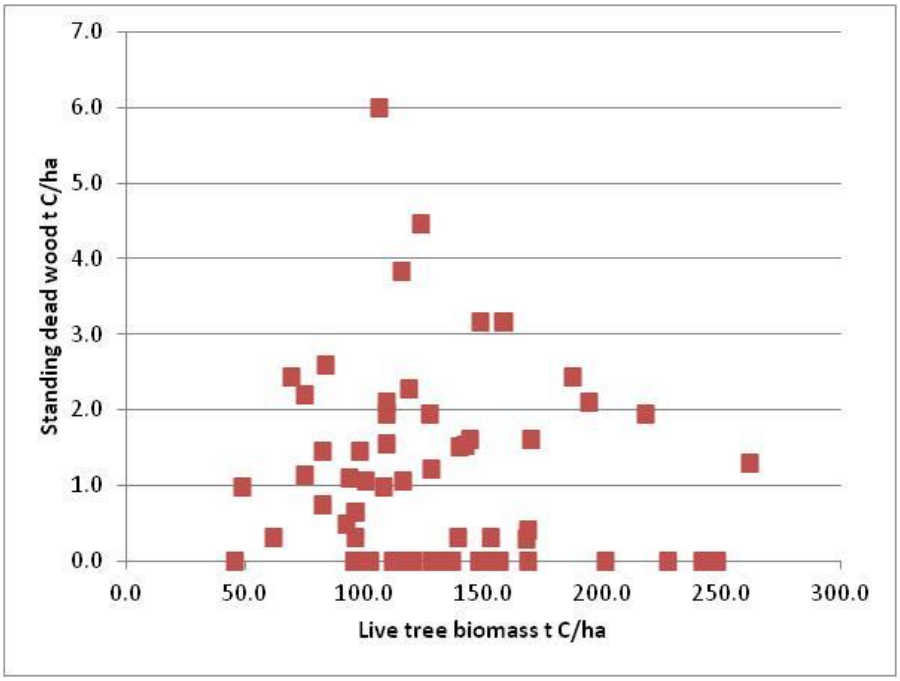
Source: Shoch et al. 2009 *Forest biomass carbon inventory of the Parque Nacional Cordillera Azul (PNCAZ)*

Note that error was not propagated across pools, because error propagation formulas require independence among component sources of error. This assumption often does not hold for aboveground biomass and dead wood, which are often inversely correlated (Figure 14), and instead pools are summed and composite errors estimated at the strata level, then propagated across strata.

Uncertainty in baseline deforestation projections was assessed referencing the 95% confidence interval of the regression model (Figure 15).

Only RRD subset 2 contributes to overall uncertainty. RRD subset 1, Huimbayoc, has a baseline rate of zero, thus its contribution to total uncertainty is zero. Calculations are detailed in Table 25 that follows the figures.

Figure 14. Standing dead wood plotted against live tree biomass, demonstrating apparent inverse correlation between live tree biomass and maximum standing dead wood.



Source: 2009 PNCAZ forest inventory (n=64)

Figure 15. The 95% confidence interval (dashed lines) of predicted deforestation rate

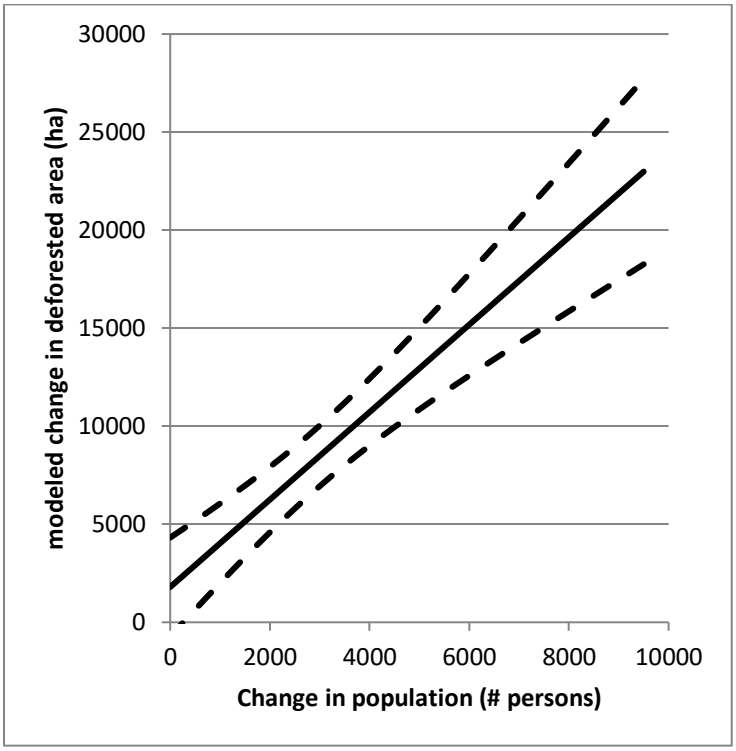


Table 25. Summary of uncertainty calculations

X-UNC eq #	5	Derived in PD Section 3	Regression model	1	3	6	10	11
Year	*Uncertainty* $y_{BSL,SS}$	Total population change	Modeled deforestation (ha)	*Uncertainty* $y_{BSL,RATE,t}$	*Uncertainty* $y_{BSL,RATE,t*}$	*Uncertainty* $y_{BSL,t*}$	$C_{REDD\_ERROR,t*}$	*Adjustment factor applied to* $C_{REDD,t*}$
2019	7.5%	36,030	82,159	27%	9%	12%	12%	100%
2020	7.5%	36,030	82,159	27%	9%	12%	12%	100%

The final adjustment factor in Table 25 above is applied to parameter $C_{REDD,t}$, cumulative total net GHG emission reductions at time *t*, to produce parameter $Adjusted\_C_{REDD,t}$, cumulative total net GHG emission reductions at time *t* adjusted to account for uncertainty.

Summary of net emission reduction calculations

Estimates of GHG credits eligible for issuance as VCU's are found in the table 26 below

- Estimated GHG emission reduction credits =
  - Baseline emissions, fixed for 10 years at validation *minus*
  - Project emissions *minus*
  - Leakage *minus*
  - Non-permanence Risk Buffer withholding (calculated as a percent of net change in carbon stocks prior to deduction of leakage)

Table 26: Table of estimated net GHG emission reductions or removals during this monitoring period (8 August 2018 to 30 December 2020)

Project Years	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Risk buffer (%)	Deductions for AFOLU pooled buffer account	Available VCUs
2019	5,362,137	98,254	0	10%	526,388	4,737,495
2020	5,362,137	98,254	0	10%	526,388	4,737,495
2021	2,144,855	37,430	0	10%	210,742	1,896,682
Total 2019-21	12,869,130	233,939	0	10%	1,263,519	11,371,671

Calendar Years	Estimated baseline emissions or removals (tCO2e)	Estimated project emissions or removals (tCO2e)	Estimated leakage emissions (tCO2e)	Risk buffer (%)	Deductions for AFOLU pooled buffer account	Estimated net GHG emission reductions or removals (tCO2e)
2018	2,144,855	39,302	0	10%	210,555	1,894,998
2019	5,362,137	98,254	0	10%	526,388	4,737,495
2020	5,362,137	96,383	0	10%	526,575	4,739,179
Total 2018-20	12,869,130	233,939	0	10%	1,263,519	11,371,671

3.3 Optional Criterion: Climate Change Adaptation Benefits

Not applicable to this project.

3.3.1 Activities and/or Processes Implemented for Adaptation (GL1.4)

Not applicable to this project.

4. COMMUNITY

4.1 Net Positive Community Impacts

4.1.1 Community Impacts (CM1.1)

The expected impacts on community well-being due to project activities were described in the validated PD, 6.1 Net Impacts on the Community.

Human Communities in the Project Area

The project is expected to ensure that there is no contact with the indigenous people in isolation who live inside the park, as well as to protect the area they use. This is a net positive impact (PD)

In this sense, since 2017 CIMA, together with the Institute of Common Good (IBC) and the support of Andes Amazon Fund have been promoting the creation of an Indigenous Reserve for Isolated Indigenous Kakataibo People, in the PNCAZ buffer zone.

In 2018, CIMA supported the development of complementary studies for the definition of limits and establishment of an Indigenous Reserve for indigenous people in isolation, in charge of the IBC.

During 2019, the Additional Categorization Study (EAC) required for the categorization and support of the informative workshops with local communities was developed through the IBC. Being the area within the Buffer Zone of 89, 366.30 ha

During 2020, the information gathering process for prior consultation to establish the Kakataibo Territorial Reserve, conducted by MINCU, was suspended in March because of the state of emergency due to COVID-19. In the last quarter, field activities were resumed to identify the towns to be consulted in the creation of the Territorial Reserve.

Human Communities in the Project Zone

The project is expected to result in a net positive impact in the communities in the buffer zone of the PNCAZ by improving land use and land security, and overall quality of life. Through the reporting period CIMA has continued to expand and consolidate this impact. The impacts for both communities' groups defined in the PD (communities western and eastern from the park) are not differentiated because either all interventions respond to the priorities defined participatively by the communities themselves or they are general impacts (see PDD, section 6.1). The only clarification is that the specific activities implemented in both areas, which correspond to the communities´ groups, may be different (e.g. supporting coffee or cacao in the west vs. supporting forestry in the east), this is a result of the landscape (more deforestation in the west and larger forested stands in the east). However, the expected results are the same. Additionally, also the communities who do not work directly with CIMA or have no involvement yet, hold relationships with other communities in the project zone and they can hear firsthand about the activities implemented by the project.

In the previous validation periods (2012-2014, 2014-2015, 2015-2016, 2016-2018) and during the current (Aug 2018-Dec 2020), CIMA has continued to focus its efforts on those communities and sectors with the most direct access to the park, strategically concentrating first on these critical areas to stabilize land-use and prevent intrusion into the park. The aim is to ensure park protection and safeguard ecosystem services and natural resources. As was previously mentioned, CIMA improved

the selection process for the intervention with local communities and populations, developing a methodology to prioritize communities, considering variables of closeness to park, governance, threats, among others, as part of a toolkit that is being constructed.

In 2018 PNCAZ was recognized in the IUCN Green List (https://www.iucn.org/es/tema/derecho-ambiental/cordillera-azul). Although this is not an additional legal status, it does bring more security to the park, as being directly watched by the IUCN

The impacts defined on PD section 6.1 on communities are addressed next:

- *Increased net income for community residents from project-related employment*: community park guards, "guides" for scientific investigators: see section 1.2 Standardised Benefit Matrix, Employment in page 9. At least 20 communal park guards have been employed during this monitoring period, increasing their income.

- *Technical assistance with financial management of community funds, development of community resource management plans should increase local capital available for infrastructure*: many communities have prioritised the strengthening of their institutions and leaders, yet the priorities are implemented in the order the communities themselves define.

- *Increased empowerment to protect community resources through community-based ZEE (Zonificacion Ecológica y Económica) or other modes of land-tenure security throughout the region*: the number of communities with ZEE or another zoning process has remained constant in this period in 24. As a reference see ZEE map in page 125.

- *Increased empowerment to protect local life-ways through validation of local ecological knowledge and cultural practices (quality of life plans):* 4 Quality of Life Plans were completed in this monitoring period, and one was delayed to January of 2021, due to pandemic. The total number of communities with QLPs is 35.

- *Increased environmental awareness through school-based and informal education programs:* from the second half of 2018 until mid 2020, non-formal education programmes continued and even some communities who do not form part of FOCAL, were starting to participate. Formal education was also imparted in visits to schools, mostly in 2018. These activities were implemented in the Tocache and Tarapoto sector. For the Tocache case, the project with Technoserve had one environmental education component and reached a total of 558 participants. (Source: quarterly reports).

- *Increased regional coordination of large-scale environmental protection through the Oversight Committee (Comité de Gestión):* the Comité de Gestión was dormant for some time but it started to get reorganised during 2020. The pandemic delayed this process.

4.1.2 Net Positive Community Well-Being Impacts (CM1.1)

The project is expected to result in a net positive impact in the communities in the buffer zone of the PNCAZ by improving land use and land security, and overall quality of life. This trend will continue with the project. As these impacts are either based on the priorities determined by the communities

themselves, or according to Table 6.1 of the PDD, no differentiation between the communities located western and eastern from the park is made in Table 4.2 further below.

Following PD section 6.1 three community groups were defined: human communities in the Project Area, human communities in the buffer zone (project zone) and human communities off-site.

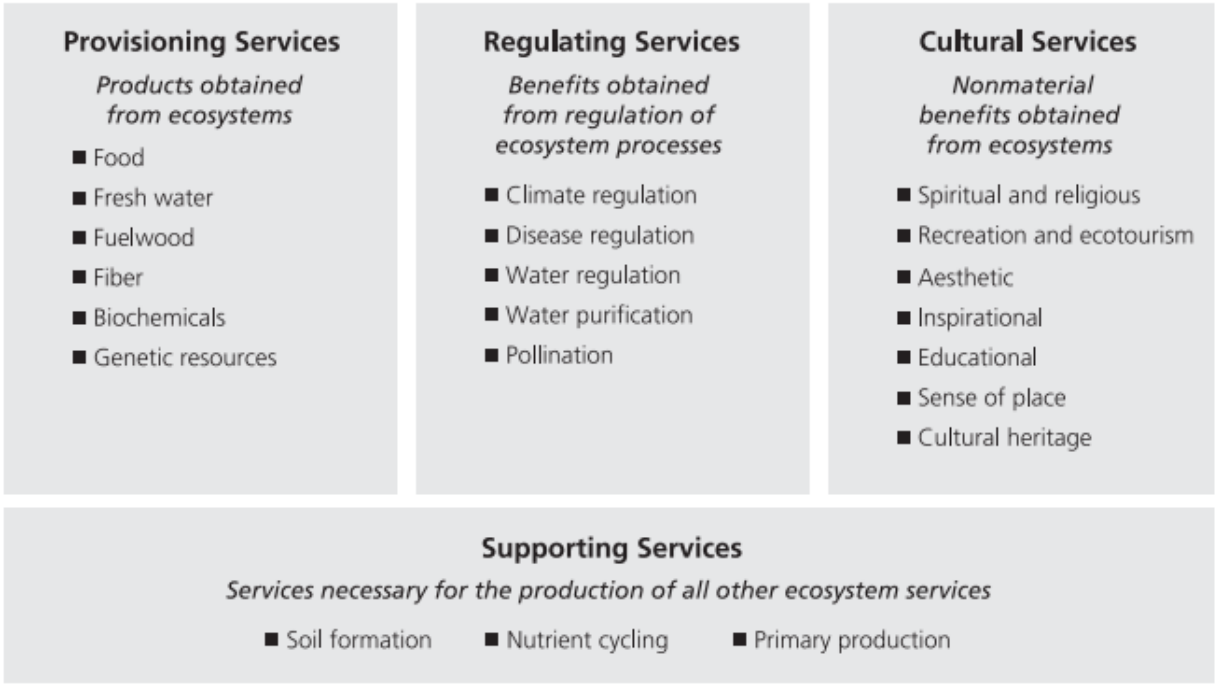
Human communities in the project area: under the without-project scenario and perhaps in the no-park scenario, the indigenous groups in voluntary isolation would be more exposed as it is unsure whether or not there would be efforts for the creation of an indigenous reserve. In the with project scenario, there has been a constant involvement pushing for the categorisation of these lands. This weights as a net positive impact.

Human communities in the buffer zone: in the without project scenario, communities in the buffer zone would probably receive sporadic assistance from development projects, which historically has shown only short term involvement. Another possible scenario is no aid from any institution and the continued practices of slash and burn based on necessity, leading to further deforestation, threatening the park and reducing all the benefits and ecosystem services the park provides. In the project scenario, CIMA is a constant partner and a strong involvement with an important amount if the communities exist. See previous section for the identified community impacts. It is expected to increase the number of communities CIMA works with. For the communities CIMA does not work with, in the without project scenario, the scenario is the same: a gradual decrease in the quality of life based on impoverished ecosystems. For this case, the PD has identified continuous communication and scouting of the whole project zone as a mitigation strategy, in order to be able to respond quickly to changing scenarios. In the with project scenario, land is secure and better management practices have been identified. There is interest in the activities CIMA implements with long term relationship communities and the REDD+ Project serves as a means of leveraging further funds, allowing to expand activities to new areas. All this weights as net positive impacts on the well-being of the people who inhabit the project zone.

Communities off site are defined in the PD as receiving no direct impact from the project activities, either positive or negative. The fact of being established in the vicinity of the park though, which has a REDD+ project, might have indirect positive benefits. One is the awareness of this kind of work and an increased interest in taking part in a similar programme. In order to achieve this, CIMA makes incidence at different levels in order to show that thanks to the existence of the park, it is possible to have a project that allows different activities to be implemented. All in all, this can be defined as a possible net impact.

4.1.3 Protection of High Conservation Values (CM1.2)

Mountain landscapes in the project zone –PNCAZ and its buffer zone– generate ecosystem services essential to the well-being of local communities. These services can be grouped into three main categories (Millennium Ecosystem Assessment 2005, MINAM 2015):



1. Provisioning services (HCVs 4 & 5):

Fresh water: Streams that originate in the park are a principal source of clean water to human settlements in the buffer zone.

Food: The park provides a protected area for **game species**, which are often overhunted in the buffer zone. Individuals from healthy populations in the park migrate into the buffer zone where they become available to local hunters and fishers.

Timeframe	# communities	# beneficiaries	Kg bushmeat	Kg fish
Aug18-Dez18	16	111	692	466
Jan19-Dez19	36	369	3979	1668
Jan20-Dez20	24	208	1776	583

2. Regulating and supporting services (HCV 4):

Disease regulation:

Undisturbed habitats often have a high diversity of both animals and pathogens. Deforestation and the shift of natural areas to human-dominated areas result in large-scale loss or degradation and fragmentation of habitats and wildlife populations. The resulting remnants of natural areas show increased risk for zoonotic diseases (Van Langevelde & Rivera, 2020).

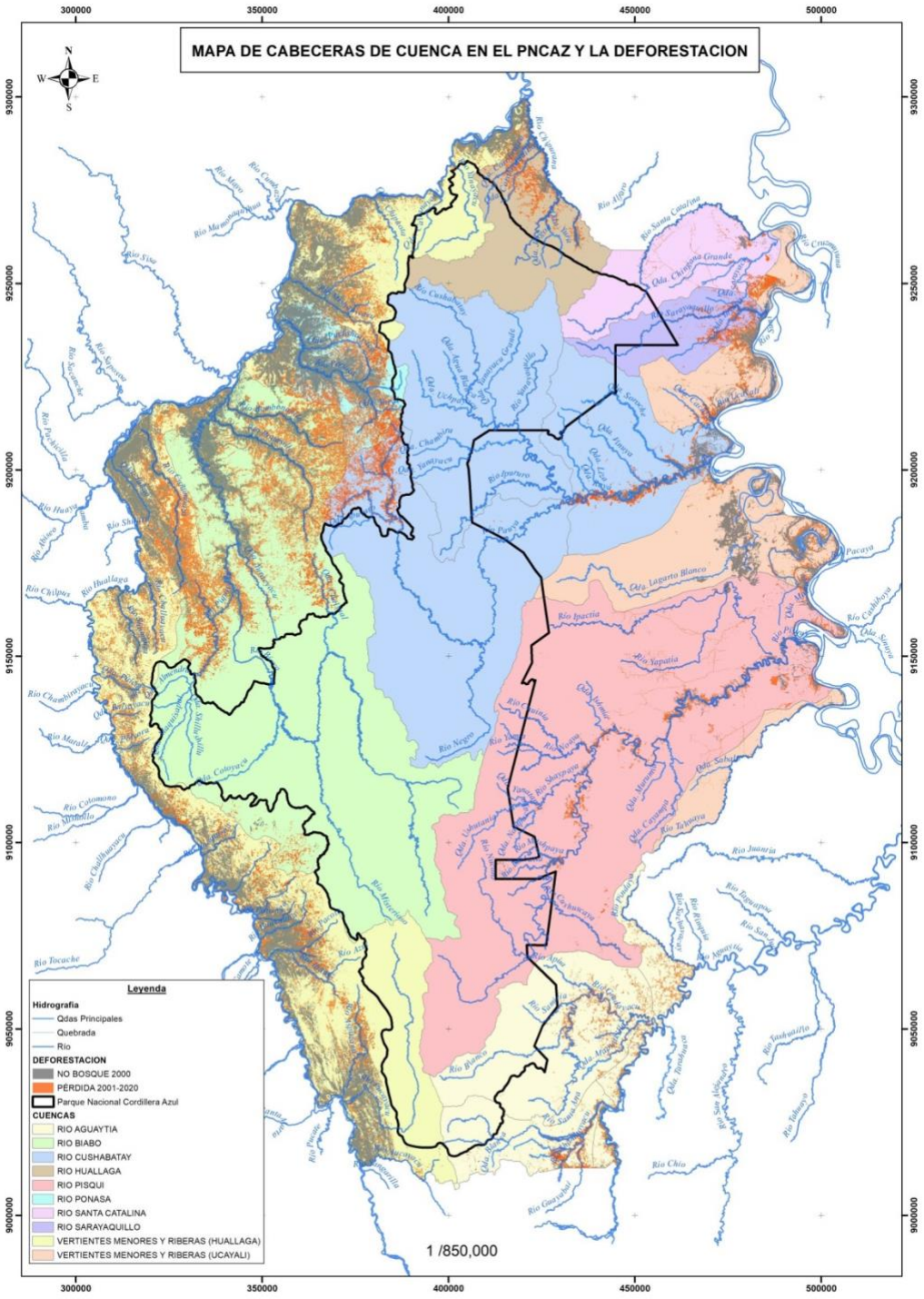
Other studies:

- https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0242685
- http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0001-37652020000100724
- https://researchgate.net/publication/316454165_Conservation_biodiversity_and_infectious_disease_Scientific_evidence_and_policy_implications

Water Regulation & Purification: Intact vegetation cover in the park is essential to maintain water quality in downstream areas by reducing erosion and sedimentation upstream. This regulation process decreases the incidence of flooding and provides a safe environment for fish in the buffer zone.

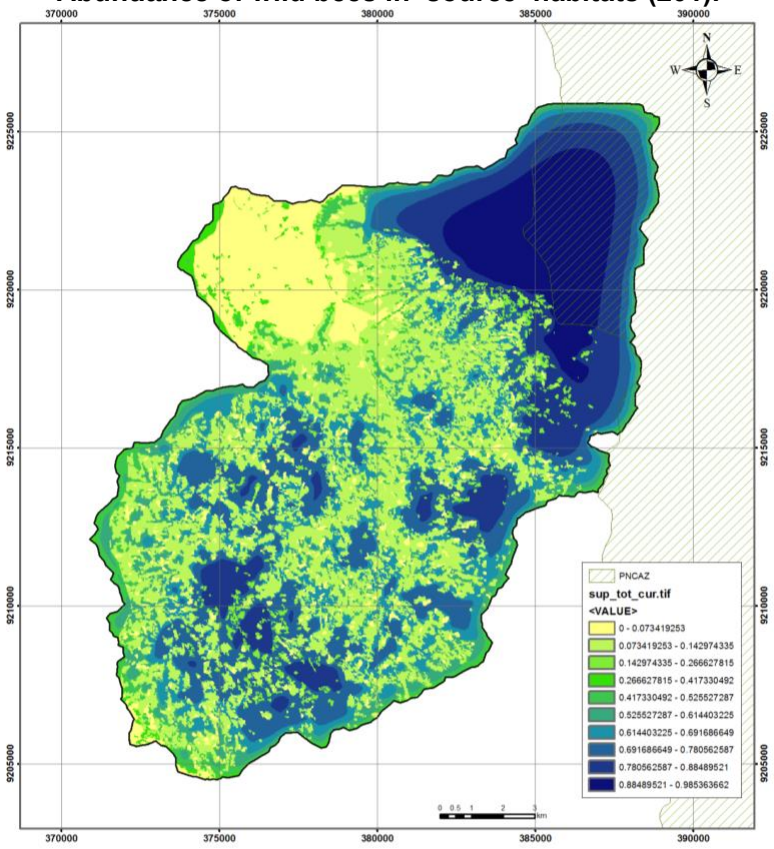
A study conducted by Vergaray (2020) In the Ponaza river basin, identified a strong correlation between the decrease in forest cover from 1999 to 2018 and the increase in river flow, and the danger of floods. The Ponaza river basin is one of the most affected by deforestation in the Buffer Zone, and its headwaters border the PNCAZ. These findings are applicable to other basins whose headwaters are within the PNCAZ and therefore better conserved. Additionally, CIMA started a restoration pilot in the Ponaza river basin through in 2018 with two projects financed by FERI and FONDAM.

The following map, elaborated y CIMA´s GIS team, presents the main watersheds and the associated deforestation. This is evidently information to be considered for the planning of new activities, especially those aligning with the concept of Nature based Solutions.



Pollination: Charles Howe, a former Peace Corps volunteer (2017), characterized the pollination service by wild bees in the Alto Ponaza sub-basin using the "InVEST: Pollinator Abundance" model and estimated the value of the coffee pollination service in the villages of Paraiso and Alto Ponaza in S/. 192,000 per year (Approx. USD 52,380 to the current exchange rate – march 2021).

Abundance of wild bees in 'source' habitats (201).



the values are relative, the blue areas (forests) provide the best conditions for wild bees and the yellow areas (annual crops and bare soil) have the worst conditions

3. Cultural services (HCV 6):

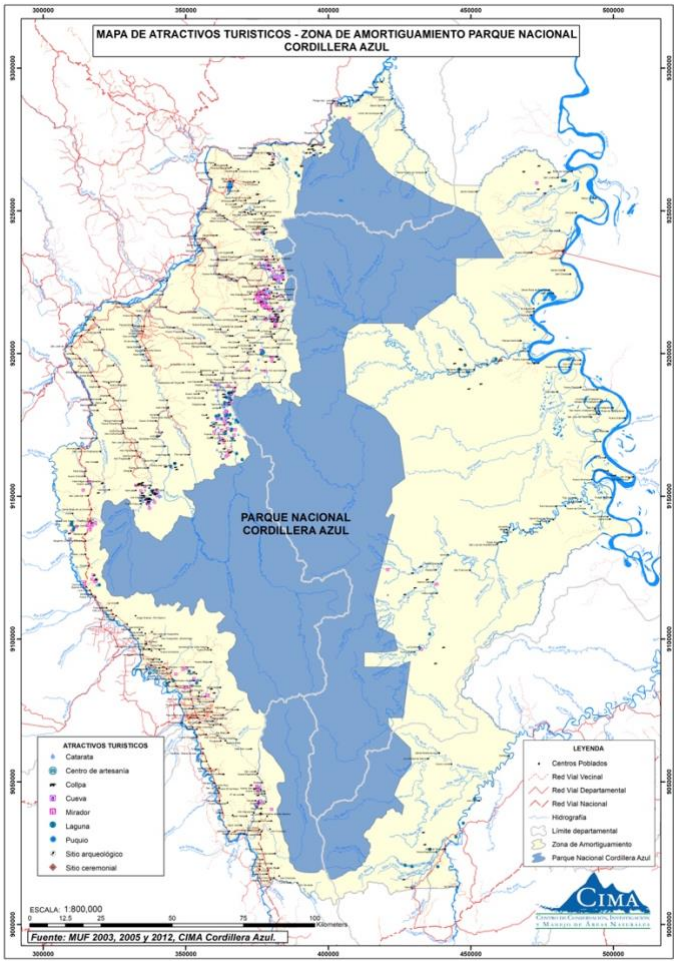
Sense of place: The PNCAZ protects landscapes important for the traditional cultural identity of indigenous people, as examples:

- Shipibo peoples from the Pisqui basin periodically enter the PNCAZ on traditional walks in search of salt that is used for direct consumption and to conserve game meat, and according to tradition, they are not permitted to hunt or fish along the way (APECO 2001).
- At the other side of the park, the *Lost World* lagoon is an important cultural location for the Mushuk LLacta community of the Chazuta (Lamista Quechua). The lake of tectonic origin in the northern portion of PNCAZ is almost inaccessible. The route from the Chipaota community and the area around the lake are home to abundant game species that are only hunted on special occasions during traditional festivals (MUF-2003).

Spiritual and religious: Example: The *Manashahuemana* mountain range in Pisqui is also an important spiritual location for the Shipibo communities. In their language, "manashahuemana" means turtles in a line position (Alverson *et al.* 2001).

Recreation and Ecotourism: Although there is almost no tourism within the PNCAZ, with the exception of the Mirador de Chambirillo, the park presence and attractiveness influence positively the tourist activity that exists in the buffer zone. CIMA´s plan is to promote at least three touristic products in three of the four administrative sectors. In the Tarapoto sector, along 2020, conversations were made with a tourism operator willing to develop a route from Tarapoto to the "Mirador de Chambirillo". This would also enhance the infrastructure of the nearby control post. In the Aguaytía sector, CIMA has been working with the native community of Yamino to improve their capacities to provide tourism services, as well as canalizing funds they used to build bungalows for visitors and to improve the community´s tourism infrastructure (dining hall, signals in the community and along an interpretative trail). Additionally, thanks to an alliance with a private company, the artisans were able to sell a batch of 500 hand-crafted pieces. Finally, in the Tocache sector, in 2020, CIMA prepared touristic cards of three different attractions (caves and waterfalls) and shared them with potential partners to promote tourism in the area. The map below indicates all the potential attractions the buffer zone has to offer and CIMA realizes this job has to be especially promoted in the western region of the park.

Map of tourist attractions in the buffer zone of the Cordillera Azul National Park



4.2 Offsite Stakeholder Impacts

4.2.1 Mitigation of Negative Impacts on Other Stakeholders (CM2.2)

No negative impacts on offsite stakeholders have occurred. Mitigating any potential negative impacts is facilitated by the fact that a large portion of the project zone perimeter is delimited by the Huallaga and Ucayali Rivers that are imposing natural barriers.

As no negative impacts to offsite stakeholders have occurred thus far and none are expected, no mitigation plans are required.

4.2.2 Net Impacts on Other Stakeholders (CM2.3)

Unchanged from description in the validated PDD.

The PNCAZ high conservation values relating to the communities (natural resources and environmental services and benefits) will be protected. Project activities will ensure the continuation of the ecosystem services provided to the communities by the project area, even in those were CIMA does not work directly. These actions allow communities to meet their basic needs in a sustainable manner and allow for the project area to continue providing the ecosystem services needed for communities to retain their traditional cultural identities.

Additionally, CIMA works closely with SERNANP and MINAM, but also with regional and local governments, several technical groups (i.e. REDD groups, Red Ambiental Peruana, RAP, UICN Peruvian commission, etc.) and other protected areas to demonstrate and teach the skills needed to successfully develop and implement a REDD+ Project. This work may have indirect positive benefits for off-site communities if similar project activities are implemented in their areas.

4.3 Community Impact Monitoring

4.3.1 Community Monitoring Plan Development (CM3.3)

CIMA has conducted a *Mapeo de Usos y Fortalezas (MUF) in 2003, 2005, 2008, 2012 and 2016,* to get the status of communities and to detect positive or negative impacts of the project; for more details about MUF see the PDD section 6.2 Monitoring of human communities in the buffer zone and the MUF Guide (http://www.cima.org.pe/files/images/publicaciones/pdf/CIMA-2014-Guia-Mapeo-de-usos-y- Fortalezas-MUF.pdf).

Due to COVID-19 restrictions established by the Peruvian Government, MUF was postponed originally to 2021, yet it is believed that it will only be able to be performed in 2022.Despite this fact, other processes aid in the community monitoring, as it will be seen in the following section: such as other projects, the implementation of the Quality Life Plans and even socio-economic research.

4.3.2 Community Monitoring Plan Results (CM3.1, CM3.2, GL2.5)

Community impact monitoring was described in the 2012 PIR, section 5.6: Monitoring of Human Communities in the Buffer Zone. As described therein, social monitoring comprises five indicators corresponding to five aspects of life quality: natural, social, cultural, political and economic (Figure 4.7), this participatory process is implemented every 3 years. These aspects are constantly reviewed with the local actors and include a participatory process each time a community has to renew any of the aspects. This means several meetings that follow a democratic process to choose what the majority of the population wants.

This information is returned to the local populations with whom it has been worked; and it is retaken and remembered when CIMA works in the construction of its Quality of Life Plan or in the implementation of the activities prioritized in the plan.

Information relevant to these indicators is raised through different components:

- Mapping of uses and assets (*Mapeo de Usos y Fortalezas* – MUF): This is the main tool to establish community and family profiles, implemented every 3-4 years, for the 104 communities and villages where CIMA has been present since 2002 (CIMA 2014), last MUF was in 2016 including 64 villages and communities.

- CIMA also can applies a real-time monitoring, with continual and direct monitoring by communities, park guards and CIMA field staff; reports are analyzed and synthesized quarterly allowing for adaptive management of the project area. Trends, changes, and suggestions or complaints guide the development and improve program strategies. Evidently, good relationships with all involved stakeholders is essential for this.

- During 2018, 2019 and 2020, CIMA gained additional experience working closely with communities, through projects with technical assistance partners. In these projects CIMA provided technical assistance to coffee and cocoa producers in the Tocache sector: from Polvora to Shapaja, and in the Aspuzana valley. These experiences allowed CIMA´s team to be in closer contact with the producers, listening to their actual needs and allowing to better plan the interventions.

Additionally, some of the research that is carried out brings interesting and detailed insights about the implementation of the processes. In this reporting period, different topics were studied. Some

research started in the previous period was finished and new also started. These socio -economic studies serve also as a calibration tool for the actions ahead.:

- Peace Corps volunteer, PhD. Elma Gely, supported CIMA's actions on sustainable business issues, through the generation and evaluation of business plans and / or actions to value resources and ecosystem services, linked to the management of the PNCAZ and the opportunities for neighboring populations.

- Hamburg University´s, MSc student, Joel Collao, assessed the impacts of REDD+ on livelihoods of local people in Peru. The research focused in populations of Shamboyacu, Tocache and Aguaytía; and used a 'Before-After (BA) comparison method developed by CIFOR. The results showed that the PNCAZ REDD+ project, contributes in terms of human, social, natural, physical and financial capital.

- Stanford University´s Allison Kendra, from the anthropology programme, is writing her dissertation in in Change of land use in the Tocache Sector populations. The research includes three aspects: (1) Everyday life of people who are participating in alternative development programs and the way in which these processes are being implemented in daily life, with attention to the environment. This is relevant because of its influence on the landscape; (2) cocoa and coffee production, as 'post-coca' crops, inclusive of human-to-human relations that are important to this production (for example, cocoa pollinators, soil, fertilizer, etc.); as well as 'the production' of these crops, including the processes of cultivating, harvesting, processing, and distributing (locally) cocoa and coffee; and, (3) combination of daily life and production, with attention to the social conjuncture and power relations.

- Cambridge University´s Josephine Chambers, finished her PhD entitled The discourse and reality of win-win interventions for forests and people in the Peruvian Amazon. This research examined PNCAZ´s case and compared perceptions of community members. The findings demonstrated how and why the approaches and narratives of the conservation organisations were mismatched with the perspectives of local people living in project areas. This in turn allows for improvement in the approach that CIMA employs.

- Finally, in 2020 a joint research project between CIMA and the university of Sussex in the UK began, entitled *Sustainable livelihoods, deforestation, and supply chains: Analysis of environmental and socio-economic data from the frontier of the Peruvian Amazon*. This project is analyzing information from the MUF and QLP processes, and also from the cacao and coffee technical assistance, which will allow to align CIMA´s activities with the UN´s Sustainable Development Goals. Another foreseeable output is that his analysis will help to improve the planning of the next MUF.

There are no negative impacts to communities caused by the project and its related interventions, such as the previously mentioned research. Quite the opposite, as project activities aim and succeed in improving the standard of living of local residents. The only negative impact detected was the potential for increased tensions between the communities that CIMA is working with initially, and those that will be worked with in the future (more details about social risks in the PD, section 1.13.4 Risk Assessment). To mediate this potential negative impact, CIMA works to ensure constant

communication with as many communities as possible to identify and address concerns as quickly as possible and to institute a strong, proactive communication program and complaint-resolution process. CIMA will never be able to work with all communities simultaneously but these measures help communities understand the priority-setting process and allow them to voice concerns.

As mentioned in previous reports, SERNANP considers the PNCAZ as one of the Natural Protected Areas with the least amount of social and environmental conflicts in the National Protected Areas System (SINANPE).

It is worth to stress some facts from the previous MUF (2016), which resonate on the good perception, the surrounding communities of the PNCAZ have about the protected area:

Tarapoto (35):

- 29 communities perceive PNCAZ as positive, with Vista Alegre being the only community that perceives it negatively.
- 31 communities feel that the PNCAZ directly benefits them, against 4 that say that do not benefit directly.
- 32 communities know what the *Environmental Services* means, and also, they recognize it as a benefit of PNCAZ.
- 32 communities affirm that the work of the PNCAZ team is beneficial to them and 33 recognize that the PNCAZ team is part of the benefits of the ANP.
- 28 communities carry out activities with PNCAZ's team and 23 participate or have participated in the management committee.
- 100% of the populations express the importance of participating in the conservation / protection of the PNCAZ.

Tocache (14):

- 12 communities perceive PNCAZ as positive, and 02 perceive it in a very positive way (Maronilla and San Antonio de Alto Marona).
- All populations feel that the PNCAZ directly benefits them, know what the Environmental Services means, and also recognize it as a benefit from the PNCAZ.
- All populations affirm that the work of the PNCAZ team is beneficial to them and also recognize that the PNCAZ team is part of the benefits of the ANP.
- 12 communications carry out activities with PNCAZ's team and 05 participate or have participated in the management committee.
- 100% of the populations express the importance of participating in the conservation / protection of the PNCAZ

Contamana (11):

- 08 communities perceive PNCAZ as positive and 01 perceive it in a very positive way (Nuevo Dorado de Insaya) and 02 perceive it in a neutral way (Inahuaya and San Luis de Charasmaná).
- 09 communities feel that the PNCAZ directly benefits them, and 02 who perceive the opposite (Inahuaya y San Luís de Charasmaná).
- 09 communities know what the Environmental Services means, and also they recognize it as a benefit of PNCAZ, but 02 state that they do not know about these services nor do they

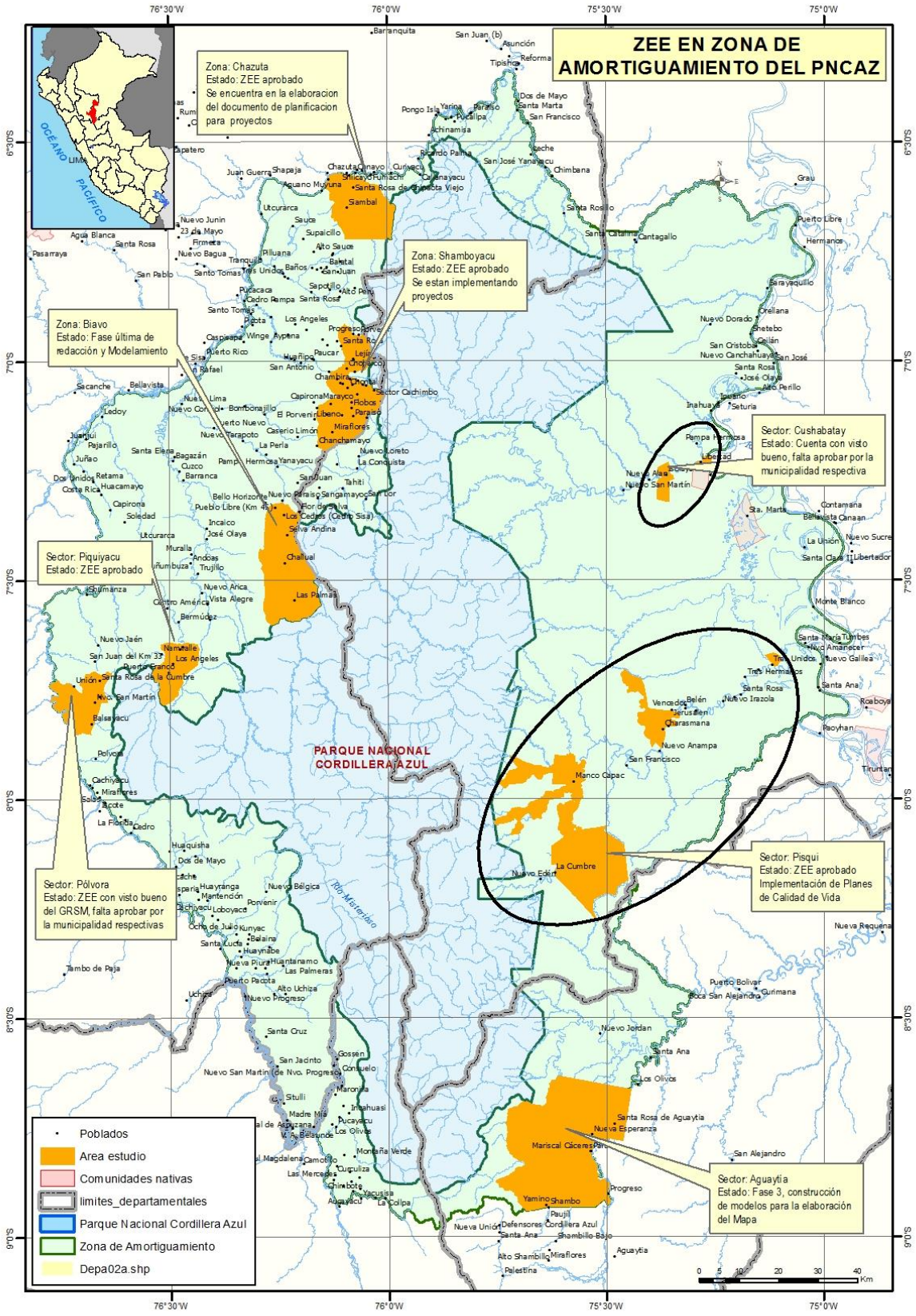
relate them to ANP (Inahuaya and San Luis de Charasmaná).

- 08 communities affirm that the work of the PNCAZ team is beneficial to them and 10 recognize that the PNCAZ team is part of the benefits of the ANP, San Luis de Charasmaná being the only one who manifests the opposite.
- 09 communities carry out activities with PNCAZ's team and 07 participate or have participated in the management committee.
- 100% of the communities express the importance of participating in the conservation / protection of the PNCAZ.

Aguaytia (03):

- 02 native communities perceive PNCAZ as positive and 01 perceive it in a very positive way (Yamino).
- All 03 native communities feel that the PNCAZ directly benefits them.
- All 03 native communities feel that the PNCAZ directly benefits them, know what the
- Environmental Services means, and also recognize it as a benefit from the PNCAZ.
- All 03 native communities affirm that the work of the PNCAZ team is beneficial to them and also recognize that the PNCAZ team is part of the benefits of the ANP.
- All 03 native communities carry out activities with PNCAZ's team and participate or have participated in the management committee.
- 100% of the native communities express the importance of participating in the conservation / protection of the PNCAZ

Another important result worth to include here, although it remains constant since previous reports, is the zoning in place, which is beneficial for many of the localities CIMA works with in the buffer zone of PNCAZ. At least 24 communities benefit from this zoning, which covers an area of more than 246,000 ha. The zoning allows for an organized land use and is the basis for better decisions regarding natural resources. See map below.


ZEE EN ZONA DE AMORTIGUAMIENTO DEL PNCAZ
Zona: Chazuta
Estado: ZEE aprobado
Se encuentra en la elaboracion del documento de planificacion para proyectos
Zona: Shamboyacu
Estado: ZEE aprobado
Se estan implementando proyectos
Zona: Biavo
Estado: Fase última de redacción y Modelamiento
Sector: Piquiyacu
Estado: ZEE aprobado
Sector: Pólvora
Estado: ZEE con visto bueno del GRSM, falta aprobar por la municipalidad respectivas
Sector: Cushabatay
Estado: Cuenta con visto bueno, falta aprobar por la municipalidad respectiva
Sector: Pisqui
Estado: ZEE aprobado
Implementación de Planes de Calidad de Vida
Sector: Aguaytia
Estado: Fase 3, construcción de modelos para la elaboración del Mapa
PARQUE NACIONAL CORDILLERA AZUL
Río Mayo
Río Mashiriato
Poblados
Area estudio
Comunidades nativas
limites_departamentales
Parque Nacional Cordillera Azul
Zona de Amortiguamiento
Depa02a.shp
0 5 10 20 30 40 Km
76°30'W
76°0'W
75°30'W
75°0'W
6°30'S
7°0'S
7°30'S
8°0'S
8°30'S
9°0'S

Below, Table 4.2. presents comparative quantitative results of community project activities by indicator, during the 2008 baseline, and the three last implementing periods: 2015-2016, 2017-2018 and 2018-2021). Note that this table focuses on human communities in the project zone who take part in CIMA´s activities. These variables have been defined in the PD section 6.2, table 6.2. Even though, for most of these variables, the collection method is stated as the MUF, which hasn´t been performed, the information source is the implementation of activities in the field and the subsequent reporting. This issue has been noted in MR section 2.2.3.

Table 4.2. Comparative quantitative results of community project activities by indicator since the Baseline of the project, to the currently period August 2018 – December 2020

Parameter	Indicator	Baseline Conditions	Project Conditions: Implementation period		
		2008	2015-2016	2016-2018	2019-2021
Natural Capital	# of hectares under community-generated management or used according to land-use plans	Only 3 communities, from Chazuta sector, had completed the land use zoning process 21,094 ha with land use zoning (ZEE	ZEE process with 24 communities and villages is completed. Further, several populations had their own conservation initiatives to maintain forests in their own domain. CIMA has been supporting to define and consolidate some of these, such as: Challual, Las Palmas, Nuevo Jaen, Nuevo San Martin, Nuevo Trujillo, San Juan, Vista Alegre y Yamino.	Since 2017 CIMA began the process of ensuring the conservation of 81 thousand hectares of forests in the Cushabatay sector (in light of the delays of SERNANP to expand the PNCAZ). In 2018, the ARA- GOREL considered this area as an Important Ecosystem for Conservation, including field evaluation and local-regional process of training and consultation.	The number of populated centers (CCPP) with Communal Participatory Zoning (ZPC) and Ecological, Economic Zoning (ZEE) has remained constant in 24 and the zoning covers an area of 246,192 ha. During this period, it has been sought to articulate this and other communal management tools to the national Forest Zoning process.[47]. Work has been done to strengthen the implementation of the

[47] *Forest Zoning (ZF) is a mandatory, technical and participatory process for the delimitation of forest lands, which defines the alternatives for the use of forest resources and wildlife and is applied on a mandatory basis. It was established in 2015 by Law No. 29763, Forestry and Wildlife Law, and its regulation, and its processes were defined in 2016. By the end of 2020, the San Martín Region approved its ZF and entered the Forest Management process, in which Cima is participating. The Huánuco, Ucayai and Loreto Regions are still developing their ZF*

Parameter	Indicator	Baseline Conditions	Project Conditions: Implementation period		
		2008	2015-2016	2016-2018	2019-2021
					ZPCs through Organizational Technical Productive Strengthening (FOTP) and Productive Projects. In two pilot areas, in Pólvora and Shamboyacu, 17 and 31 files were compiled to implement a new forestry regulation allowing assignment in use for agrofrestry use. 9 new Blue Agreements were established.
Social Capital	# of communities implementing quality-of-life plans and sharing experiences with neighbors	Zero Quality of Life Plans (QLP)	Until August 2016, 21 villages and communities had been developed their QLP as well as to continue the process of Implementing.	Until August 2018, 31 villages and communities had been developed their QLP as well as to continue the process of Implementing.	Until December 2020, 35 villages and communities had been developed their QLP as well as to continue the process of Implementing. 5 new QLP in the CCPP: Las Palmas, Nuevo San Martín, Villa Hermosa, Alto Marona and Cahuide.

Parameter	Indicator	Baseline Conditions	Project Conditions: Implementation period		
		2008	2015-2016	2016-2018	2019-2021
	# of communities with women as active participants in REDD+ Project interventions	Zero; field activities were limited and women's groups were not yet specifically targeted	More than 319 women, in at least 8 villages/ communities directly and actively participating in formal associations strengthened and supported by CIMA: - Asociación de Artesanas Shipibas del Río Pisqui "AASHRIPIS" (130), - Club de Madres "Sarita Colonia" (34), - Club de Madres "Las Samaritanas" (25), - Club de Madres "Virgen de las Mercedes" (12), - Asociación de Artesanas "Kari Isa Xanu" (18). - Women health for Lejía (>100) Additionally, women participating from different Instituciones educativas and permanent and actively participated in development processes in villages/ communities: ZEE application, Community Rules, Strategic planning and implementation.	At least 8 villages/ communities have organization exclusively conformed by women, directly and actively participating in formal associations strengthened and supported by CIMA: - Asociación de Artesanas Shipibas del Río Pisqui AASHRIPIS - Club de Madres Sarita Colonia - Club de Madres Las Samaritanas" - Club de Madres Virgen de las Mercedes Asociación de Artesanas Kari Isa Xanu - > 150 Women actively participate from different Instituciones educativas and rondas campesinas Women participate permanent and actively in development processes in >50 villages/ communities: Environmental education and reflection, Community Rules, Strategic planning and implementation.	At least 8 villages/ communities have organization exclusively conformed by women and actively participate in formal associations supported by CIMA: - Yamino :Asoc. de Artesanas Kari Isa Xanu y Asoc. de Turismo Ecológico Saludable - San Luis de Charashmaná, Manco Cápac, La Cumbre: Asociación de Artesanas Shipibas del Río Pisqui AASHRIPIS - Paraíso (Shamboyacu): APAFA, 50% women - San Juan (Tres Unidos): Club de Madres Sarita Colonia - Alto Ponaza: Club de Madres Las Samaritanas" - Nuevo Loreto: Club de Madres Virgen de las Mercedes
Human Capital	# of REDD+ Project	10 families were involved	3,801 families from 39 villages/communities are	4,188 families from 44 villages/ communities are	17,000 people from 54 villages/communities are

Parameter	Indicator	Baseline Conditions	Project Conditions: Implementation period		
		2008	2015-2016	2016-2018	2019-2021
	participants applying new technical skills in resource management, project administration and governance	in learning agroforestry and technical training relating to farming	supported to implement strategic plans (Quality of Life Plans and Action Plans) according to diverse community priorities; in order to implement planning with Public Investment Projects (PIP), value chains (producers' cooperatives and committees), handicrafts and tourism associations, infrastructure, forestry, bee-keeping, recycling, boundary-marking and patrols, etc.	supported to implement strategic plans (Quality of Life Plans and Action Plans) according to diverse community priorities; in order to implement planning with Public Investment Projects (PIP), value chains (producers' cooperatives and committees), handicrafts and tourism associations, infrastructure, forestry, bee-keeping, recycling, boundary-marking and patrols, etc.	supported to implement strategic plans (Quality of Life Plans and Action Plans) according to diverse community priorities

Parameter	Indicator	Baseline Conditions	Project Conditions: Implementation period		
		2008	2015-2016	2016-2018	2019-2021
Physical Capital	# of communities with Economic Capital infrastructure improvements and mechanisms for maintaining them sustainably	Zero. Most communitie s had only basic and often insufficient infrastructure to fulfill basic needs. Many had infrastructure needing repairs which the communities could not do due to the types of technology or materials needed to repair the infrastructure.	15 communities identify infrastructure improvements as a priority in their life plans: ✓ Infrastructure projects water and sewage (4 communities), ✓ access roads (4 communities), communication services (2 communities), ✓ construction of health infrastructure (2 communities), ✓ construction education infrastructure (1 communities), ✓ categorization (2 communities). Additionally, 13 populations include plans for: ✓ reforestation and forest conservation (10 communities), ✓ proper management of solid waste (3 communities), among others. Among the actions developed by CIMA is linking with local governments, sub- national, sectoral organizations to promote public investment for	30 communities identify infrastructure improvements as a priority in their life plans: ✓ Infrastructure projects water and sewage (13 communities), access roads and bridges (10 communities), ✓ communication services (4 communities), ✓ construction of health infrastructure (17 communities), ✓ construction education infrastructure (7 development of these infrastructure projects, communities), ✓ categorization & titling (14 communities). Additionally, 16 populations include plans for: ✓ reforestation and forest conservation (8 communities), ✓ proper management of solid waste (9 communities), among others. CIMA continues developing	Out of the 35 QLPs, in 2020 we assessed the accomplishment of the priorities that had been identified by the communities. 31 communities have reached some of their priorities so far, totalizing 74 completed priorities. The priorities, according to CIMA´s intervention model (figure in page 81) are divided in the following aspects: ✓ Social: 31 priorities (17 communities), ✓ Economic: 21 priorities (15 communities) ✓ Environmental/Natural: 10 priorities (8 communities) ✓ Political: 11 priorities (9 communities) ✓ Cultural: 1 priority (1 community)

Parameter	Indicator	Baseline Conditions	Project Conditions: Implementation period		
		2008	2015-2016	2016-2018	2019-2021
			the development of these infrastructure projects.	actions to linking with local governments, sub- national, sectoral organizations to promote public investment for the	

Parameter	Indicator	Baseline Conditions	Project Conditions: Implementation period		
		2008	2015-2016	2016-2018	2019-2021
Economic Capital	#of participating communities whose basic family and communal needs are satisfied through sustainable economic activities in accordance with land-use and quality-of-life plans	Zero communities. Only a few families were successfull y practicing agriculture or economic activities sustainable over time	23 communities, 20 community organizations Action plans linked to value chains and infrastructure for connection had been development with local institutions (committees, associations etc.) in 23 villages and communities, for these activities: Producers (15, mainly cocoa / coffe): Vista Alegre (Comité de productores), Alto Ponaza (Small animal producers), Paraíso (Small animal producers), Santa Rosa (Selva Verde), Chambira (Allima Sacha), Nuevo Arica(Comité de productores), Cachiyacu (Nueva vision), Maronilla (ronda campesina & cocoa), Shapaja (ronda campesina & honey), Nuevo Dorado (Coop Nvo. Dorado), Fernando Belaúnde Terry, Nuevo San Martín, Isolaya, Nuevo Alan (ADECAVACU), Yamino (Asociacion de Cacaoteros), Santa Rosa de Aguaytía (Coop. Cacaoteros). Tourism and handicraft (4): San Luis de Charashmaná, La	23 communities, 20 community organizations: - Producers organiced by associations (16), mainly cocoa AFS: Chambira (ALLIMA SACHA), Santa Rosa (Selva Verde), Nuevo Jaén (Ronda Campesina), Maronilla (Planta Aspuzana), Belaúnde, Nuevo San Martin, Isolaya (ADECAVACU), San Lorenzo, Nuevo Dorado (Asoc. de Cacaoteros San Pedro de Nuevo Dorado), Mariscal Cáceres (Asoc. Agrop. Nukan Apatai Unicama), Santa Rosa de Aguaytía, Yamino(Asoc. Cacaot. Valle de Yamino), Nuevo Arica (Rayos del Sol), Vista Alegre (Comité Alto Biavo), Cachiyacu (Nueva Visión) and Orellana (AREMPU); - Tourism and handicraft (4): San Luis de Charashmaná, La Cumbre, Manco Cápac (AASHPIRIS) and Yamino (Asoc. Turismo y Asoc. Artesanas) Alto Ponaza and Nuevo Loreto.	At least 28 organisations in 23 communities: - 19 Producer organisations (mainly cocoa, also forestry): Cooperativa Agraria Comunidad Nativa Santa Rosa (Santa Rosa de Yanayacu), Asoc. Agropecuaria de Cacaoteros del Valle de Yamino and Veeduría Forestal de Yamino (Yamino), Comité de cacaoteros de la CCNN Mariscal Cáceres (Mariscal Cáceres), Asociación de Cacaoteros del Valle del Cushabatay (Fernando Belaúnde Terry), Asociación de cacaoteros del CP Nuevo Dorado (Nuevo Dorado), Asociación de Cacaoteros y Reforestadores San Pedro de San Lorenzo - ACRESAN (San Lorenzo), Asoc. Productores Agropecuarios Allima Kawsay (Nuevo Picota), Junta Vecinal Comunal (Playa Hermosa), Comité

Parameter	Indicator	Baseline Conditions	Project Conditions: Implementation period		
		2008	2015-2016	2016-2018	2019-2021
			Cumbre, Manco Cápac (AASHPIRIS) and Yamino (Asoc. Turismo y Asoc. Artesanas) Infrastructure to improve acces (3): Lejia, San Juan and Mariscal Cáceres Restauration and resourcemanagement/conservation (2): Chipaota, Cachiyacu (Nueva vision).	Note 3: roads are also improvement as part of the QLP, getting better conditions for market access.ç - Restauration (2): San Juan and Lejia. - Honey (1): Shapaja (ronda campesina) Note 1: in native communities of Aguaytía and Contamana the forest management is included Note 2: Several farmers receive technical assistance for cacao and coffee, CIMA also works with “Clubes de madres” from San Juan,	de cacaoteros Valle del Alto Biavo (Vista Alegre), Comité de cacaoteros Rayos del Sol (Nueva Arica), Ronda Campesina (Lejía, Ramón Castilla y Siambal), Comité de Productores Agropecuarios La Fortaleza de Paraíso (Paraíso -Shamboyacu), Comité de Productores Agropecuarios Los Triunfadores (Alto Ponaza), Comité de productores agropecuarios Selva Verde (Santa Rosa - Shamboyacu), Comité cacaotero Allima Sacha (Chambira), Asociación de Productores de Cacao Nueva Visión (Cachiyacu). - 3 tourism, handicraft organisations: Asoc. de Artesanas Kari Isa Xanu y Asoc. de Turismo Ecológico Saludable Ñuina Kama Jisti (CN Yamino), Asociación de Artesanas Shipibas del Rio Pisqui

Parameter	Indicator	Baseline Conditions	Project Conditions: Implementation period		
		2008	2015-2016	2016-2018	2019-2021
					(AASHRIPIS) (San Luis de Charashmaná, Manco Cápac y La Cumbre) - 1 Security organisation: Comité de Autodefensa-CAD (Chipaota). - 5 Women organisations : APAFA (Paraíso - Shamboyacu, half women), Club de Madres Las Samaritanas (Alto Ponaza), Club de Madres Sarita Colonia (San Juan (Tres Unidos)), Club de Madres Virgen de las Mercedes (Nuevo Loreto), Club de Madres Virgen del Carmen (Lejía).

4.3.3 Dissemination of Monitoring Plan and Results (CM3.3)

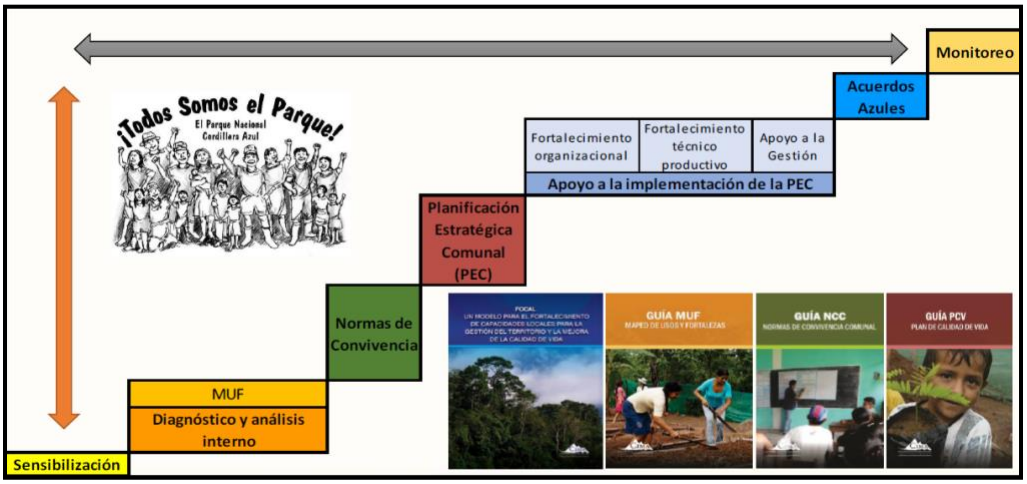
Unchanged from description in the validated PD; see section 6.2 Monitoring of human communities in the buffer zone.

The strategies and specific tools used by CIMA for park and project management are publicly available in CIMA's web page http://cima.org.pe. These tools and their advantages and limitations have been explained to local populations during training and awareness- raising sessions as well as distributed in print to local leaders, institutions, authorities and other stakeholders.

The FOCAL process (Fortalecimiento de Capacidades Locales para la Conservación) seeks to generate commitments to the PNCAZ conservation and sustainable use of natural resources and territory that may lead to improved quality of life. FOCAL process is implemented at the level of village or community. It has diagnostic tools, community planning, and participatory forms of consensus and decisions-making. This methodology was synthetized and published in our website in 2013: https://www.cima.org.pe/files/images/publicaciones/pdf/CIMA-2013-Modelo-FOCAL.pdf

The aforementioned diagnosis tool, which is the MUF -also seen in the following figure-, should have taken place in 2019/2020, and is also key in terms of results dissemination. Unfortunately, during the period in question, there were budgetary constraints and then the COVID pandemic made this task impossible. In previous years the MUF methodology was also synthetized and published in our website: https://www.cima.org.pe/files/images/publicaciones/pdf/CIMA-2014-Guia-Mapeo-de-usos-y-Fortalezas-MUF.pdf

This same logic applied to the Coexistence Rules (Normas de Convivencia), which is the next step to the MUF methodology. These were also synthetized and published in CIMA´s webpage:



https://www.cima.org.pe/files/images/publicaciones/pdf/CIMA-2014-GUIA-Normas-de-Convivencia.pdf.

Like in previous years, and following the PDD section 7.1.3, we have prepared a summary of the project achievements for the current period and we have communicated them to the stakeholders, informing about the ongoing verification process, and indicating where they can find further information. The reception charges of these letters have been attached to our supporting documents and were sent to municipalities and some organisations

Finally, our institutional webpage has a new section, showing specific information about the REDD+ project and its benefits. This section will be constantly updated in order to present the results in the clearest way. The link to this section is the following: https://www.cima.org.pe/es/parque-nacional-cordillera-azul/proyecto-redd-cordillera-azul-project.

Looking at a post-COVID scenario, CIMA plans to resume field activities during the second half of 2021. These activities will include meetings in the communities where the activities have taken place in the past to explain the project activities and results, and also to socialize the materials that are jointly produced during field work, as for example the renewal of the Quality Life Plans. CIMA´s communications team is also developing infographic material in order to distribute it along the buffer zone and posters will be printed, showing the monitoring methodologies and results of the REDD+ project. This work will be led by the institution´s communicator in close coordination with the directors and the technical team, especially in the regions. A current idea, is to include REDD+ contents and specific results in the Non-formal Environmental Education component, which makes part of the FOCAL model.

During 2021, an evaluation of the whole FOCAL process will also take place. At the closing of this report, a part has already been done, which allowed to count the priorities that have been completed. After this whole evaluation is completed, a report shall be produced which ought to be shared, presents and explained in the buffer zone.

4.4 Optional Criterion: Exceptional Community Benefits

Not applicable to this project.

4.4.1 Barriers to Benefits (GL2.3)

Not applicable to this project.

4.4.2 Protections for Poorer and More Vulnerable Households and Individuals (GL2.4)

Not applicable to this project.

5. BIODIVERSITY

5.1 Net Positive Biodiversity Impacts

5.1.1 Biodiversity Changes (B1.1)

As predicted in the PD, the project has had a net positive impact on biodiversity and no HCVs related to biodiversity have been negatively affected. The baseline conditions (2008) are indicated in Table Table 5.1 in section 5.3.2 – Biodiversity Monitoring Results) with a Data and Index Rankings Table for selected indicators used to monitor impact on biodiversity in the project area, according to section 5.2 Biodiversity Monitoring from PD. This information is also updated to the current period.

Baseline 'Without project' biodiversity scenario

The impact on biodiversity by deforestation in the PNCAZ would be especially devastating because it would fragment one of the largest protected areas and one of the last remaining, intact altitudinal corridors in the eastern tropical Andes. The area most vulnerable to encroachment in the PNCAZ is the site known as "the neck" where special attention is being paid by CIMA and SERNANP to increase protection, especially to the sector Boca Pauya.

Without the project, notable reductions in population sizes and declines in species numbers are expected in the PNCAZ and the surrounding region. Most affected would be the endemic, rare, and already threatened species that characterize the park and represent a globally important array of natural communities of the tropical Andes, which are endangered or unprotected elsewhere and are fast disappearing. As a region, the tropical Andes is expected to experience a great loss of species or species migrations in the near future, given present rates of deforestation and projected impact of climate change (Brooks et al 2002; Malcolm et al 2006) and would likely cause alterations in ecosystem services (Anderson *et al*. 2011, Marengo *et al.* 2011).

In the absence of enforcement of park boundaries and stabilization of land-use in the buffer zone, deforestation, and forest degradation will compromise the integrity of the park. The projected deforestation results show significant deforestation along rivers and in a path across the north portion of the park (PD, Section 3.1.7 Projected Deforestation Location). Deforestation along this path would cut the park in two and decrease the effective size of the protected area. In addition, deforestation would facilitate access into the park and its resources.

Habitat loss and fragmentation of the park would have cascading effects on biological communities. Deforestation and degradation would alter the basic structure of the landscape as a mosaic of habitats within which many faunal species move in search of habitat, food, or reproducing grounds. Habitat fragmentation and degradation is one of the primary drivers of faunal species declines worldwide, in both terrestrial and aquatic environments. A limited number of species would thrive in the newly cleared areas, but the majority, beginning with the rare and specialized species, would decline rapidly. Also, as deforestation occurs along the rivers, it will limit the water supply for species that are unable or will not travel through cleared spaces to reach the rivers. The fragmentation of the park would have a significant impact on the larger mammals, especially spectacled bears, tapir, spider monkeys, and the large herds of white-lipped peccaries (Bodmer et al. 2013)

The implications of species loss extend beyond reduction in numbers, as deforestation can negatively affect community structure. Of particular concern would be the decline of large carnivores, seed dispersers, and pollinators, based on their key roles in ecosystems. The risk of faunal extinctions is also high in PNCAZ: the Rapid Biological Inventory (2001) found more than 30 species likely new to science and potentially restricted to the park.

Aquatic systems suffer degradation as a result of deforestation. The direct consequences of deforestation for aquatic environments have been well documented (Pusey and Arthington 2003) and include increased sediment, increased water temperatures, greater runoff from rain events, changes to river channels and pollution. Of most concern for aquatic biota is increased sediment loading, as it alters aquatic habitats and results in physiological stress for gill-breathing organisms. Deforestation in other parts of the tropical Andes has been linked to major reductions in fish species richness, and the

elimination of migratory fishes, such as *Brycon, Prochilodus*, and *Salminus* (Winemiller *et al.* 2008). These same genera are known to occur in streams of PNCAZ. Through the MUF process and the work monitoring the effects of extraction activities in the buffer zone, fishermen in the buffer zone have indicated that they have observed declines in several catfish such as "zungaro" (*Zungaro zungaro*), "dorado" (*Brachyplatystoma* sp.), "doncella" (*Pseudoplatystoma fasciatum*) and "carachama" (*Chaetostoma* and other Loricariids), as well as "boquichico" (*Prochilodus nigricans*) among others, over the last ten years (Macedo 2013).


MONGABAY LATAM

BOSQUES OCÉANOS ANIMALES CONSERVACIÓN MEDIOAMBIENTE OPORTUNIDADES ORGANIZACIÓN Para buscar, teclee y hag

Hallan posible nueva especie de pez ciego cerca del Parqu e Nacional Cordillera Azul

por Joaquín Ortiz en 25 Agosto 2016

- La especie encontrada no tiene escamas en el cuerpo, presenta espinas en la cabeza, carece de pigmentación o tiene una pigmentación muy tenue –lo que indica su adaptación a condiciones sin luz– y presenta barbos largos en la boca.
- El hallazgo se llevó a cabo en la cueva Milagrosa, cerca de Tocache en la región San Martín.
- El Parque Nacional Cordillera Azul "protege una diversidad biológica muy alta porque el ámbito que cubre es de más de 1 millón 300 mil hectáreas de bosques primarios y prístinos", explica Tatiana Pequeño, Directora de

NUESTRA MISIÓN

Mongabay pretende aumentar el interés y la apreciación por la tierra salvaje y la vida silvestre a la vez que examina los efectos de las tendencias emergentes en el clima, la tecnología, la economía y las finanzas en la conservación y el desarrollo.

Of special concern would be those species associated with aquatic environments, where the loss of a minimum quality or quantity of water has a dramatic impact, especially in restricted habitats species, including some that have not yet been described or remain unknown, such as fishes in caves (Figure 5.6) or other *troglophile* species (Ñahuicopa et al. 2016 and Hidalgo et al. 2017). More details about these fishes in section 7.

Figure 5.6. Troglophile fishes (*Trichomycterus* sp.nov.) in a stream's cave in Tocache Sector.

Source: https://es.mongabay.com/2016/08/peru-hallan-posible-nueva-especie-pez-ciego-cerca-

The fact that PNCAZ encompasses the headwaters of two major Amazon tributaries - Huallaga and Ucayali rivers - deserves special mention, as the impacts of deforestation in this region under the baseline scenario would be exported to downstream areas. It is well known that ecological processes occurring in headwater streams influence biological communities and ecosystem function downstream, and for this reason river basins should be managed as a unit. Aquatic ecosystems in headwater streams are often driven by allochthonous inputs from terrestrial systems; deforestation in riparian areas would compromise the habitat, community structure, and ecosystem function of these streams. Several migratory species of fishes spawn within streams of the park: their survival depends on connectivity between upstream and downstream areas, and adequate habitat quality. As well, river turtles (especially taricayas whose eggs are favored food for Amazonian indigenous groups) and other aquatic reptiles depend on river beaches for laying eggs.

Without the project, increased deforestation and absence of CIMA's activities in the buffer zone will lead to a significant increase in human activity within the park. Increased hunting pressures, stemming from uncontrolled park access in the absence of the project, would compromise survival of the more vulnerable species in PNCAZ. Indiscriminate hunting would affect large mammals (tapirs, monkeys,

peccaries, deer), game birds (curassows, guans), and favored fishes most quickly. But eventually, the entire biotic community would deteriorate.

'With project' biodiversity scenario

The 'with project' scenario was developed to prevent deforestation in the PNCAZ which protects a large, intact expanse of lower-montane forest remaining in Peru. Besides encompassing a wide range of habitat types— from lush lowland forests, to stunted vegetation on the rugged sandstone ridges, to elfin forests on the mountain tops—and rare geologic formations such as the Vivians, the park offers intact forest cover from the lowlands at 150 meters to mountain peaks at 2,400 meters. The park protects an eastern outlier of the Andes that has been isolated for a sufficiently long period for massive speciation to occur.

The initial knowledge of the project area's impressive biodiversity and endemism comes from scientists from the Louisiana State University (1996), The Field Museum of Chicago and the Museo de Historia Natural-UNMSM (2000) as Peruvian counterparts. To complement the biological information CIMA promotes research in the PNCAZ and its buffer zone. During the period 2019- 2021 at least 25 studies updated and enriched the knowledge about the project zone biodiversity and the relevance of this biodiversity and natural processes to human populations surrounding the park (Table 5.6).

Table 5.6. New research conducted during the monitoring period Aug 2018-Dez 2020

Institution		Research Title	Year		
			2018	2019	2020
1	CIMA, U. Leeds-IIAP	Establishment of a permanent botanic plot in Pauya-Cushabatay area	X		
2	Peace Corps	Analysis of economic benefits	X		
3	U. North Dakota, U. Southern Mississippi, Federal University of Mato Grosso	Description of two new avian parasite species from Shapaja sector. Achatz et al. Journal of Parasitology 2019 105(5) 704–717		X	
4	U. Cambridge	Evaluation of social and ecological intervention strategies in the region of San Martín. Thesis presented by Josephine Chambers.		X	
5	EAE Business School – U.de Lleida	Ecotourism study in Cordillera Azul National Park.		X	
6	Natural History Museum – San Marcos University (UNMSM)	Amazon Fish Project: Ponasa y Mishquiyacu	X	X	
7	Natural History Museum – San Marcos University (UNMSM)	Amazon Fish Project: Biavo	X	X	X
8	Natural History Museum – San Marcos University (UNMSM)	Amazon Fish Project: Cushabatay - Pauya	X	X	X

9	Natural History Museum – San Marcos University (UNMSM)	Description of new species: troglophilic fish	X	X	X
10	Natural History Museum – San Marcos University (UNMSM)	Icthyofauna information system in Cordillera Azul National Park and its buffer zone	X	X	X
11	U Cambridge	Blockchain analysis to avoid double accounting in REDD+		X	
12	DISPLAMAZ Project	Ethnobotany study in Yamino Native Community	X	X	
13	Duke University (USA)/ PNCAZ-SERNANP	New installation of camera-traps to study birds and large mammals in Cordillera Azul National Park.	X	X	
14	Stanford University	Land use change in communities of sector Tocache	X	X	X
15	NGO Missouri Botanical Gardens Oxapampa- Pasco	Flora diversity and its relationships with soils in the Wilderness area of Cordillera Azul National Park	X	X	X
16	LSU Museum of Natural Science	New bird species description: Cordillera Azul Anteater (*Myrmoderus eowilsoni*). The Auk 135, 2018, pp. 114-126. DOI: 10.1642 / Apr 17-97.1	X		
17	University of Hamburg (Germany)	Assessment of impacts of REDD+ on livelihoods of local people in Peru	X		
18	NGO Missouri Botanical Gardens Oxapampa- Pasco	Project MonanPERU, establishment of RAINFOR plots and botanical collections. Two new species were published: *Lissocarpa bracki* (Ebenaceae) – zone: Chambirillo, and *Drypetes azulensis* (Putranjivaceae) - zone Mishquillaquillo			X
19	University of Sussex, CIMA	Sustainable livelihoods, deforestation, and supply chains: Analysis of environmental and socio-economic data from the frontier of the Peruvian Amazon			X
20	UNAS	Behaviour of reintroduced native forest species for ecolgical restoration in a secondary forest. San Juan, San Martín			X
21	UNAS	Horizontal structure of the forest system in the permanent plot in Lejia			X
22	Postgraduate School – Universidad Nacional Agraria La Molina	Analysis of the management of forest species and an economic analysis to improve the parameters of the DEMAs (mechanism to access forest resources in Peru) - preliminary title			X
23	Yunkawasi	Primates inventory in Aspuzana Valley – buffer zone of Cordillera Azul National Park			X
24	UNAS	Reestablishment of ecological succession in a “shapumba” (Pteridium aquilinum (l.) Kuhn) (fern) in San Juan, San Martín			X
25	UNAS	Caracterization of the natural regeneration in the forest monitoring permanent plot in Lejia San Martín			X

26	UNAS	Behaviour of forest species in functional groups for ecological restoration in an abandoned coffee farm, San Juan, San Martin			X
27	UNAS	Floristic composition and importance value index in the permanent plot of Maronilla, buffer zone of Cordillera Azul National Park, Huánuco			X
28	UNAS	Caracterisation of dasonomic and ecological variables of natuial regeneration in the buffer zone of Cordillera Azul National Park			X
29	UNAS	Horizontal and vertical structure of the primary forest in the buffer zone of Cordillera Azul National Park Maronilla, Pucayacu, Huánuco			X
30	UNAS	Multitemporal analysis of forest cover and its influence on the flooding dangerousness in the Ponaza basin, Picota, San Martin.		X	X
31	CIMA	Carbon estimation and information of secondary forests and other land use categories of different ages			X

Fuente: CIMA, Reports 2018, 2019 y 2020

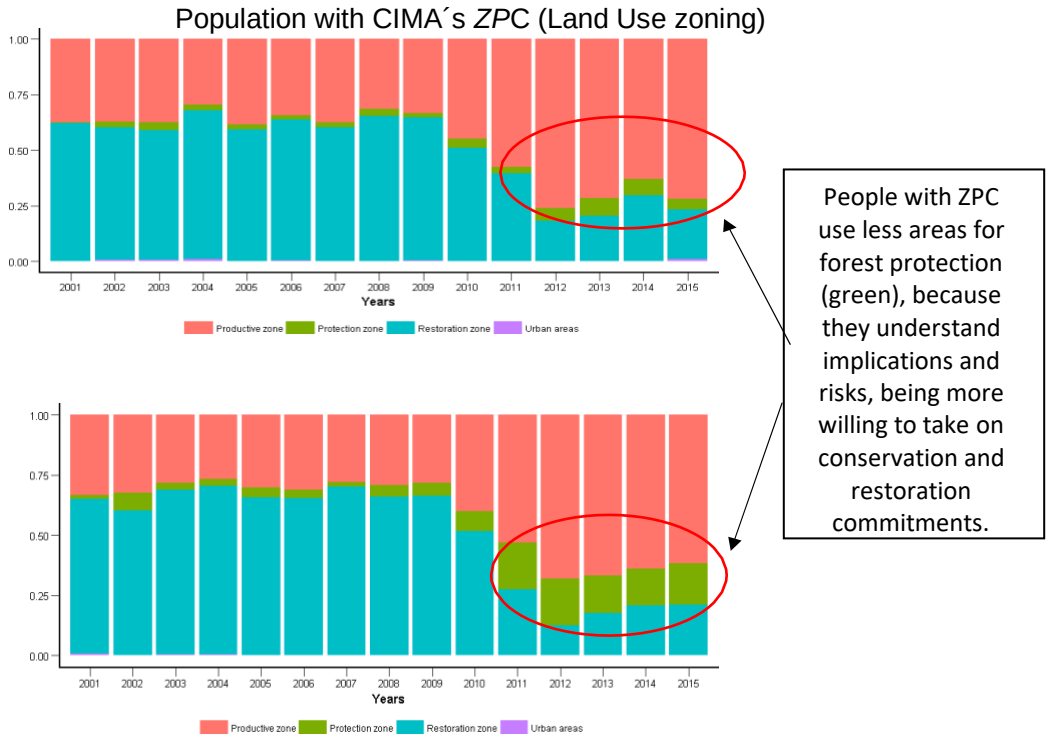
The results of these studies were used in multiple ways to improve project activity development and implementation, for example:

- As inputs for CIMA's biodiversity / forest monitoring and activities planning;
- To identify areas with better probabilities to development restauration projects/programs, especially in areas with high historical deforestation, like Shamboyacu sector.
- To identify new species or species ranges for the park or buffer zone which are highlighted in the summary of project biodiversity;
- As inputs for a wide range of community activities (Quality of Life planning, zoning, communication and education programs);
- To provide new data to local, regional and national government authorities for their planning and monitoring use and also to complement CIMA´s information useful for proposals for example.
- To make the PNCAZ better known at international and national level in diverse topics, such as its biological and social diversity, customs, threats and opportunities, management, governance, etc.

As mentioned in section 4.1.1, an analysis of yearly high-resolution forest cover data supports the fact that deforestation activities in biologically sensitive zones decreased rapidly during the time of the land zoning activities implemented by CIMA (Zonificacion Participativa Comunal – ZPC); case study was

in Shamboyacu sector (Rodríguez et al. 2018). We find that particularly the long-term presence of the bridging institution and the continuous testing and reflection of the integrated "hybrid knowledge" enabled communities to develop adaptive capacities, to carry out more friendly activities with the territory. From the analysis of the ZPC, our results reveal the enabling conditions for promoting the learning process to develop a sustainable land-use management in the context of migration and rapid changes (Figure 5.6).

Figure 5.6. Comparison between area with and without participatory land-use zoning. (Source: Rodríguez, L., et al. 2018).



So, even if the reduction in deforestation is not as impressive (although the population has continued to increase) as the capacity of the population to choose the best areas for carrying out their economic activities. Meaning that conservation can be integrated into the spatial management of local populations, allowing a better decision on where to develop their agricultural activities, according to the zones designated for this purpose or areas that will be avoided favoring conservation.

Information provided by neighboring villagers through the MUF process, park guard reports and CIMA staff indicate that local residents have been suffering the effects of deforestation in the buffer zone. According to resource-use information, it is known, for example, that hunters have to travel much farther to find game, especially in the Huallaga populations when compared to the native communities of the Ucayali – where game species and fish are the principal source of protein- who live further from access routes and therefore have more intact forest. In some areas, people have forbidden hunting of certain species to protect them from local extinction, unless it is for traditional use such as in indigenous communities (Gálvez-Durand 2009, Pérez 2013). The most vulnerable game animals in the park include tapir, spider monkey, and curassow, and other big mammals as spectacle bear and jaguar; all these species show healthy individuals and healthy populations within PNCAZ, as shown in the results of the trap cameras installed in 2013 and 2016, throw a project with the Duke University and CIMA.

As mentioned previously, in 2016, a small set of trap cameras were installed in the forest of Shapaja sector, around armadillo burrows, in order to evaluate the use of the same for other animals, such as wild dogs (Figure 5.4), founding healthy populations of animals, including several species in couples and other species with young descendants.


a
b

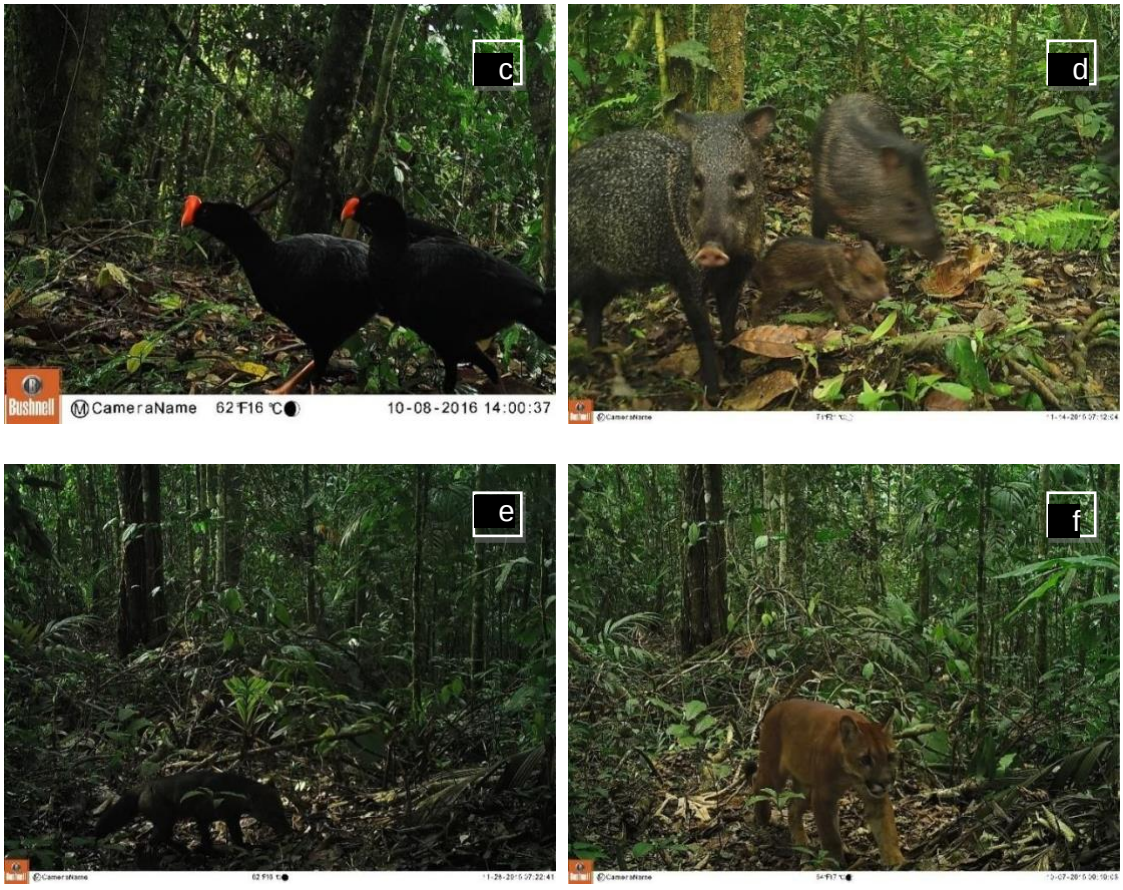
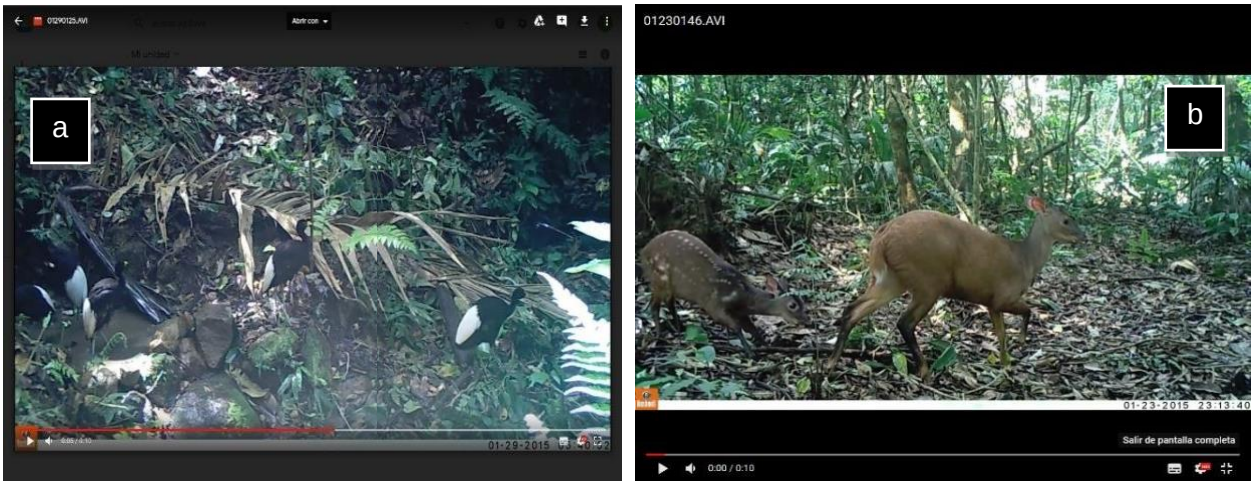


Figure 5.4. Images captured by the camera trap in 2016: (a) adult deer, (b) adult tapir, (c) couple of curassows, (d) family of peccaries, (e) adult bush dog, and (f) young puma.

In 2017 and 2018, CIMA developed two (02) parkguard training courses, in order to generate field capacities for the SERNANP personnel and generate a guide for the installation of cameras, as well as to incorporate this monitoring function and the planning of the ANP. In August 2018, the first cameras were installed, obtaining the first images placed directly by the PNCAZ staff, in an attempt to make the information more independent and sustainable. Videos and pictures were obtained from these first cameras setting exclusively by parkguards (Figure 5.5).

Videos taken by camera tramps setting by parkguards in Nuevo Loreto control point



Pictures taken by camera tramps setting by parkguards in Nuevo Loreto control point

Figure 5.5. Images captured by three camera traps in 2018: (a) group of Pale winged Trumpeter, (b) adult Deer and its baby, (c) Common curassows, (d) nocturnal picture of Tapir, (e) nocturnal picture of Jaguar, and (f) Short eared adult bush dog

5.1.2 High Conservation Value Protection (B1.2)

Park guard patrol routes are used to collect the monitoring data and these routes encompass large areas both in the park and in the buffer zone, resulting in monitoring of the entire project zone. The information presented along section 5 shows a clear net positive impact on biodiversity as a result of the project activities.

Forest cover inside the park remained about the same since 2008, even some small forest gaps have been recovered (see section 5.1.1). Biodiversity has therefore remained high over the monitoring period 2019-2021. Thus, the overall Index Score jumped from a 1 in 2008 to 10 in 2014. In the last monitoring period, this number decreased two points, which is explained in the previous section. Overall, the numbers have remained high mainly due to similar findings in number of species and average abundance, and few infractions in the last period (see section 5.3.2).

Within the PNCAZ hunting is allowed for subsistence only and covers 5.09% of PNCAZ area (MUF 2003, Pequeño and Pizarro 2018). MUF data demonstrated a perception that flora and fauna both thrived when the park is protected and sustainable community activities are implemented.

These results are consistent with a successful conservation project and indicate that the project has had a net positive impact on biodiversity over the without project scenario and maintained the HCVs 1, 2 and 3, directly related to biodiversity.

5.1.3 Invasive Species (B1.3)

As stated in the PDD, no invasive or exotic species were used in the project activities. Project activities were shown to have lowered the number of incidents where exotic species were used by those not associated with the project.

5.1.4 Impacts of Non-native Species (B1.4)

Not applicable to the project.

5.1.5 GMO Exclusion (B1.5)

As stated in the PDD, no GMOs were used in the project activities.

5.2 Offsite Biodiversity Impacts

5.2.1 Negative Offsite Biodiversity Impact Mitigation (B2.2)

This project is devoted to preventing negative biodiversity impacts inside the project area and in the project zone. Project activities themselves generate positive, not negative impacts on

biodiversity. Work with communities in the buffer zone focuses primarily on land-use stabilization and wildlife management. Both efforts benefit native biodiversity outside the park. In addition, stream recovery and agroforestry with native species is promoted in the buffer zone as well as reducing hunting pressure inside PNCAZ, further benefiting the native biota in the region which in turn benefits the local communities.

Similar positive impacts may also be felt beyond the buffer zone (offsite). Stream recovery and erosion prevention measures will have impacts on biodiversity all along the stream and downstream waters. Increases in herd size and habitat may allow biota to travel in wider ranges and some locations offsite might also notice increases in biota numbers.

In the worst-case scenario, the project's efforts will result in unchanged conditions for biodiversity outside the project zone. More likely, results from project activities will greatly improve conditions for native biodiversity in the buffer zone, in accordance with the Source and Sink Model (Pulliam 1988) that has been described in the first Master Plan for PNCAZ (INRENA 2006), which in turn will positively impact the off-site biodiversity. Combined with the positive benefits for biodiversity in the park, the overall effect of project activities for biodiversity conservation will be extremely positive.

Because no negative impacts for offsite biodiversity are expected, no mitigation plans are required and none were implemented during this period.

5.2.2 Net Offsite Biodiversity Benefits (B2.3)

There are none negative unmitigated offsite biodiversity impacts resulting from the project´s area stricter protection, which is the greatest benefit inside the project area. On the contrary, protection of species in the park will likely result in greater numbers of animals in the buffer zone as well, which in turn is a net positive effect on biodiversity.

By providing a protected environment, especially for overhunted game animals such as deer, peccaries (white lipped and collared), tapir, several species of monkeys, guans and curassow, the park will allow the populations of the species to increase and stabilize. Larger populations inside the park will lead to larger populations in the buffer zone as animals that travel or migrate. This benefits both the animals and the communities in the buffer zone. As discussed in section 4.4.3 of the PD, hunting provides an important source of protein for the communities and they only perform subsistence hunting. This concept is discussed in more detail in the wildlife management section of the 2003 Master Plan (INRENA 2006) and in the PD.

The park rangers register monthly the villagers who enter the park to carry out subsistence hunting. The nutrient intake from wildlife is one of the ecosystem services provided by the PNCAZ as mentioned in the PD (Table 1.6 of the section 1.13.5.1 Ecosystem Services).

CIMA systematizes the monthly park ranger records on the number of subsistence hunters that enter the park for each sector, carried out in the control posts. It is important to point out that the COVID-19 pandemic presented a lot of difficulties and due to restrictive measures in Peru, even the park rangers weren´t allowed to out and perform their duties for a long time. Additionally, this also created a decrease in the report quality for specific periods, which did not allow to differentiate the data (Jul-Sep 2020).

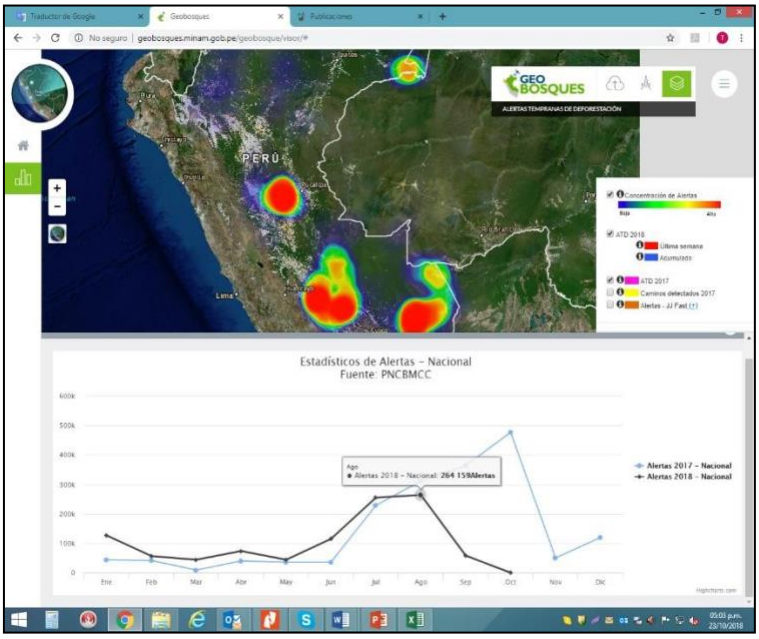
Table 5.2 in section 5.3.2 shows the index evolution of the biodiversity indicator as defined in the PD table 5.6, section 5.2. This numbers originate from the ranger patrols which include both buffer zone (offsite) and park (project area). The number clearly increases and then stabilizes, while the index of preys/hunter in the 2020´s wildlife report (Annex CM3.2, B3.2, Table 5, pag. 11) show an increase, indicating a net positive effect on biodiversity.

5.3 Biodiversity Impact Monitoring

5.3.1 Biodiversity Monitoring Plan Development (B3.3)

The plan and its implementation remain unchanged from description in the validated PDD.

At the landscape level, CIMA analyzes the forest cover with satellite images and aerial overflights when feasible (i.e it was pretended to have one in 2020 but it was not possible), to confirm that there is no deforestation inside the park. In recent years the availability of satellite images has improved, so the analysis has been more frequently than annual. Deforestation in the park is the best indicator readily available to the project, of any negative impact to biodiversity. Where incursions into the park are detected through review of images or park guard reports, cessation of the illegal activities and appropriate remediation become the highest management priority.



In addition to the constant monitoring carried out by CIMA and park rangers following the monitoring plan, CIMA constantly checks MINAM´s Geobosques platform for the national level of forest loss monitoring; CIMA also interacts with SERNANP and MINAM based on the alerts that may occur in the Project area.

Source: Geobosques http://geobosques.minam.gob.pe/geobosque/visor/#

At the biological community level CIMA will focus on organisms that indicate habitat health and are easy to sight and identify. CIMA will specifically focus on sensitive game animals (tapir, deer, curassow, monkeys and big carnivores). Since the project began, regular observations (sightings and tracks) by park guards have occurred monthly inside the park, along the regular patrol routes (in PNCAZ and buffer zone) around 18 control posts and park guards' centers that include a good sample of the habitat heterogeneity of the landscape.

In addition, CIMA evaluates forest and biological communities' integrity at the landscape level using parkguards´ information based on records of specific threats (violation of rules of use). This information assists in defining threats or possible impacts to biodiversity.

There are several benefits for park guards recording the information about flora and fauna, especially the species used by local villagers. Park guards routinely patrol large portions of the park and already have a system of reporting back to CIMA (Pequeño and Kuroiwa 2007, Pizarro 2016, Pequeño y Pizarro 2018). Because most of the guards are from local communities, they usually have good knowledge of local flora and fauna and they receive additional training.

5.3.2 Biodiversity Monitoring Results (B3.1, B3.2)

The plan for selecting variables for quantitative monitoring and its implementation remain unchanged from the description in the validated PDD, but currently more non-quantitative information is being considered to have a greater context of the situation of biodiversity in the project zone. Thus, the monitoring plan has not been modified. In fact, the indicators and all its components (methods, sources, and frequency) have remained the same between the PDD and this report. However, some clarifications were required, which are highlighted below:

- The information obtained comes from the project area, in the rangers' patrol areas, precisely areas with higher human pressure where it is more likely that land use changes or increased hunting pressures exist.
- The quantitative analysis has not changed, so it is comparable. An index has been created based on indicator species (not on all the PNCAZ biodiversity) because of its size and large biodiversity it would be unlikely to assess at that level. This clarification and the improvement of work with the rangers have been coordinated with SERNANP. Field Reporting systems have also been improved by training parkguards, who collect basic information for this analysis.
- It is prohibited to take threatened species (both flora and fauna) from PNCAZ, and that component is detailed in the "breaches" or illegal actions indicator in terms of: (1) hunting using prohibited methods or poaching prohibited species, (2) logging or (3) introduction of invasive species. It has to be noted that this work requires strict analysis by CIMA´s team, of the information provided by the rangers´ reports and sometimes it is hard to define what constitutes an infraction or not. The park rangers report every hunting event as a possible threat, however, as explained, subsistence hunting is indeed allowed and therefore only when the report mentions the word "illegal" or when a banned method is identified, it counts as an infraction. For logging, an infraction is counted, when recent extraction is identified (rests of a fallen tree for example, or trees left to take out). Finally, for invasive species, in this report, there was evidence of a coca plantation and we did count it as invasive species.
- In addition to the quantitative analysis done using the indicators mentioned before, all the available information provided by the research conducted during the verification period is considered for the management of the project area, as well as the information which comes

from the interaction with communities. As it is mentioned in the section B.1 of PIR, this information contributes to the improvement of the development of activities and the overall implementation of the project, including its monitoring system.

- Methodologies to estimate and monitor biodiversity were described in PDD (Section 5.2 Biodiversity Monitoring). Protocols to monitor wildlife were shared with SERNANP staff, the Director of the PNCAZ and park guards. The park rangers conduct the survey of wildlife information in the field, along its patrol routes from at least 18 control points.

As described in section 5.1.1, the project has had a net positive impact on biodiversity and no HCVs related to biodiversity have been negatively affected. Table 5.1 below presents the indicators defined in the PD section 5.2, which at the same time ensure that HCVs 1, 2 and 3 defined in the PD section 1.10.7 are maintained.

Table 5.1. Comparative quantitative results and rankings of indicators to monitor impact on biodiversity in the project area along the project

Parameter	Indicator	Project Phase/Time period							Ranking						
		Baseline 2008	Implem. 2008-2012	Implem. 2012-2014	Implem. 2015	Implem. 2016	Implem. 2017-2018	Implem. 2019-2020	2008	2008-2012	2012-2014	2015	2016	2017-2018	2019-2020
Natural vegetation cover	# ha conserved forest (canopy cover) in the Project area	99.9 % of primary forest (Intact Forest)	99.9 % of primary forest (Intact Forest)	99.96 % of primary forest (Intact Forest)	99.98 % of primary forest (Intact Forest)	99.98 % of primary forest (Intact Forest)	99.98 % of primary forest (Intact Forest)	>99% of primary forest (Intact Forest)	3	3	3	3	3	3	3
Presence of species locally threatened by hunting	# key spp. registered (average) by park guards in the project zone (monkeys, tapir, deer, spectacled bear, jaguar and curassow).	8 key spp. (Intact Forest, low hunting activities)	7 key spp. (Intact Forest, low hunting activities)	8 key spp. (Intact Forest, low hunting activities)	10 key spp (Intact Forest, low hunting activities)	10 key spp. (Intact Forest, low hunting activities)	10 key spp. (Intact Forest, low hunting activities)	10 key spp. (Intact Forest, low hunting activities)	4	4	4	4	4	4	4
Abundance of species locally threatened by hunting	# individuals by species (monkeys, tapirs, jaguar, deer and curassow) registered by parkguards	# individuals/ patrol: 8 (High Abundance)	# individuals/ patrol: 11 (High Abundance)	# individuals/ patrol: 15 (High Abundance)	# individuals/ patrol: 15 (High Abundance)	# individuals/ patrol: 13 (High Abundance)	# individuals/ patrol: 15 (High Abundance)	# individuals/ patrol: 15 (High Abundance)	2	3	4	4	4	4	4

Parameter	Indicator	Project Phase/Time period							Ranking						
		Baseline 2008	**Implem. 2008-2012**	**Implem. 2012-2014**	**Implem. 2015**	**Implem. 2016**	**Implem. 2017-2018**	**Implem. 2019-2020**	**2008**	**2008-2012**	**2012-2014**	**2015**	**2016**	**2017-2018**	**2019-2020**
Number of rules violated according to the protection status and zoning of the park	# unauthorized hunters, use of illegal hunting methods or hunting forbidden species	30 infractions by hunters or fishermen	15 infractions by hunters or fishermen	0	0	1	1 infraction by hunter	1	-3	-3	0	0	-1	-1	-1
	# unauthorized loggers, or selective extraction of timber species	39 infractions by loggers or invaders (Disturbed)	1 infraction by loggers or invaders (Slightly disturbed)	1 infraction by loggers or invaders (Slightly disturbed)	0	0	0	4	-3	-1	-1	0	0	0	-2
	# exotic animal or plant species introduced to the PNCAZ	3 infractions	0	0	0	0	0	0	-2	0	0	0	0	0	0
Index evolution									**1**	**6**	**10**	**11**	**10**	**10**	**8**

Natural forest restoration. Several areas inside the PNCAZ have been zoning as "recovery areas" and have been regenerating naturally. Areas under 1 ha recovered in less than 4 years, areas of 1-3.5 have taken to recover from 6 to 8 years, and larger areas take at least 10 years, in the case of the study conducted in the sector Tornillal (Figure 5.2, Vergaray et al. 2018). This can be considered both for medium-term planning (actuation of the Master plan every 5 years) and for the long term, in the update of the management plan where a new zoning could be proposed.

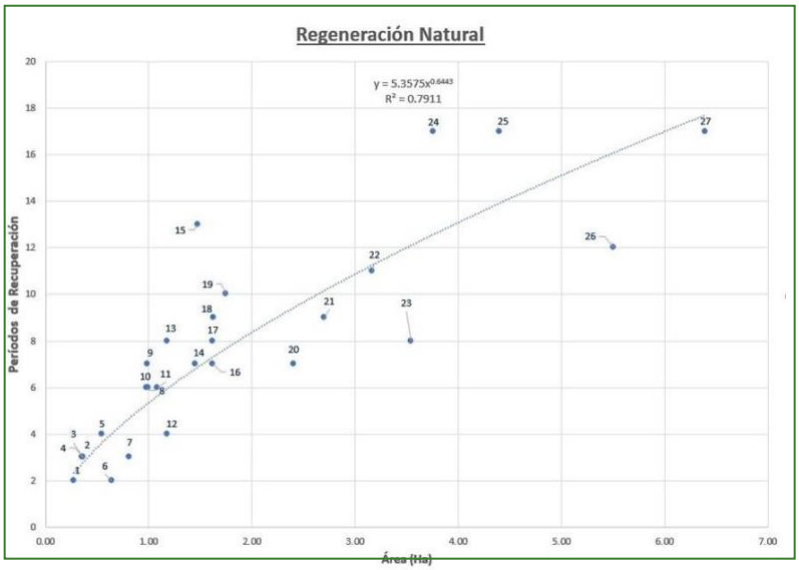


Figure 5.1 Rate of recovering time in different sizes of forest loss inside PNCAZ (Vergaray et al. 2018).

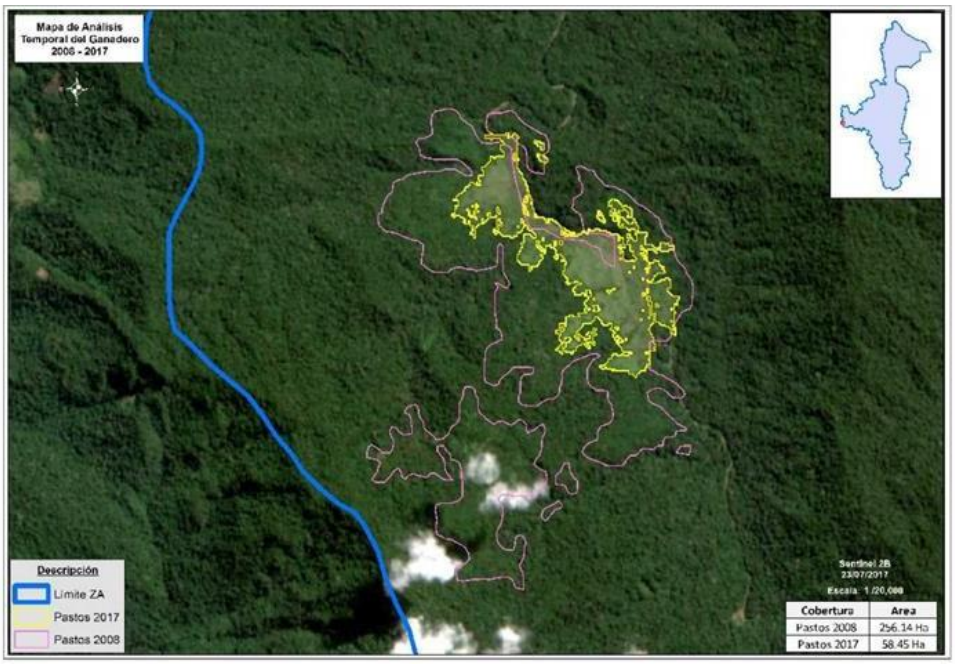


Figure 5.2 Map that represents the area of pastures in process of natural regeneration, since the maximum grassland expansion in 2006 – Pólvora sector

Presence and abundance of species locally threatened by hunting: During the years 2019 and 2020, the parkguards obtained data on the frequency (number of wildlife encountered, groups of individuals counted as one encounter) and abundance (number of individuals by species, for flocks or grouped individuals) during a total of 1088 patrols (more than 700 in 2019 and 317 in 2020[48]). Park guards focused on *key indicator species* defined as those sensitive to hunting:

- ☐ Big herbivores (02): Red deer/Venado rojo (*Mazama americana*), and Tapir/Sachavaca (*Tapirus terrestris*)
- ☐ Big endangered bird (01): Curasaw/Paujil común (*Mitu tuberosum*)
- ☐ Primates (11): Squirrel monky/Fraile (*Saimiri boliviensis*[49]), Red howler monkey/Aullador (*Allouatta seniculus*), Marañón white-fronted capuchin/Machín blanco (*Cebus yuracus*[50]), Machín negro (Sapajus macrocephalus[51]), Woolly monkey/Choro (*Lagothrix lagotricha poeppigii*), Saki monkey/Huapo negro (*Pithecia inusta*[52]), Illiger´s saddle-back tamarin/Pichico común (*Leontocebus illigeri*[53]), Moustached tamarin/Pichico barba blanca (*Saguinus mystax*), White- bellied pygmy marmoset/Leoncito (*Cebuella pygmaea*), Black spider monkey/Maquisapa (*Ateles chamek*), Titi monkey/Tocón colorado (*Callicebus discolor*[50])
- ☐ Big carnivores (04): Jaguar/Otorongo (*Panthera onca*), Cougar/Puma (*Puma concolor*), Spectacle bear/Oso anteojos (*Tremarctos ornatus*), Giant otter/Lobo de rio (Pteronura brasiliensis)

More than 2000 individual animals were registered from the species mentioned above. This is the raw data, and needs to be curated in order to calculate the indexes and indicators. Something else worth mentioning is that this information is possible thanks to the parkguards, who are the people who know the park the most and are the first line to gather information.

As it has been reported in previous occasions, CIMA has complementary methods, since some species that are not detected by the rangers. For example in the last quarter of 2020, a study was carried out by a group of primatologists on the south-western portion of the buffer zone, finding 6 different species of monkeys, which will serve as indicator for one of the activities carried out by CIMA in the buffer zone, including zero deforestation produce and ecological restoration. This diversity serves as an indication of the wildlife species that could be found inside the park.

Additionally, work with camera traps has also been done in Cordillera Azul and its buffer zone, which has allowed to capture species such as the yaguaroundi and the elusive mountain dog - for this elusiveness neither of both species were included as indicator species - but can be

[48] It is important to note that in 2020, due to COVID restrictions, ranger activity largely decreased for several months of the year.
[49] Previously: *Saimiri sciureus*
[50] Previously: *Cebus albifrons*
[51] Previously Cebus apella
[52] Previously: *Pithecia monachus*
[53] Previously: *Saguinus fuscicollis*

registered by the camera-traps installed along trails (i.e. in areas that can be used as shelter(i.e. hollows and burrows in the ground) around some control posts (Alvarez y Pequeño 2017) where they can show the presence and relative abundance of large mammals and birds that inhabit the Park (Alvarez *et al.* 2014). Also in this line, in the framework of other activities carried out by CIMA, other experiments with camera-traps have been performed in the buffer zone, which have allowed to register small monkeys and anteaters. This monitoring is part of an ecological restoration project, and also serves as an indication of the wildlife resident in the park.

Also, the work done with river turtles (*Podocnemis unifilis*), known as "taricaya," is a further example of the success of resource management in the project area where population conditions of these turtles has enhanced[54]. On the Cushabatay and Pauya Rivers, where CIMA has worked in the buffer zone the sensitization on the use of resources and repopulation with taricayas, it was possible to observe individuals sunning themselves and a good amount of wildlife fauna. This was evidenced during the ocular field verification work done by SERFOR (ARA-GOREL/SERFOR 2018), the Loreto Regional Government (GOREL), carried out as part of the proposal for Concession for conservation Pauya Cushabatay area (previously proposed to PNCAZ expansion), as a strategy to conserve this important and threatened area in the ZA; currently this area is being proposed as a Priority Ecosystem for Conservation in Loreto, by GOREL (Table 5.3).

Table 5.3. River turtles (Podocnemis unifilis) observed during the ocular field verification work done by SERFOR (ARA-GOREL/SERFOR 2018) at Pauya - Cushabatay rivers

Pt	***Este***	***Norte***	***Altitud***	***Descripción***
6	427454	9190021	168 msnm	Se observaron varios individuos de la especie *Podocnemis unifilis* "Taricaya" en el curso del rio Pauya.

Source: Ficha de Verificación de Ecosistemas Priorizados para la Conservación de la Biodiversidad, marzo 2018 (ARA-GOREL / SERFOR 2018)

[54] During early assessments, people were found to enter unpatrolled rivers to take taricaya eggs from nests on beaches, and even egg-laying females, which caused a strong negative impact on turtle population.

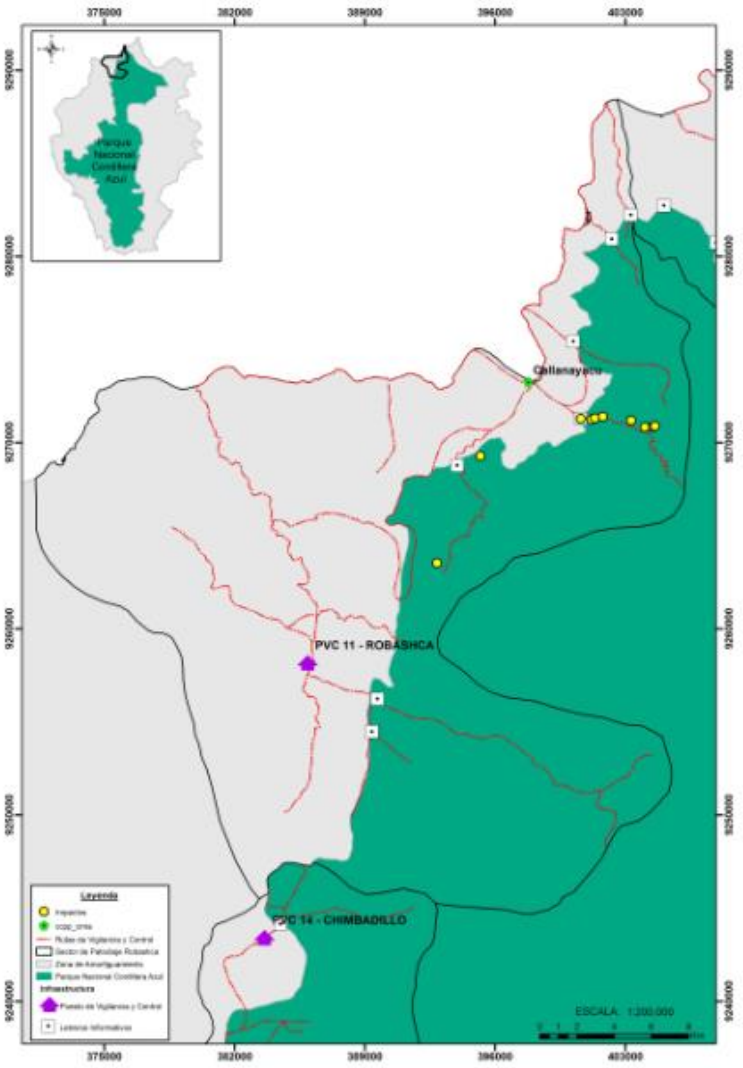
CIMA technicians and park guards work hard to raise awareness about the impact of unsustainable extractive activities and provide training on the use of artificial nests with collected eggs on river beaches. This activity has resulted in a recovery of taricaya population without prohibiting egg collection by local residents for family consumption. Furthermore, the turtle known as “charapa” (*Podocnemis expansa*), thought to be locally extinct for quite some time, was seen in the area.

Violations of rules of use or other infractions: The park guards looked for signs of activities within the park and buffer zone that were inconsistent with the approved uses as defined in the law creating PNCAZ. Park guards recorded information about possible threats or infractions committed in the park on their monthly reports.

In the project zone the following infractions were registered by the park guards:

Period	Infraction type	Qty
Aug2018-Dec2018	Illegal logging: fallen tree	1
Jan2019-Dec-2019	Illegal logging: fallen tree	3
Jan2020-Dec2020	Hunt: poachers	1
	Total	**5**

The illegal logging events were reported by the parkguards as either fallen trees ready to be pulled out of the forest or stumps found in the forest. A more detailed analysis showed that these events were registered in December 2018, April 2019 and August 2019 in the Robashca sector and close between each other, even along a same road (see image below). By the end of 2018, a climatic event flooded the Robashca post, precluding its further use. This caused the rangers to move and spend more time in the town of Callanayacu, further away from the park, reducing their presence. Brunner et al. (2001) have shown the correlation between park effectiveness and presence of park-guards. Thus, the simple presence of park guards is a deterrent against threats such as illegal activities, i.e. illegal logging. Robashca´s guards reduced presence might be an example of this and explains the logging events.



- In 2020, one hunting event was reported, which included the participation of the Ronda Campesina from Las Palmas. An actual intervention was possible and a group of six poachers was identified, reprehended and warned against committing a crime penalized by law for not having registered themselves. It has to be noted that hunting and fishing for self-consumption is admitted as a way to ensure the food security of nearby populations. For these reasons the parkguards report each event when they find tracks and abandoned camp sites, but these normally correspond to registered users. Brunner et al. (2001) also measured deterrents "as the product of the probability of apprehending violators when guards detected a violation". The incident of the Ronda Campesina is an example.

  In the Project area - around PNCAZ - there are numerous drivers of deforestation, mainly livestock and shifting agriculture (including lands traffic); however, in recent years the illegal activities such as drug trafficking has returned to proliferate in the forest. Nevertheless, during 2019 and 2020, a total of 13.17 ha of anthropogenic deforestation were detected by CIMA.

During the previous period, the exit of the livestock from the sector called “ganadero Suarez” was concluded successfully and this order has been maintained since. Yet 33.3 hectares remain to be naturally restored.

It is important mentioning that during the third quarter of 2020, an illegal event was detected near the control post Shanshuico in the Tarapoto sector. This resulted in a quick response by CIMA. Dissuasive posters were printed and taken to the field and also informative events were placed in the community Flor de Café. Additionally, a prosecutor was taken to the place where the event occurred to confirm the anthropogenic disturbance and place a demand in the Environmental Prosecution Office (FEMA in Spanish). Below, one of the dissuasive posters and one picture of the informative event in Flor de Café.

1 Dissuasive poster placed in the Shanshuico control post

2 Informative event responding to illegal deforestation event in the community Flor de Café

The complete documentation to solve a case is attached (Appendix G3.10) and described as follows:

The attached documents correspond to the process of a deforestation case in the PNCAZ Buffer Zone that constitutes environmental crimes. All cases of deforestation are categorized as environmental crimes under Decree-Law 635, art 310, with the difference that those located within the Park include aggravated crimes punishable by actual imprisonment. At the same time, all deforestation cases in the ZA are infractions of the Forestry and Wildlife Law - Law 29763.
In this case, attached are the documents corresponding to the deforestation that occurred on November 9, 2020, in the Bajo Chambira Sector - buffer zone of the PNCAZ, in the Ipururo Surveillance and Control Post (PVC 17). The documents make up the Fiscal Folder 078-2021 that was initially in charge of the Provincial Prosecutor's Office Specialized in Environment (FEMA) Nauta but was later transferred to the FEMA Moyobamba with the number of Fiscal Folder 240-2021. The Map of the PNCAZ Surveillance and Control Posts is also attached in order to locate the place where the case in question was recorded.
The sequence and explanation of the papers are as follows:
1. Technical Report and Record of Findings GP N°01-2020-PVC 17-IPURURO: The park rangers of PCV 17 Ipururo post prepare the technical report on the deforestation case found within their patrol route. The report identifies the location, description of the site, and the results. Attached in the annexes are a field report, photos, and a sketch of the affected area.
2. Technical Report November 2020-PVC 17-IPURURO: The monthly report of the park rangers describes the patrols carried out during the month and identifies and describes the cases of deforestation found. The deforestation case that we are following is registered in Annex 01: Patrolling Report in this report.
3. Official Report Nº 056-2021-SERNANP-Deforestation ZA PNCAZ-Sector Bajo Chambira-Ipururo: The PNCAZ Surveillance and Control Specialist, Eder Murrieta, prepares the Official Report addressed to the Provincial Prosecutor of the Provincial Prosecutor's Office Specialized in Environment (FEMA) of Loreto. The Official Report denounces the illegal deforestation case in the PNCAZ's ZA and requests an inspection or fiscal verification in the Bajo Chambira Sector. To complete this report, CIMA's GIS specialists prepare a map of the location of the deforestation area (attached in Annex 1) and verify the site based on GPS coordinates. The Official Report is

finally reviewed and signed by the Park Chief and sent to the Prosecutor's Office to open the Prosecutor's Folder for the case.
4. FISCAL DECISION 01-2021 (78-2021): Response letter from the Public Prosecutor's Office, from the Environmental Specialized Provincial Prosecutor's Office (FEMA) of Loreto, regarding the Official Report. It is approved to initiate the fiscal inspection diligence in the affected area.
5. Minutes of Fiscal Verification_Caserío Tahiti_21.10.2021: Prosecutor conducts the field inspection with park rangers and SERNANP personnel. Subsequently, the Prosecutor issues the field inspection report and, with this document, completes the Prosecutor's Folder of the case to file a complaint with the Public Prosecutor's Office.
6. PNCAZ Case_Inventory 2021_17-12-2021: The lawyer hired by CIMA to provide legal advice to the PNCAZ elaborates the Excel list of deforestation cases organized by each FEMA. This document is updated until December 2021, and is usually updated every 15 days. It presents all deforestation cases which constitute environmental crimes.

A final point worth mentioning is that the last wildlife course for parkguards was carried out in the previous reporting period (August 2017 and March 2018), in which, techniques to calibrate an install camera-traps to take pictures of animals in natural conditions were imparted. Due to the COVID pandemic, such an activity was not possible to be performed in 2020, nor a workshop to accompany parkguards to calibrate the data entry in the field.

5.3.3 Monitoring Plan and Results Dissemination (B3.3)

The monitoring plan developed during the preparation of the PD has remained unchanged in its essence (PD section 5.2 – CCB B3.1), but it was gradually fitted with input from the specialists of the General Directorate of Natural Protected Areas from SERNANP. Likewise, more specific information on the diversity of the PNCAZ's fauna based on biological monitoring and other investigations was sent to the DGANP - SERNANP specialists in order to enrich the list of species of the National System of Natural Protected Areas (SINANPE).

The monitoring results and procedures have been disseminated to communities and other stakeholders in the same documents as the Community Monitoring Results Dissemination (section 4.3.3). This follows the PD section 7.1.3. We have included the PIR (in Spanish) for the current period and we prepared letters that were sent to different stakeholders including regional governments, municipalities and some organisations. These letters were meant to inform about the ongoing verification process and to indicate where further information is to be find and who in CIMA to contact for any concern. The reception charges of these letters have been attached to our supporting documents.

It also has to be emphasized that the MUF process, which did not take place in 2020 due to Covid pandemic, means the loss of a very important space where the results dissemination is done at its best. Yet, all field technicians maintain good relationships with the communities they work with and they also reinforce the relationship between the park´s conservation and the activities implemented in a non-structured way.

Finally, as mentioned in section 4.3.3 the new REDD+ section in CIMA´s institutional website, will be constantly updated in order to present the results in the clearest way. The link to this section is the following: https://www.cima.org.pe/es/parque-nacional-cordillera-azul/proyecto-redd-cordillera-azul-project.

On a more academic level, CIMA has taken part in different platforms and technical groups meetings during 2018 and 2020. Some examples include:

Workshops and scientific platforms:

- CIMA has participated as a member of the *Ad Hoc* Group for the preparation of the VI National Report to the CBD, contributing during the "Presentation of sections 1, 2 and 3 of VI National Report on the application of the Convention on Biological Diversity", at the Ministry of the Environment. CIMA, en su calidad de miembro de la **Coordinadora Nacional de la Red Ambiental Peruana (RAP)** continúa participando activamente en sus reuniones de coordinación y otros espacios institucionales, entre ellos cabe indicar que como representante de la RAP participa en el Comisión Nacional de Cambio Climático.
- First National Symposium on Forest Ecosystem Restoration with a Landscape Approach, held by SERFOR on November (2018). CIMA participated by presenting the progress of the Scalable Ecological Landscape Restoration Strategies Project: Models in San Martín, Peru, buffer zone of the Cordillera Azul National Park, in the Governance and Participation section.
- As a member of the Peruvian Committee of the IUCN, CIMA has actively supported SERNANP, for the organization of the **National Congress of Scientific Research in Natural Protected Areas** (26-28 Sept. 2018). CIMA participated with two posters and one oral presentation:
    - Applicability of different methodologies for evaluating wildlife conservation in Cordillera Azul NP.
    - Monitoring restoration in recovery zones of PN Cordillera Azul
    - Unexpected benefits from a management contract: integrating knowledge in land-use planning & building adaptive capacities in socio-ecological systems

- CIMA participated in the IUCN Regional Workshop on the Green List of Protected and Conserved Areas, held in Bogotá. This event was developed successfully, with participants from Chile, Colombia, Costa Rica, Mexico. The delegation of Peru was attended by representatives of SERNANP, the ANP Cordillera Azul, Amarakaeri, Abiseo and members of the EAGL. Important inputs, lessons learned and recommendations were obtained that will facilitate the application of the Green List standard as a management tool in new protected natural spaces belonging to these Latin American countries.
- CIMA is part of the Consultative Committee of the Forest Investment Program (FIP - Forest Investment Program), which manages four projects financed by the Inter-American Development Bank (IDB) and the World Bank (WB). In June, they participated in an extraordinary session of this space, carried out virtually, in order to know the status of the program during the COVID 19 pandemic.
- CIMA, as part of the San Martín Regional Environmental Commission, took part in a presentation on the San Martín forest zoning. At this meeting, shared interest of GORESAM, SERFOR and CIMA in the joint implementation of Forest Zoning was perceived. This resulted in a new MOU with the Regional Government of San Martin to implement regional instruments (regional

strategies on biodiversity, climate change, rural development low in emissions and the forestry zoning) in the buffer zone of the Park.

- At the end of June 2020, the event "Green List, a future beyond 2020: Sharing experiences in Latin America and the Caribbean" took place. In this space, different regional experiences could be learned.
- CIMA took part in a scientific forum organized by the group GEAS, for its acronym in Spanish “Group of environmental and social studies” from the Catholic University in Lima (PUCP). In this event, the partial results of CIMA´s research project with the University of Sussex, were presented. This topic dealt about deforestation drivers in San Martin, analysis of value chains of certain products (coffee and cacao) and its alignment with the SDGs.
- CIMA's Institutional Development Director participated in the discussion “What do we want and what do we expect from the 2020-2030 Protected Areas Director Plan?” The questions that guided this discussion were

  How to incorporate strategic foresight into the Director Plan, which means having a vision for 2050 and framed in global challenges and commitments? What should we prioritize in the Protected Area System to achieve changes in the next 10 years? Are we willing that to achieve a vision for 2050 and long-term objectives we must activate legislative and / or institutional changes when required?

  CIMA took part in the III Congress of Protected Areas of Latin America and the Caribbean - III CAPLAC (Oct 2019) in various events:

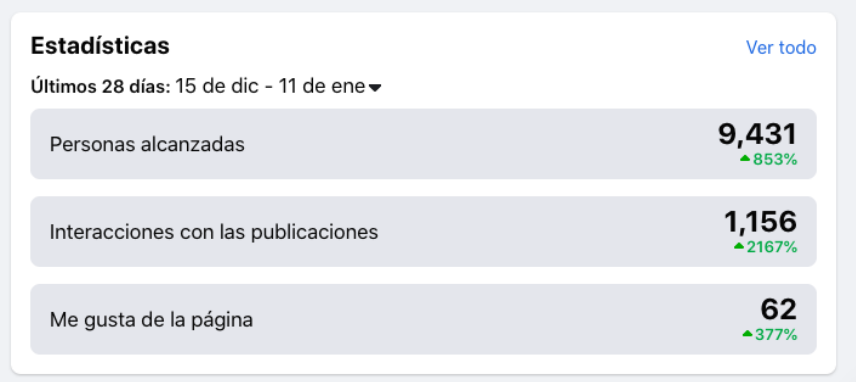
  Symposium: Institutional adjustments for the adaptive management of protected area systems in Latin America in the face of climate change, with the presentation Cordillera Azul National Park: Main impacts in 10 years of REDD+ Project.

Side event: The Incubator for the Conservation of Nature (Annex 7.7), where CIMA presented the experience of PNCAZ, entitled “Towards financial sustainability in the Cordillera Azul National Park (PNCAZ)”.

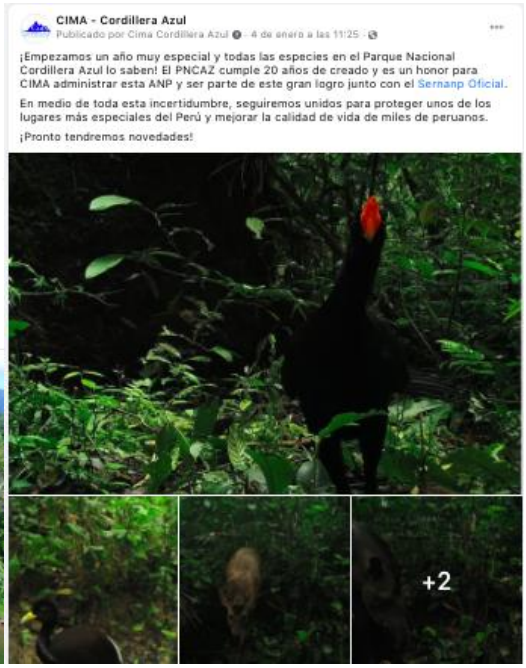
News (social networks SERNANP and others):

CIMA has a Facebook *fanpage* were the activity is spread. Some examples of notes are:

- https://www.cima.org.pe/es/noticias/recuperando-y-conectando-areas-degradadas-favorecemos-la-conservacion-de-especies-de-fauna-silvestre
- https://www.cima.org.pe/es/noticias/evaluando-las-oportunidades-de-restauracion-a-escala-de-paisaje-en-san-martin
- https://www.facebook.com/notes/cima-cordillera-azul/el-valle-del-aspuzana-celebra-el-5-de-junio-arborizando-orillas-de-la-quebrada-m/1318807418295489/
- https://www.facebook.com/notes/cima-cordillera-azul/impulsando-la-escalabilidad-de-la-restauracion-ecologica-del-paisaje-en-el-valle/1301483166694581/
- https://www.cima.org.pe/es/noticias/foro-en-restauracion-de-ecosistemas-forestales
- https://www.cima.org.pe/es/noticias/el-parque-nacional-cordillera-azul-crece-en-altura
- https://www.cima.org.pe/es/noticias/pobladores-de-lejia-y-san-juan-reintroducieron-y-enriquecieron-con-especies-forestales-sus-areas-de-restauracion
- Towards the last quarter of 2020, CIMA started to give a boost to its social networks, achieving positive results:



- Work has begun on pieces for job opportunities and the jobs at each of the locations are also being shown more clearly. What has been very well received by the people who come to our Facebook page.



Likewise, CIMA has now Instagram and Twitter accounts.

The web Panorama Solutions has also referenced CIMA´s work:

- https://panorama.solutions/en/node/5148

Besides, Andina, a news chain, launched a note about Dakar Rally 2019, which bought 5000 tCO_2 for compensation through Cordillera Azul´s REDD+ Project:

- https://andina.pe/agencia/noticia-dakar-2019-sera-carbono-neutral-proyecto-redd-parque-nacional-cordillera-azul-737739.aspx
- CIMA also regularly sends notes to IUCN´s newsletter. The following link is June´s 2020 note: https://civicrm.iucn.org/civicrm/mailing/view?reset=1&id=1919

6. Additional Project Implementation Information

Not applicable to this project

7.Additional Project Impact Information: Exceptional Biodiversity Benefits

The PNCAZ REDD+ Project has the CCB Gold Level for Biodiversity, so we believe it is pertinent to highlight these project qualities in this section.

Along 2018, 2019 and 2020, research that initiated in previous year was continued, and also new projects started or were planned. Some of them should be postponed until further notice due to international COVID restrictions and for health reasons. For example, an ornithology expedition from Louisiana State University and its Peruvian partner CORBIDI was planned for mid-2020. There were also coordinations for an herpethology expedition along an altitudinal gradient with a PhD researcher from the Aleander König Museum of the University of Bonn.

Regarding previous research and actualization about biodiversity information, the new fish species that was mentioned in the previous report is still in description (Max Hidalgo, ichthyologist, pers.comm.) and the actualization of the important species considered by the project both at the end of 2019 and 2020, confirmed that to the date, there are no Critically Endangered species inhabiting Cordillera Azul, which is a good indicator of the park´s health. Finally regarding new species described for science, we can mention three plant species that once again represent only a sample of the still-to-be discovered biodiversity in the PNCAZ.

The PNCAZ counts with Endangered (EN), Near Threatened (NT) and Vulnerable species (VU), and likewise a surprising biodiversity, according to the IUCN Checklist of species[55].

Endangered (EN) species: presence of at least a single individual

Potential negative impact	There is no negative impact derived from the Project for these Endangered (EN) species, listed in Appendix 2 of this document. On the contrary, this project prevents any event that might affect them. The only species that could be affected are those that are allowed to be hunted (i.e. peccaries, deer, big and medium rodents, some guans); as already mentioned in the PD this is traditional and subsistence hunting.

[55] Appendix 2 is a table of the endangered, and threatened species within the project zone, as classified by the IUCN Red List, and the Peruvian Red Book of threatened fauna, published in August 2018. For this part of this document though, only the IUCN category is considered.

Species or individuals affected	• Amphibia: *Atelopus andinus* • Amphibia: *Ameerega cainarachi* • Bird: *Heliangelus regalis* • Mammal *Ateles chamek* • *Ateles belzebuth* • *Lagothtix (lagothricha) poeppigii* • *Pteronura brasiliensis* None of the mentioned species is affected. These species are protected legally and effectively within the PNCAZ thanks to the parkguards patrols. They are species whose permanence and the health of their populations depend directly on the conservation of the forest as their habitat.
Impact aversion and mitigation	Parkguards conduct continuous surveillance actions to ensure the compliance of the wildlife use rules in the park. Monitoring reports are made with the hunting data provided by parkguards, in order to ensure that no endangered species is hunted.

Vulnerable species (VU): presence of at least 30 individuals or 10 pairs.

Potential negative impact	There is no negative impact derived from the Project for these Vulnerable species (VU), listed in Appendix 2. On the contrary, this project prevents any event that might affect them.
Species or individuals affected	• Amphibia: *Atelopus pulcher* • Reptilia: *Podocnemis unifilis* • *Podocnemis sextuberculata* • *Chelonoidis denticulata* • Birds: *Ara militaris* • *Primolius couloni,* • *Touit huetii* • *Touit strictopterus* • *Capito wallacei* • Mammal: *Myrmecophaga tridactyla* • *Priodontes maximus* • *Calimico goeldii* • *Cacajao calvus*

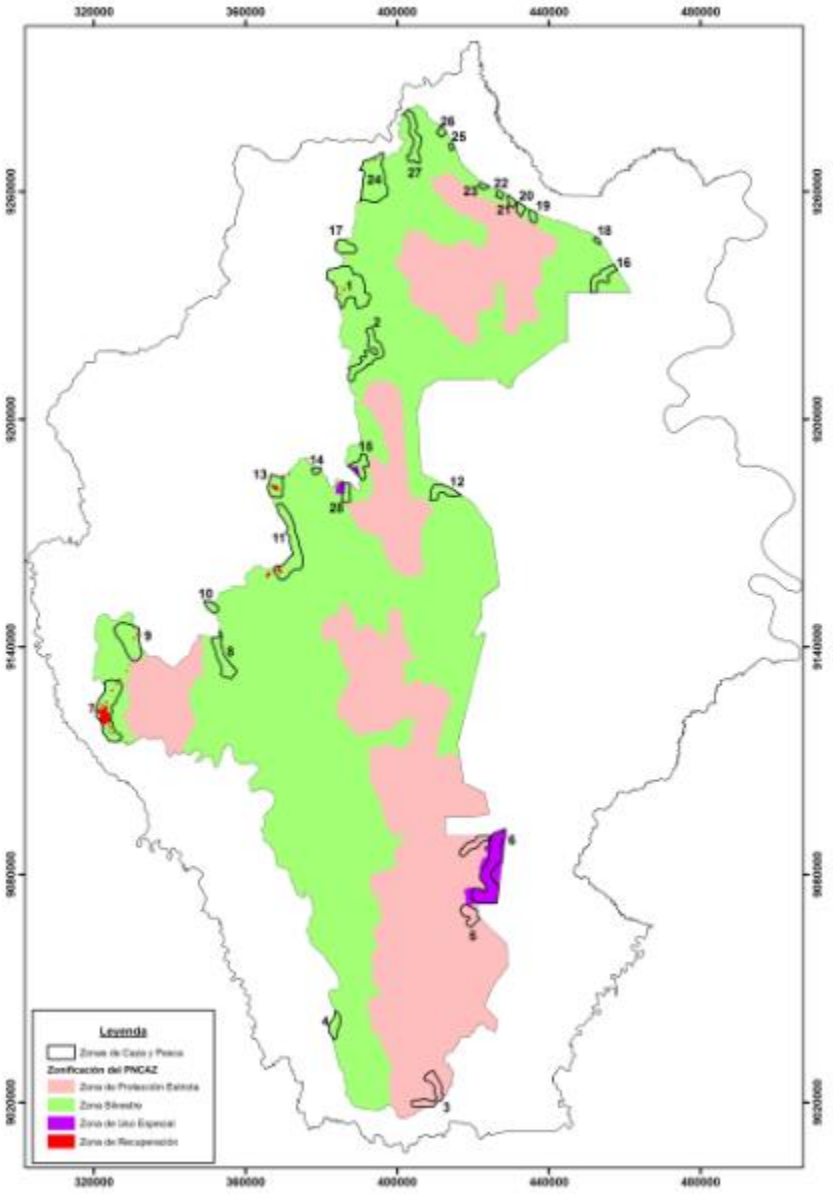
	• *Cebuella pygmaea* • *Tremarctos ornatus* • *Tapirus terrestris* • *Tayassu pecari* None of the mentioned species is affected. These species are protected legally and effectively within the PNCAZ thanks to the parkguards patrols.
Impact aversion and mitigation	Parkguards conduct continuous surveillance actions to ensure the compliance of the wildlife use rules in the park. Monitoring reports are made with the hunting data provided by parkguards, in order to ensure that no endangered species is being hunted. Only subsistence hunting is allowed.

Near threatened species (NT)

Potential negative impact	There is no negative impact derived from the Project for the Near threatened species (VU), listed in Appendix 2. On the contrary, this project prevents any event that might affect them.
Species or individuals affected	• Birds: *Harpia harpyja* • *Morphnus guianensis* • *Spizaetus ornatus* • *Aburria aburri* • *Amazona festiva* • *Amazona farinosa* • *Pyrilia barrabandi* • *Hemitriccus rufigularis* • *Myrmoderus eowilsoni* • *Henicorina leucoptera* • Mammal: *Speothos venaticus* • *Atelocynus microtis* • *Lontra longicaudis* • *Panthera onca* • *Cebus yuracus* None of the mentioned species is affected.

Impact aversion and mitigation	Parkguards conduct continuous surveillance actions to ensure the compliance of the wildlife use rules in the park. Monitoring reports are made with the hunting data provided by parkguards.

It should be noted that the hunting areas within the park cover 68,934 ha, which accounts for 5.09%, located in the Wilderness Zone, Recovery Zone and Special Use Zone. These areas had been used traditionally since before the creation of the ANP (MUF 2003). The image below and its accompanying table show their location and area. Note that these calculations are estimated and they are crosschecked with the guards´ reports.



#	Area (Ha)
1	7,619
2	3,755
3	2,756
4	1,370
5	1,673
6	8,884
7	6,182
8	2,885
9	4,507
10	716
11	5,769
12	1,759
13	2,000
14	330
15	1,665
16	1,972
17	1,549
18	205
19	531
20	536
21	421
22	286
23	290
24	6,687
25	188
26	398
27	2,904
28	1,098
Total	**68,934**

When a hunter enters the park, the parkguards register their origin, and when the hunters leave, parkguards record the prey species and ammount, the sector of hunting and the time they stayed inside. So, parkguards ensure that hunting and fishing regulations within the park are complied with.

Hunting and fishing is part of the benefits that neighboring residents receive from the Park, as an additional protein supply.

- *Project Zone includes an extensive area of high biodiversity conservation priority*

The success of the project's activities in producing net positive impacts on biodiversity means that project activities have also protected the endemic and endangered species in the project area, fulfilling the criteria of protection to vulnerable and irreplaceable species. In fact, the park was recognized by SERNANP as the protected area that exhibits the best species conservation rate in the national protected area system.

As described earlier in the PIR, the project offers remarkable opportunities for protection of large numbers of endemic and rare species in all groups of organisms that were sampled in the Rapid Inventory and others: vascular plants, fishes, amphibians and reptiles, birds, and large mammals. The project zone also harbors many range-restricted species and unique assemblages of species.

Table 5.7. Numbers of species observed, regional species estimations and species new to science in the project zone

Taxa	No. species from Rapid Inventory (2001)	Total species observed	Estimated for the Region	New to Science since 2000	
		To 2012		Estimated	Described
Plants	1600	> 1600	6000	>12	3
Fishes	84	176	200	> 17 + 1 (2016)	4
Amphibians	58	71	210	11 +1 (2017)	1
Reptiles	26	59		4	2
Birds	575	617	800	1 + 2 (2017, 2018)	3
Mammals	71	91	120	1	0

The PNCAZ has one of the most successful biodiversity conservation initiatives in Peru. It has qualified as the protected area that exhibits the best conservation rate in the national system of protected areas (SINANPE), and with the least amount of socio-environmental conflicts due the participatory and peaceful structure of work with local populations adjacent to the area. These same populations benefit from the variety and abundance of natural resources provided by the park. This recognition of the benefits of conservation of nature by local people living in the buffer zone is one of the principal reasons why they take care of the park, not only elements used to ensure food security, but the whole forest and biological diversity within the park.

Plants - At least 12 species of plants new to science were recorded during the Rapid Inventory along with several new records for Peru and hundreds more that were range extensions. A list of all plant species identified during the inventory is included in Alverson *et al.* 2001. Rapid Inventory scientists also found plants with unusual biological features or behaviors, including more than 20 species that have obligate mutualism with ants. At least five tree species, all in the genus *Tachigali*, show evidence of monocarpy (*i.e.* flowering only once in their life, then dispersing seed and dying). Large, commercially valuable species— such as mahogany (*Swietenia macrophylla*) and tropical cedars (*Cedrela odorata, Cedrela fissilis*)—are now very rare and have nearly vanished from riparian and river floodplain areas due to selective harvesting elsewhere in the tropics.

In 2020, and as part of the Project "MonanPERU: establishment of RAINFOR plots and botanical collections", which established six RAINFOR permanent plots inside the Park in 2018-2019, carried out by IIAP and the NGO Missouri Botanical Garden, two new species of small trees were published: *Lissocarpa bracki* (Ebenaceae) – zone: Chambirillo, and *Drypetes azulensis* (Putranjivaceae) - zone Mishquillaquillo. In the two papers where the species are described (citation in section 5), identification keys were also published.

A palm species was also described during 2020, however the publication dates from 2021. The species is *Ceroylon ravenii* and so far only one population has been recorded higher than 1200 m.a.s.l.in the wilderness area of the PNCAZ.

Large Mammals - The fauna of PNCAZ includes several endemic and rare mammals. Of the 71 species registered in 2000, 12 are of international concern because of their global rarity—three species of monkeys—Spider monkey (*Ateles belzebuth*), Woolly monkey (*Lagothrix lagothricha poepiigii*), and Saki monkey (*Pithecia inusta*)—and nine other mammals are listed in CITES: Spectacled bears (*Tremarctos ornatus*), Neotropical otters (*Lontra longicaudis*), Giant river otters (*Pteronura brasiliensis*), Tapirs (*Tapirus terrestris*), White-lipped peccaries (*Tayassu pecari*), Jaguars (*Panthera onca*), Bush dogs (*Speothos venaticus*), Giant anteaters (*Myrmecophaga tridactyla*), and Giant armadillos (*Priodontes maximus*). The inventory team also found a likely new species of squirrel (*Microsciurus* "oscura"). Two species, the water opossum (*Chironectes minimus*) and the short-eared dog (*Atelocynus microtis*) are rare.

In 2020, a primate study was performed in the south-western part of the Park´s buffer zone, in the Aspuzana valley. This study confirmed the presence of 9 monkey species, including *Pithecia inusta* (saki monkey) and *Plecturocebus discolor* (titi monkey), both in a disturbed mix of secondary forests and crops. These findings are of great importance because, they testify of the abundant diversity that inhabits the park and even show up in zones with relatively low anthropogenic impact. Also, this is the area where CIMA is developing a landscape model with zero deforestation, providing technical assistance to agroforestry cacao crops and ecological restoration. It is expected that monkey species will be an indicators of restoration´s success.

Birds - The park's stunted forests seem to be the center of distribution of three endemic, very poorly known species of birds: (1) Scarlet-banded Barbet (*Capito wallacei*) (O'Neill et al. 2000), (2) Bar-winged Wood- Wren (*Henicorhina leucoptera*) and (3) Royal Sunangel (*Heliangelus regalis*). During 2017 and 2018, ornithologist describe new species of birds:

The Striped Manakin (***Machaeropterus eckelberryi)*** is part of the species complex of the bird known as the Striped Ptarmigan (*Machaeropterus regulus*), from the foothills of hills and mountains in

southwest Loreto to San Martín (Peru). It is almost identical to the one that inhabits the Tepui, but with a great difference in the voice, which is a very important characteristic to differentiate birds. This species is likely to be endemic (spatially restricted) to the buttresses of the north-central Peruvian Andes, at elevations between 400-1400 m.s.m., particularly where there are humid forests of short stature on poor and sandy soils; just as are the mountain ridges characteristic of the Cordillera Azul (Lane et al. 2017).

The Cordillera Azul Antbird (*Myrmoderus eowilsoni)*, was discovered at a place called "Plataforma", and is known to live in humid montane forests of the buffer zone of the park (beween 1340 – 1670 m), very likely also present inside the Park. It could be distinguished as a new species thanks to its characteristic whistled call and the help of digital sequence information (Moncrieff et al 2018). This represents a new genus for Peru, because its congener species are distributed only Brazil and Guyanas.

The park also protects large populations of big gamebirds that are threatened by hunting throughout their range: the Spix's Guan (*Penelope jacquacu*), Blue-throated Piping-Guan (*Pipile cumanensis*), Wattled Guan (*Aburria aburri*), and importantly, the Razor-billed Curassow (*Crax tuberosa*), which is particularly vulnerable to local extinctions.

Reptiles and Amphibians - In terms of reptiles and amphibians, the park protects the habitat of a rare salamander (*Bolitoglossa sp.*), and several species of endemic, new, or geographically restricted frogs in the genera *Pristimantis (Eleutherodactylus in RBI)* and *Ameerega* (*Epipedobates* in the inventory report).

In 2020 another salamander *Bolitoglossa awajun* was described also form Cordillera Azul (Cusi et al. 2020), being the fourth endemic species to Peru.

It is worth noting that he *Atelopus pulcher,* a species previously considered by the IUCN as Critically Endangered (CR), currently is categorized only as Endangered (EN). This species has a restricted range in the Andean foothills of Amazonian slope of the eastern Andes of northern Peru in the regions of Amazonas and San Martin. So far, little is known about the natural history of *A. pulcher* and there are records of his disappearance in some localities of San Martín (Lotters *et al*. 2005). One of the main causes of the decline of amphibians in the Neotropical region is chytridiomycosis, caused by the fungus *Batrachochytrium dendrobatidis*, linked primarily to the rapid disappearance of many species of *Atelopus* (La Marca *et al.* 2005). Chytridiomycosis is often the only explanation for the disappearance of *Atelopus* frogs in pristine places like national parks, where habitat destruction, pollution and overfishing are not possible (La Marca *et al*. 2005); in contrast, the road between Tingo Maria and Tarapoto has been identified as one of the most critical to the survival of these genus of amphibians in terms of loss of habitat (Catenazzi and Von May 2014).

Between 2010 and 2012 CORBIDI conducted a herpetological inventory in the area, finding three new species to science, two new species of woodlizards, genus *Enyailioides*, (Venegas et al. 2013), so far these are the only places where the distribution of these species is known. It is not possible to show these species in any category of IUCN since its discovery is very recent and have not yet been evaluated.

Chelonoidis carbonaria, turtle from the Huallaga Dry forests, at risk of extinction

Scinax sp. nov. frog from the Huallaga Dry forests, new to science

In the buffer zone of PNCAZ, the dry forests of Huallaga valley harbor endemic species. In the assessment conducted by biologists from the Instituto de Investigación de la Amazonía Peruana (IIAP), were recorded 41 species of amphibians, 21 species of reptiles; a remarkable record is Chelonoidis carbonaria, terrestrial turtle at risk of extinction; also they have been collected three species of amphibians from the genus Chiasmocleis, Phyllomeduusa and Scinax, and two lizards from the genus Stenocercus and Morunasaurus, probably new to science (Mejia and Gagliardi 2015) A remarkable discovery was the Beacked Toad Rhinella lilyrodriguezae in honor of one of CIMA´s founders, Dr Lily Rodriguez. This frog lives in the montane forests of the Cordillera Azul National Park between 1,245 and 1,280 m.a.s.l. in the Cordillera Oriental, San Martín, is currently known only from the Shapaja sector. This new species was founded at the border of the Park, in the Mysteriosus river basin, this beacked toad was also noticed to be new to science and described after analyzing morphological and DNA information (Cusi et al. 2017).

Similar to the case with LSU and CORBIDI regarding an ornithological expedition, a herpetology study was being coordinated for mid-2020 with one PhD student affiliated to the Alexander König Museum / Rheinische Friedrich-Wilhelms-Universität Bonn. CIMA had continuous communication with the PhD researcher in early 2020, shared maps and even co-designed possible access routes. This study was intended to be carried out along one or perhaps even two altitudinal gradients. Currently the study in on hold, but the latest communications with the researcher still demonstrate high interest in being able to complete this trip.

Fishes - Streams and rivers draining the park contain unique species assemblages of fishes, particularly in headwater areas (Weber and Montoya-Burgos 2002, Reis *et al.* 2003, Rengifo *et al.* 2007 and Lujan *et al.* 2010). In the 2000 inventory, scientists recorded 22 new species for Peru and ten probably new to science. Some examples are *Hipostomus fonchii*, a new species recorded during the RBI, restricted to Cushabatay River, *Tahuantinsuyoa macantzatza* restricted to Aguaytia basin and its tributaries, *Crossoloricaria Pisqui* (Alverson *et al*. 2001), and the new species of Giant Carachama, the great *Panaque schaeferi* (Lujan, et al. 2010).

Fishes in headwater areas are adapted to life in shallow, fast-flowing water. Aquatic habitats in the park also provide spawning areas for migratory species, including large species consumed by riparian human communities: *Colossoma macropomum* (gamitana), *Piaractus brachypomus* (paco), *Prochilodus nigricans* (boquichico), *Brycon cephalus* (sábalo cola roja), *Brycon melanopterum* (sábalo cola negra), *Salminus affinis* (sábalo macho), *Pseudoplatystoma punctifer* (doncella), *Zungaro* (zúngaro), large Loriicarids (carachamas), and *Potamotrygon spp.* (rays), among others.

Since 2015, CIMA was informed about a fish that inhabiting a cave at 950 m of altitude in the buffer zone in Tocache sector (Ñahuicopa *et al.* 2016, Hidalgo et al. 2017). During 2016 a group of researchers from CIMA and the Museum of Natural History (MUSM) conducted an expedition confirming the discovery. This strange blind catfish is still being reviewed (morphologically and genetically) by scientists waiting for official description and name. In between, The “Milagrosa Cave” can become one of the atractions for ecotourist visitors and will be promoted by the local government of Tocache.

This fish has typical characteristics of troglobiotic species, like absence of eyes in adults, barbs elongated in the region of the mouth and the lack of pigmentation of the skin. Animal with phenotype of adaptation to areas of darkness (eg caves, abyssal-hadales): ocular degeneration, loss of pigmentation, increase or greater development of sensory elements. Being a species of caves and restricted distribution, it is estimated that its permanence is highly related to the constriction of the surrounding forests in the buffer zone of the PNCAZ.

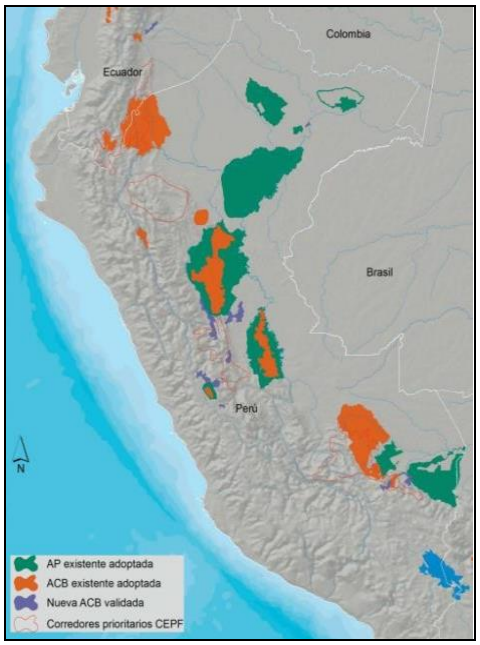


Figure 5.8 Protected areas and ACB[58] of freshwater delimited in Peru. Red indicates the priority corridors identified by the Critical Ecosystem Partnership Fund (CEPF). https://portals.iucn.org/library/node/46341

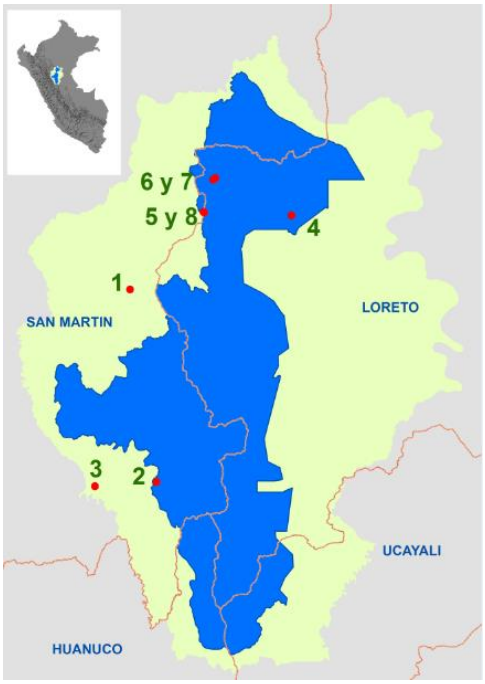


Figure 5.9. Map showing type localities for the 8 species recently discovered: (1) “Cordillera Azul Antbird”, (2) “Lily Rodriguez’s Beaked Toad”, (3) “Tocache Blind Catfish” first discovered, (4) ”Painted Manakin”, (5) Lissocarpa bracki, (6) Drypetes azulensis,(7) Virola pseudosebifera, 3 newly described trees and (8) Awajun salamander.

During the last couple of years, three biology degree thesis of young researchers associated with the Natural History Museum of San Marcos University (MHN-UNMSM) have been completed. These studies have dealt basically about fish diversity in different areas of the park´s buffer zone: Biavo basin, Pauya-Cushabatay basin and Ponasa-Mishquiyacu basin. Thanks to the affiliation with the MHN-UNMSM, the students could benefit from the experience of the museum´s senior researchers, some of them even took part in the early Rapid Biological Inventories.

It should be noted that in the last report of the IUCN RED List about the State of Conservation and distribution of freshwater biodiversity in the AndesTropicales (Tognelli *et all*. 2017) it is highlighted that the Cordillera Azul National Park boasts one of the largest interregional conservation efforts, contains a very diverse biota, numerous aquatic habitats and probably numerous endemic species; standing out those species that have been described from their findings in this protected area. The conservation of two important basins headwaters: Huallaga and Ucayali, was one of the conservation objectives for the creation of the PNCAZ (INRENA 2016), considered in the zoning of the Master Plan as Zones of strict Protection and Wild Zone, that is to say, with the lowest degree of disturbance and greater protection status (SERNANP 2012).

Due to COVID-19 pandemic, two scientific expeditions to the park have been postponed. One, from LSU and CORBIDI, to study birds, and a second one, from the Koenig Museum (Uni-Bonn, Germany) to study herps.

APPENDIX 1: INTERPRETATION AND CLASSIFICATION OF IMAGERY

Landsat imagery

The Landsat program has provided the longest temporal archive of moderate resolution satellite imagery available, and as of 2008 USGS made all of this data freely available to all users. The combination of frequent data capture, moderate resolution (30m) and accessibility have made Landsat data the most widely used satellite platform for land cover change analysis.

To ensure consistency with all previous monitoring events, the classification method employed followed the approach used for the previous monitoring events in 2018, 2016, 2014 and 2012. This method was used both to ensure continuity in the analysis and to overcome the problem of cloud cover. All methods are based on common good practice in the remote sensing field. To overcome the cloud cover and shadow problems and maintain continuity with the previous monitoring, all available 2020 images from the reference region were combined through a post-classification concatenation procedure. For each Landsat path/ row in the reference region the best images with useable (low cloud cover) data were obtained from USGS EarthExplorer. Table 5.1 shows the collection of images that were used in the final classification.

Table Appendix 1.1: Images that were used in the final classification.

Path/Row	Date Image 1	Date Image 2	Date Image 3
7/65	8/6/2020	7/21/2020	
7/66	8/6/2020	7/21/2020	1/27/2020
8/65	8/29/2020	5/09/2020	6/10/2020
8/64	6/10/2020	5/09/2020	
6/66	12/21/2020		
6/65	10/18/2020		

Pre-processing

When using Landsat 8 data, imagery can be obtained from Earth Resource Observation Systems - EROS with multiple pre-processing steps completed. These processing steps are summarized below and more detail information can be found from NASA[56].

The 1G product available to users is both radiometrically and geometrically corrected. The correction algorithms employed model the spacecraft and sensor using data generated by onboard computers during imaging events and ground control points and a digital elevation model are also used to improve the overall geometric fidelity. The geometric correction process utilizes both ground control points (GCP) and digital elevation models (DEM) to attain absolute geodetic accuracy. The WGS84 ellipsoid is employed as the Earth model for the Universal Transverse Mercator (UTM) coordinate transformation. Associated with the UTM projection is a unique set of projection parameters that flow from the USGS General Cartographic Transformation Package. The end result is a geometrically rectified product free from distortions related to the sensor (*e.g.*, jitter, view angle effects), satellite (*e.g.,* attitude deviations from nominal), and Earth *(e.g.,* rotation, curvature, relief).

[56] http://landsathandbook.gsfc.nasa.gov/level/

When using Level 1G-processed imagery, geometric accuracy should be confirmed, but extra geo-referencing steps are typically unnecessary.

Processing
Each image was processed using a hard classification technique. Using a clustering technique all useable data were identified. Through this process, pixels are grouped according to their spectral similarities and are then identified to land cover classes. Therefore pixels with no data due to clouds and shadow can be removed. For each image, the remaining data is processed to identify all forest and non-forest clusters. Using known areas of forest, these cluster groups are identified and clumped. The same process is conducted for non-forest clusters. Since the non-forest category also includes categories that can be difficult to separate, such as agroforestry, secondary forests, swamps and mountain areas that have illumination variability, a secondary classification step was used in cases when forest and non-forest could not be distinguished. Challenges were isolated for clusters in all classes that included potential confusion and separability. These areas were processed again through a secondary cluster analysis focused only on these categories, and resulted in further dividing confusion classes. Through careful inspection of these new finely distinguished clusters, areas of non-forest were distinguished. This secondary classification was done for the best images available for each area (path/row). All areas that were identified as non-forest through this process (agriculture & re-growth) were then aggregated.
Areas of natural disturbance are important to separate from anthropogenic deforestation. This can be done through visual inspection and identification of areas of know disturbances, such as landslides, that are remote and outside of areas of human influence. The project area has many extreme topographic features- Including very steep slopes, and areas at high elevation that have minimal tree cover. These areas were removed from the spatial modeling due to their inaccessibility, and are also removed from the change detection analysis since any land cover change in these areas is due to non-anthropogenic sources. GIS files that delineate these masked areas are archived so that each analysis will maintain the same masks. These specific exclusion zones can help in identifying the areas of natural disturbance.

Following classification, classified scenes are joined to produce a final map that will be compared against the benchmark map.

Post-processing
After all areas of usable 2020 data were distinguished into forest and non-forest, a mode filtering procedure was used to align the classification as closely as possible with the Peruvian DNA forest definition. A 3 pixel x 3 pixel filter was used which increases the minimum mapping unit to 0.81 ha. (90m x 90m). In some cases where clouds, cloud shadows and terrain shadows caused classification errors, shadow effects were delineated and classified.

The result of this classification procedure is shown in Figure 5.1. where more than 93% of the reference region is classified with less than 7% unclassifiable due to cloud coverage (Table 5.2).

Figure appendix 1.1: 2020 Classification for full reference region

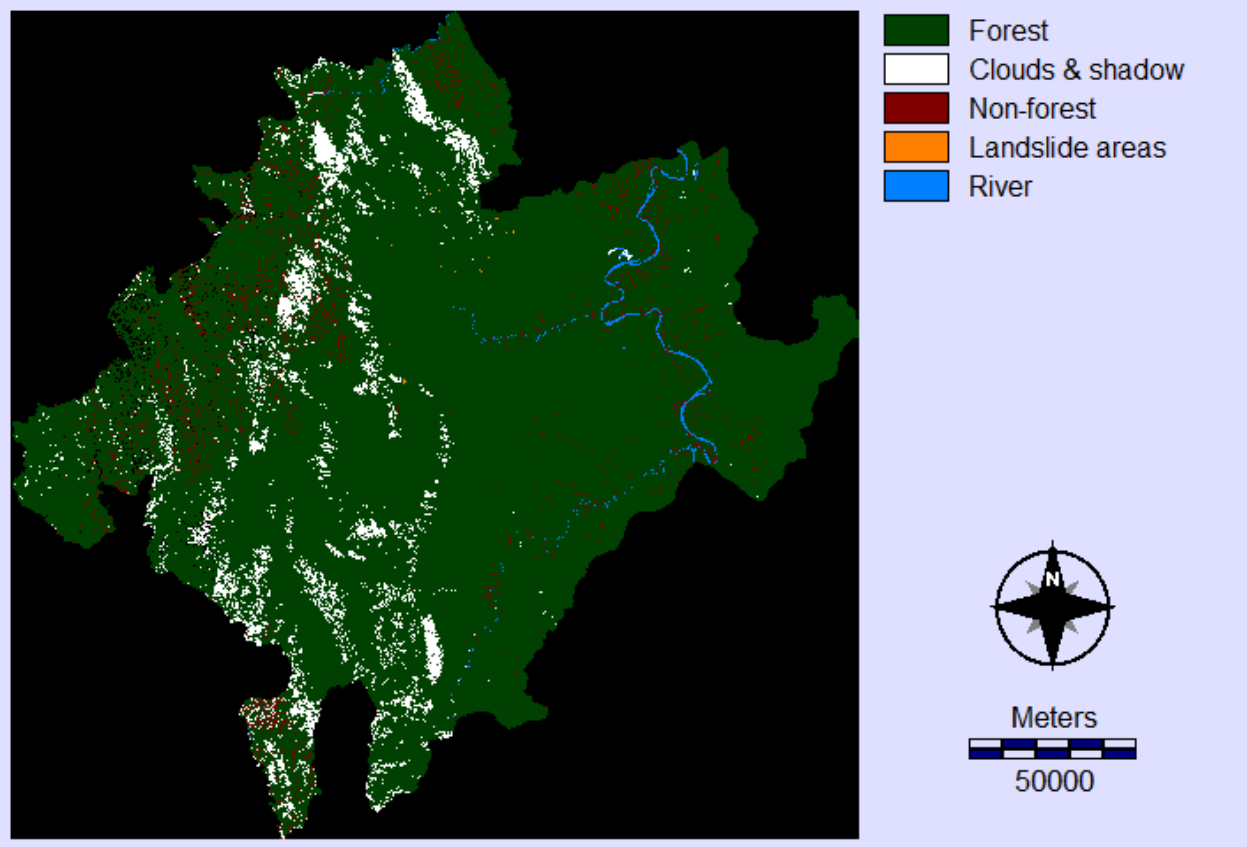


Table Appendix 1.2: Classification area

Category	Hectares
Forest & Non-Forest	3,363,785.5
Cloud & shadow	217,316.3
Total area classified	3,581,101.8
% cloud	6.07%

Analysis of the total cloud cover in the year 2020 and 2018 show that less than 10% of the region is obscured by clouds in either year or for both years combined (Table Appendix 1.3).

Table Appendix 1.3: Cloud obscured total area

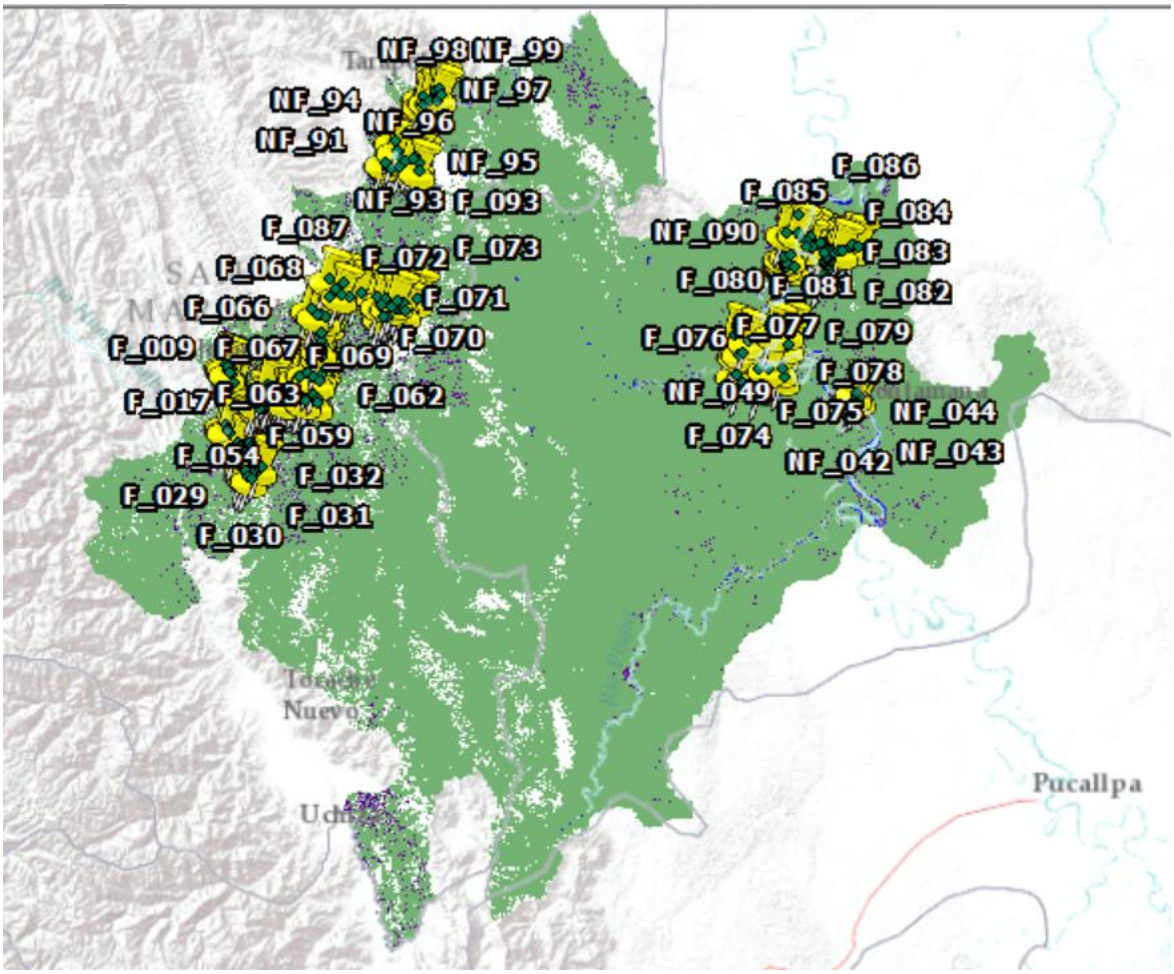
CLOUD COVER ANALYSIS	Ha	% of area
2020 cloud cover	217,316.3	6.1%
2018 cloud cover	62,054.9	1.7%
2018/2020 cloud overlap area	14,223.3	0.4%

Quality Assurance/Quality Control

To ensure consistency and quality results, all data sources and analytical procedures are documented and archived (detailed under data archiving above).

Accuracy of the classification was assessed by comparing the classification with ground truth points and samples of high resolution imagery (Quickbird imagery/ Astirum ~5m resolution available on Google Earth). All data collected from ground-truth points are recorded (including GPS coordinates and identified land-use class) and archived. Any sample points of high resolution imagery used to assess classification accuracy are also archived. Samples used to assess classification accuracy are well-distributed throughout the classification area (as far as is possible considering availability of high resolution imagery), with a minimum sampling intensity of 50 points each for the forest and non-forest classes. Distribution of all points is shown in Figure appendix 1.2.

Figure appendix 1.2 Points of AA data



All available recent high resolution imagery was used in this accuracy assessment, but no points fell within the project area. All of the points are within the leakage belt. The map above shows the distribution of points in the full classification area which covers an area much greater than the reference region alone. Some of the accuracy assessment point all fall within the classification area, but outside of the reference region. This is a conservative approach since the landscape surrounding the reference region represents very challenging heterogenous mixtures of forest and non-forest.

Overall classification accuracy was 93.68% Results of the accuracy assessment are in Table appendix 1.4

Table appendix 1.4 Classification accuracy assessment 2020

Classification	**Land-use class as determined from ground-truth points**		**Total**	**Accuracy (%)** ***User's accuracy*** ***(# correct/ row total)***	**Error of Commission (%)**
	Forest	**Non-forest**			
Forest	93	2	95	97.9%	2.11%
Non-forest	9	85	94	90.4%	9.57%
Total	102	87	190		
Accuracy (%) ***Producer's accuracy*** ***(# correct/ column total)***	91.2%	97.7%			Overall Accuracy 93.68%
Error of Omission (%)	8.82%	2.30%			

New benchmark maps were created for 2020 for the project area (Figure Appendix 1.3) and leakage belt (Figure Appendix 1.4)

Figure Appendix 1.3: Project Forest Cover Benchmark Map 2020

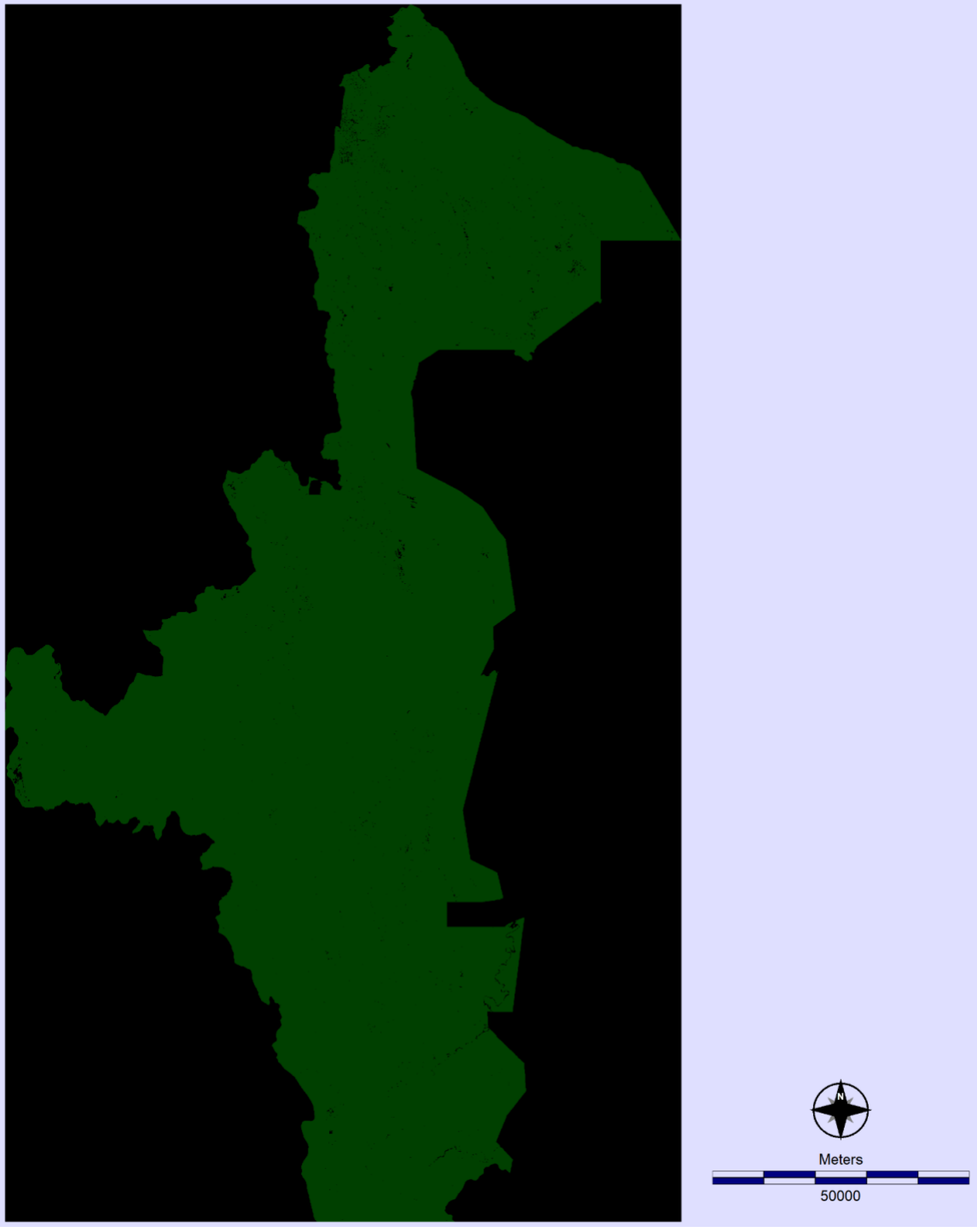
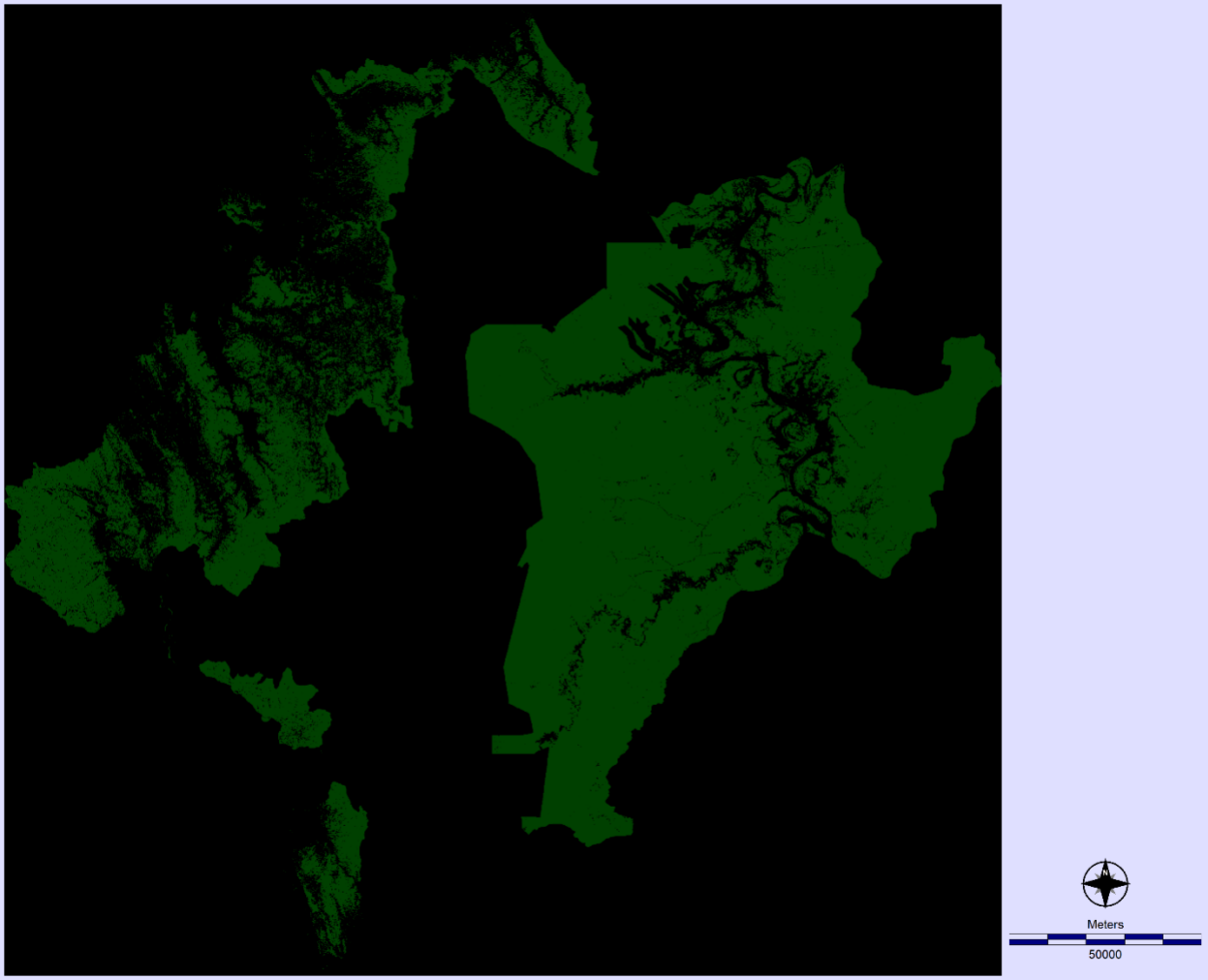


Figure Appendix 1.4: Leakage Belt Forest Cover Monitoring Map 2020



APPENDIX 2: LIST OF IMPORTANT SPECIES PRESENT IN ANY CATEGORY OF THREAT OTHER THAN LEAST CONCERN AND DATA DEFICIENT. THE CATEGORIZATION ACCORDING TO THE RED BOOK OF THREATENED FAUNA OF PERU IS ALSO INCLUDED. THIS LIST WAS TAKEN FROM THE LIST ORIGINALLY INCLUDED IN THE PDD AS IMPORTANT SPECIES.

CLASE	ORDEN	FAMILIA	GENERO	ESPECIE	IUCN 2019	IUCN 2020	Red Book Fauna Perú
AMPHIBIA	ANURA	Bufonidae	*Atelopus*	*andinus*	**EN**	**EN**	**CR**
AMPHIBIA	ANURA	Dendrobatidae	Ameerega	*cainarachi*	**EN**	**EN**	**NT**
AMPHIBIA	ANURA	Bufonidae	*Atelopus*	*pulcher*	**VU**	**VU**	**VU**
AVES	APODIFORMES	Trochilidae	*Heliangelus*	*regalis*	**EN**	**EN**	**EN**
AVES	FALCONIFORMES	Accipitridae	*Harpia*	*harpyja*	**NT**	**NT**	**EN**
AVES	FALCONIFORMES	Accipitridae	*Morphnus*	*guianensis*	**NT**	**NT**	**VU**
AVES	FALCONIFORMES	Accipitridae	*Spizaetus*	*ornatus*	**NT**	**NT**	**EN**
AVES	GALLIFORMES	Cracidae	*Aburria*	*aburri*	**NT**	**NT**	**VU**
AVES	PASSERIFORME	Tyrannidae	*Hemitriccus*	*rufigularis*	**NT**	**NT**	**VU**
AVES	PASSERIFORME	Thamnophilidae	Myrmoderus	*eowilsoni*	**NT**	**NT**	**-**
AVES	PASSERIFORME	Troglodytidae	*Henicorhina*	*leucoptera*	**NT**	**NT**	**VU**
AVES	PSITTACIFORMES	Psittacidae	*Amazona*	*festiva*	**NT**	**NT**	**NT**
AVES	PSITTACIFORMES	Psittacidae	*Amazona*	*farinosa*	**NT**	**NT**	**-**
AVES	PSITTACIFORMES	Psittacidae	*Pyrilia*	*barrabandi*	**NT**	**NT**	**-**
AVES	PICIFORMES	Capitonidae	*Capito*	*wallacei*	**VU**	**VU**	**NT**
AVES	PSITTACIFORMES	Psittacidae	*Ara*	*militaris*	**VU**	**VU**	**-**
AVES	PSITTACIFORMES	Psittacidae	*Primolius*	*couloni*	**VU**	**VU**	**NT**
AVES	PSITTACIFORMES	Psittacidae	*Touit*	*huetii*	**VU**	**VU**	**-**
AVES	PSITTACIFORMES	Psittacidae	*Touit*	*stictopterus*	**VU**	**VU**	**VU**
MAMMALIA	CARNIVORA	Mustelidae	*Pteronura*	*brasiliensis*	**EN**	**EN**	**-**
MAMMALIA	PRIMATES	Cebidae	*Ateles*	*chamek*	**EN**	**EN**	**NT**
MAMMALIA	PRIMATES	Cebidae	*Ateles*	*belzebuth*	**EN**	**EN**	**EN**
MAMMALIA	PRIMATES	Cebidae	*Lagothrix*	*lagothricha poeppigii*	**VU**	**EN**	**VU**
MAMMALIA	CARNIVORA	Canidae	*Speothos*	*venaticus*	**NT**	**NT**	**VU**
MAMMALIA	CARNIVORA	Canidae	*Atelocynus*	*microtis*	**NT**	**NT**	**-**
MAMMALIA	CARNIVORA	Mustelidae	*Lontra*	*longicaudis*	**NT**	**NT**	**VU**
MAMMALIA	CARNIVORA	Felidae	*Panthera*	*onca*	**NT**	**NT**	**-**
MAMMALIA	PRIMATES	Cebidae	*Cebus*	*yuracus*		**NT**	**VU**
MAMMALIA	ARTIODACTYLA	Tayassuidae	*Tayassu*	*pecari*	**VU**	**VU**	**-**
MAMMALIA	CARNIVORA	Ursidae	*Tremarctos*	*ornatus*	**VU**	**VU**	**VU**
MAMMALIA	PERISSODACTILA	Tapiridae	*Tapirus*	*terrestris*	**VU**	**VU**	**VU**
MAMMALIA	PRIMATES	Callitrichidae	*Callimico*	*goeldii*	**VU**	**VU**	**VU**
MAMMALIA	PRIMATES	Cebidae	*Cacajao*	*calvus*	**VU**	**VU**	**VU**
MAMMALIA	PRIMATES	Cebidae	*Cebuella*	*pigmaea*	**VU**	**VU**	**VU**
MAMMALIA	XENARTHRA	Myrmecophagidae	*Myrmecophaga*	*tridactyla*	**VU**	**VU**	**VU**
MAMMALIA	XENARTHRA	Dasypodidae	*Priodontes*	*maximus*	**VU**	**VU**	**-**
REPTILIA	TESTUDINES	Podocnemididae	*Podocnemis*	*unifilis*	**VU**	**VU**	**VU**
REPTILIA	TESTUDINES	Podocnemididae	*Podocnemis*	*sextuberculata*	**VU**	**VU**	**NT**
REPTILIA	TESTUDINES	Testudinidae	*Chelonoidis*	*denticulata*	**VU**	**VU**	**NT**

APPENDIX 3: REFERENCES CITED

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