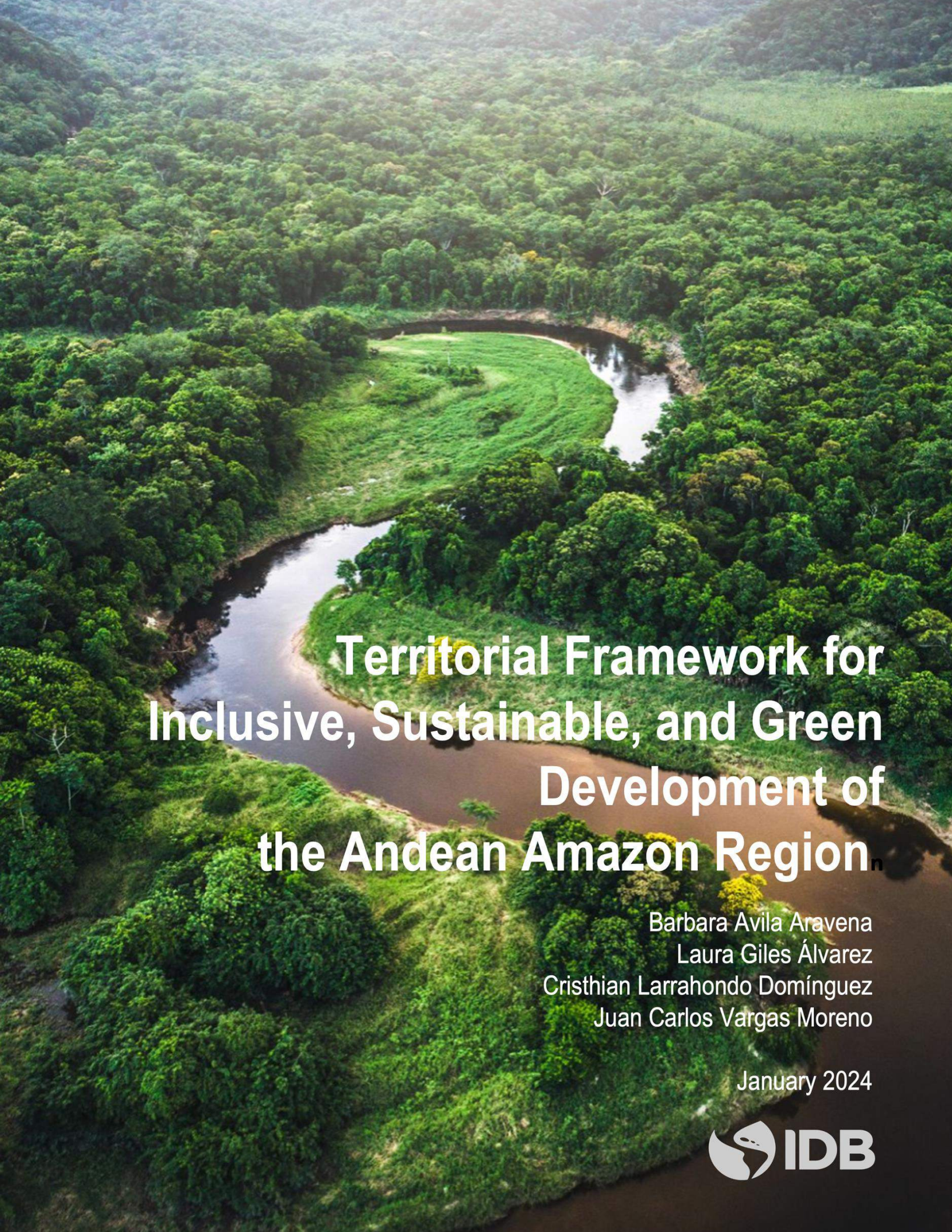

# Territorial Framework for Inclusive, Sustainable, and Green Development of the Andean Amazon Region

Barbara Avila Aravena
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January 2024

IDB

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Inter-American Development Bank
Country Department for the Andean Region
January 2024

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About the Andean Amazon Region (AAR):
The AAR refers to the geographical region that encompasses the eastern part of the Andes Mountain range and the lowlands of the Amazon River basin in South America. This area extends across several countries, including Bolivia, Peru, Ecuador, Colombia, and Venezuela, covering approximately 2.7 million km[21], hosting 10% of the known global biodiversity, and being home to more than 24 million people[22].

About the Inter-American Development Bank (IDB):
The IDB works to improve lives in Latin America and the Caribbean. Through financial and technical support to countries working to reduce poverty and inequality, the IDB helps improve health and education and advance infrastructure. Its goal is to achieve sustainable and climate-respectful development. With a history dating back to 1959, today, it is the main source of financing for the development of Latin America and the Caribbean. The organization provides loans, grants, and technical assistance, as well as conducts comprehensive research. The IDB maintains a strong commitment to achieving measurable results and the highest standards of integrity, transparency, and accountability.

About GeoAdaptive:
GeoAdaptive is a global consulting, strategy, and development planning technology firm. It specializes in solving complex economic, environmental, and social problems in various industries and scales using advanced spatial intelligence technologies and analysis. By integrating data and location analysis, spatial econometrics, design, and planning, we create strategies for our clients worldwide, reducing their risk and maximizing opportunities for inclusive and sustainable growth. In Haiti, GeoAdaptive supported the IDB's strategy for the country by developing a spatial approach to map and prioritize development gaps. Contact: info@geoadaptive.com

[1] Watershed boundary used by the Amazon Geo-referenced Socio-environmental Information Network.

[2] According to analysis based on WorldPop 2020 data.

## Executive Summary

**The Amazon is one of the most complex and richest resources in the world**. With its 5.5 million km$^2$ of dense tropical forest and 7.9 million km$^2$ of river basin, it is one of the most biodiverse and richest regions on the planet. In Bolivia, Colombia, Ecuador, Peru and Venezuela - the Andean Amazon Region (AAR) these 2.7 million km$^2$ are also home to approximately 24.7 million people, including more than 200 known indigenous groups.

**Despite its advantages and the efforts invested, the AAR, its territory and population, continue to be exposed to a number of social, economic and conservation challenges**. These challenges have not allowed a responsible use of this rich and diverse natural asset, contributing to a rapid process of deforestation, high levels of poverty and exclusion, and low levels of productivity. The question arising from these challenges is: How to promote an inclusive and sustainable development model that at the same time protects the environment and the natural capital of the AAR?.

**In order to respond to this question, this study conducts a development gap analysis for the AAR**. The methodology uses a combination of quantitative and qualitative techniques to identify and measure development gaps in the territory, both at the sectoral and multisectoral levels, and proposes an intervention model based on networks and nodes. The analysis is based on the premise that development models in this region should focus efforts on three major areas that will make it possible to address the internal and external challenges of each country in a focused and efficient manner, leading to the closing of development gaps: 1. Taking responsible advantage of existing wealth, including the millenary knowledge of its population and territories; 2. Protecting the environment and natural resources; 3. Promoting an inclusive and green productive model.

**The results show that 85.6% of the population and 94% of the territory of the study experience at least one development gap**. Regarding the area affected, gaps in access to drinking water, access to primary and secondary education in rural areas, and investment in green and inclusive activities are the most severe, involving 45.9%, 45.2% and 52.1% of the area, respectively. Whereas gaps related to investment in climate resilience, access to power substations, and investment in green and inclusive activities affect the largest number of people: 54%, 41.9% and 35.7% of the population, respectively.

**The estimation of 20 sectoral gaps enables the creation of a multisectoral index, which identifies the concentration of gaps in a region.** The study calculates three indices: human capital, environmental protection and economic opportunities. Results show that more than one million people experience at least six human development gaps, more than 14 million people live in areas with natural capital conservation gaps, and more than 10 million people of working age live in areas with potential for production in sectors linked to sustainable, green and inclusive development.

**Finally, while the study does not develop a menu of investments or specific interventions, it does propose a development model based on nodes and networks that can guide both national and regional interventions**. It offers a gradual development model, less invasive for the territory and that takes advantage of economies of scale, by building from 18 existing productive and human capital nodes (or centers) in the territory, connecting them with 22 secondary nodes to address their isolation and improve productive networks, and finally creating a development network through the spillover effect to reduce social and productive gaps in the long term in 24 tertiary nodes.

## TABLE OF CONTENTS

## TABLE OF ACRONYMS

| | |
|---|---|
| **IDB** | Inter-American Development Bank |
| **AAR** | Andean Amazon Region |
| **IT** | Indigenous Territory |
| **FAO** | Food and Agriculture Organization |

# 1 Understanding the Andean Amazon Region

**The Amazon represents one of the most complex and environmentally rich landscapes in the world, with 7 biomes, enough natural capital to supply the countries it encompasses, innovation potential and great cultural diversity.** With an area of 5.5 million km$^2$ of dense tropical forest and 7.9 million km$^2$ of watershed[33] this area is the most biologically diverse river basin in the world and contains the world's largest tropical rainforest.[44] More specifically, Bolivia, Colombia, Ecuador, Peru and Venezuela - comprise 2.7 million km$^2$. It also represents a globally significant carbon sink. The main biomes include wet and dry tropical broadleaf grasslands, tropical savannah and mountain grasslands. The Amazon is also of great social importance. The total population of the AAR basin is estimated to be around 24.7 million people (WorldPop, 2020), among which there are around 200 known indigenous groups.

**However, despite its advantages and the efforts invested in the region, the territory and its people remain exposed to a number of social, economic and conservation challenges.** These challenges have not allowed the benefits of these riches to be harnessed sustainably, due to traditional economic models, which have shown problems of inequality, poverty, isolation and deforestation, among others. In Bolivia and Colombia, around a quarter of their forests, corresponding to the humid tropical broadleaf forests, have been lost. The road network associated with the dispersed settlement pattern in the Amazon is one of the main deforestation drivers. The AAR provides the natural capital to support regenerative agriculture, sustainable forestry, fisheries and complex bio-based products. However, until these activities are established with the right incentives and investments, the dominant activities aligned with a green, resilient and inclusive economy in the Andean Amazon will continue to be agriculture and livestock. Regarding the social sphere, the Relative Wealth Index[55] shows that it is on average more than 6 points higher in Amazonian areas compared to non-Amazonian territories, indicating high deprivation in these units (lower wealth). Socio-economic indicators could be improved in the Amazon region through activities under the approach described above, enabling the most vulnerable communities to at least match their prosperity compared to urban areas within the Amazon region.

**These challenges question the traditional models of development and whether they have been adequate for the specific characteristics of this region.** The question that arises from these challenges is how to promote an inclusive, sustainable development model that at the same time protects the environment and the natural capital of the AAR? To this end, it is proposed to concentrate efforts in three main areas that will allow the internal and external challenges of each country to be addressed in a focused and efficient manner, thereby closing the development gaps to:

1. Responsibly harness the existing wealth, including the millenary knowledge of its people and territories;
2. Protect the environment and natural resources;
3. Promote a productive model that is inclusive and green.

**Therefore, an economic transformation based on the principles of a sustainable, green and inclusive development model becomes a vehicle to bring sustainable development to the region.** For this purpose, the human and productive capital of the AAR must be strategically built to develop the capacity to establish livelihoods compatible with the ecological integrity and cultural diversity of the Amazon. Designing and developing this process requires a territorial approach that provides technical inputs for decision-making at both sectoral and territorial levels.

3 Available at https://www.alianzadelclima.org/grupos-indigenas/cuenca-amazonica.html

4 Primary forest extension and tree canopy extension of the world's major rainforest regions in 2020. (n. d.) Available at: https://www.statista.com/statistics/1346900/largest- rainforests

5 The dataset of the Global Relative Deprivation Index (GRDI), Version 1 (GRDIv1), characterizes the relative levels of multidimensional deprivation and poverty at each 30-second arc-second pixel (~1 km), where a value of 100 represents the highest level of deprivation, and a value of 0 represents the lowest. GRDIv1 is constructed from sociodemographic and satellite data inputs that were harmonized, indexed, and spatially weighted into six main components to produce the final index raster. Inputs were selected from the best available data that vary continuously in space or have at least an administrative level 1 resolution (provincial/state) and have global spatial coverage.

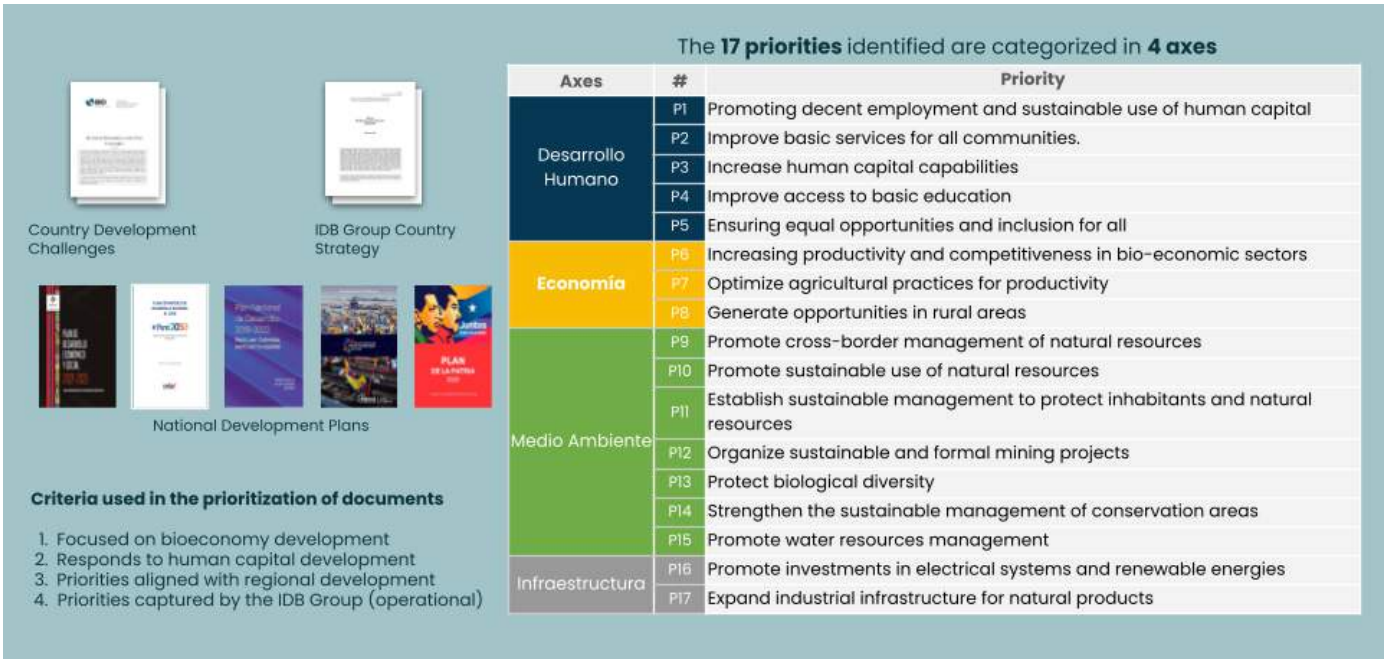
# 2 Methodological Framework

**In response to the challenges highlighted in the previous section, this study undertakes a development gap analysis for the AAR.** The methodology uses a combination of quantitative and qualitative techniques to identify and measure development gaps in the territory.

First, binding priorities were identified based on official documents from the 5 countries and the Inter-American Development Bank (IDB). Through the initial identification of 115 national priorities, 62 guidelines and 86 challenges established by the Inter-American Development Bank, 31 regional priorities were selected based on the document review. Once again, these priorities highlight the need for a sustainable, inclusive and green development model that responds to the three major challenges presented in the previous section: the need for a sustainable, inclusive and green development model, which responds to the three major challenges presented in the previous section: the degradation of the environment and natural capital of the AAR, the social challenges of such a diverse area and, finally, the need to promote a sustainable productive model that is inclusive and green, and that aligns with the regional and global Sustainable Development Goals.

**The priority analysis breaks down these three priorities into four axes and 17 priorities.** Based on the challenges identified, 4 main axes (or blocks) were identified that build a more specific development model for the AAR: human capital, economy, environment and infrastructure. These blocks were then divided into 17 binding priorities, grouping together those challenges that are most important at the regional level.

**Figure 1. Planning instruments, selection criteria and the 17 selected binding priorities that lead to the creation of the development gaps.**




| Axes | # | Priority |
|---|---|---|
| Desarrollo Humano | P1 | Promoting decent employment and sustainable use of human capital |
| | P2 | Improve basic services for all communities. |
| | P3 | Increase human capital capabilities |
| | P4 | Improve access to basic education |
| | P5 | Ensuring equal opportunities and inclusion for all |
| Economía | P6 | Increasing productivity and competitiveness in bio-economic sectors |
| | P7 | Optimize agricultural practices for productivity |
| | P8 | Generate opportunities in rural areas |
| Medio Ambiente | P9 | Promote cross-border management of natural resources |
| | P10 | Promote sustainable use of natural resources |
| | P11 | Establish sustainable management to protect inhabitants and natural resources |
| | P12 | Organize sustainable and formal mining projects |
| | P13 | Protect biological diversity |
| | P14 | Strengthen the sustainable management of conservation areas |
| | P15 | Promote water resources management |
| Infraestructura | P16 | Promote investments in electrical systems and renewable energies |
| | P17 | Expand industrial infrastructure for natural products |

Prepared by the authors.

**In the second step, sectoral gaps were identified to translate development priorities into territorial units for analysis.** The number of gaps analyzed was based on the priorities identified and on the existence of comparative geo-referenced data for the five countries with which the study could be conducted. Gaps were assessed with specialists from the 5 IDB country offices through the Amazon committees (or their equivalent) that each team has.

**The gaps are both access and outcome or policy related, and have been assessed according to regional thresholds.** Based on specific indicators, these thresholds are used to diagnose the region. The list of gaps and their respective thresholds (described in Table 1) were then used for geospatial analysis and gap identification. The identification of the gap area was based on the comparison of a spatial indicator within a potential gap area with a specific threshold for its territory. If the spatial indicator is above the benchmark (e.g., access to health infrastructure, where a higher value indicates disparity) or below the benchmark (e.g., investment in green, inclusive and sustainable activities, where a lower value indicates disparity), then a gap is established.

**This process was done for all gaps with their respective territories, in order to identify, according to their spatial extension, those areas that were below or above their respective thresholds, based on the characteristics of each indicator, which were adjusted at the regional level, not by country.** The data were calculated to provide a numerical value showing the spatial distribution across the region if each administrative level or reporting cell was above or below the threshold assigned according to the territory it represents.

**Table 1. Identification of gaps and their thresholds**

| N° | Sectoral gap | Gap description | Threshold | Threshold source |
|---|---|---|---|---|
| 1 | Limited access to drinking water | Populated areas with access rates to public water services within the home below 43.0% | < 43,0% | UNICEF (2021) |
| 2 | Limited access to electricity in urban areas | Urban territories outside protected areas with access rates to public electricity networks below 96.4%. | < 96,4% | World Bank (2020) |
| 3 | Limited access to electricity in rural areas | Rural territories outside protected areas with access rates to public electricity networks below 81.3%. | < 81,3% | World Bank (2020) |
| 4 | Limited access to health services | Populated areas with access to public sanitation services at home below 9.0% | < 9,0% | UNICEF (2020) |
| 5 | Limited access to health centers in urban areas | Urban territories more than 30 minutes by car from a health center (hospital or clinic) | > 30 min | Malaria Atlas (2019) and Mathon, Apparicio & Lachapelle (2018) |
| 6 | Limited access to health centers in rural areas | Rural territories more than 120 minutes by car from a health center (hospital or clinic) | > 120 min | Malaria Atlas (2019) and Mathon, Apparicio & Lachapelle (2018) |
| 7 | Limited access to primary and secondary education in urban areas | Urban areas more than 20 minutes by car from a primary or secondary educational center | > 20 min | Ding and Feng (2022) |
| 8 | Limited access to primary and secondary education in rural areas | Rural areas 30 minutes by car from a primary or secondary educational center | > 30 min | Ding and Feng (2022) |
| 9 | Low female employment rate | Populated areas with an employment rate of the female population of working age below 51.4% | < 51,4% | National surveys, 2021 (except Peru, 2020) |
| 10 | Low productivity on agricultural land | Agricultural territories with less than 29,240 USD/km2 contribution to agricultural GDP | < 29.240 USD/km2 | INE Bolivia, INE Colombia. BC Ecuador, INE Perú. BC Venezuela. |
| 11 | Limited investment in green and inclusive economic activities | Low or no investment in georeferenced green and inclusive economy activities available in IATI | Two investments or less (lowest two quintiles) | IATI Database |
| 12 | Low investment in climate resilience | Areas with high risk of threats from climate change (flood, fires, high precipitation and high temperatures) and where there are no investments in climate resilience | High to very high climate risk index | IATI Database |
| 13 | Low relevant investments in indigenous territories | Indigenous territories without investments in climate resilience or in green and inclusive economy activities. | Indigenous territory without investments | IATI Database |
| 14 | Indigenous territories exposed to climatic dangers | Indigenous territories with high risk of threats from climate change (floods, fires, precipitation, temperatures | High to very high climate risk index | Water Risk Atlas (2020). NASA (2021) |
| 15 | Low protection of biodiversity | Areas of high biodiversity - equal to or above 95.0% of global biodiversity for terrestrial flora and fauna - that are located outside protected areas and indigenous territories. | > 5.0% of biodiversity values | Biodiversity Mapping (2021) |
| 16 | Poor performance in carbon resource management | Areas with high-value carbon stocks (2018) that have experienced forest loss 2018-2021 | Unrecoverable carbon density ≥ global 90th percentile | Noon et al. (2021) |
| 17 | Limited access to main roads | Populated areas that are more than 45 minutes from a major highway | > 45 min | Mathon, Apparicio & Lachapelle (2018) |
| 18 | Limited access to secondary roads | Populated areas that are more than 45 minutes from a secondary road. | > 45 min | Mathon, Apparicio & Lachapelle (2018) |
| 19 | Limited digital connectivity | Populated areas more than 45 minutes from a cell tower and/or 5 km in rural areas and/or 2 km in urban areas | > 45 min, > 5 km / 2 km | OpenCellID (2020) / Simmons, A. (2022) |

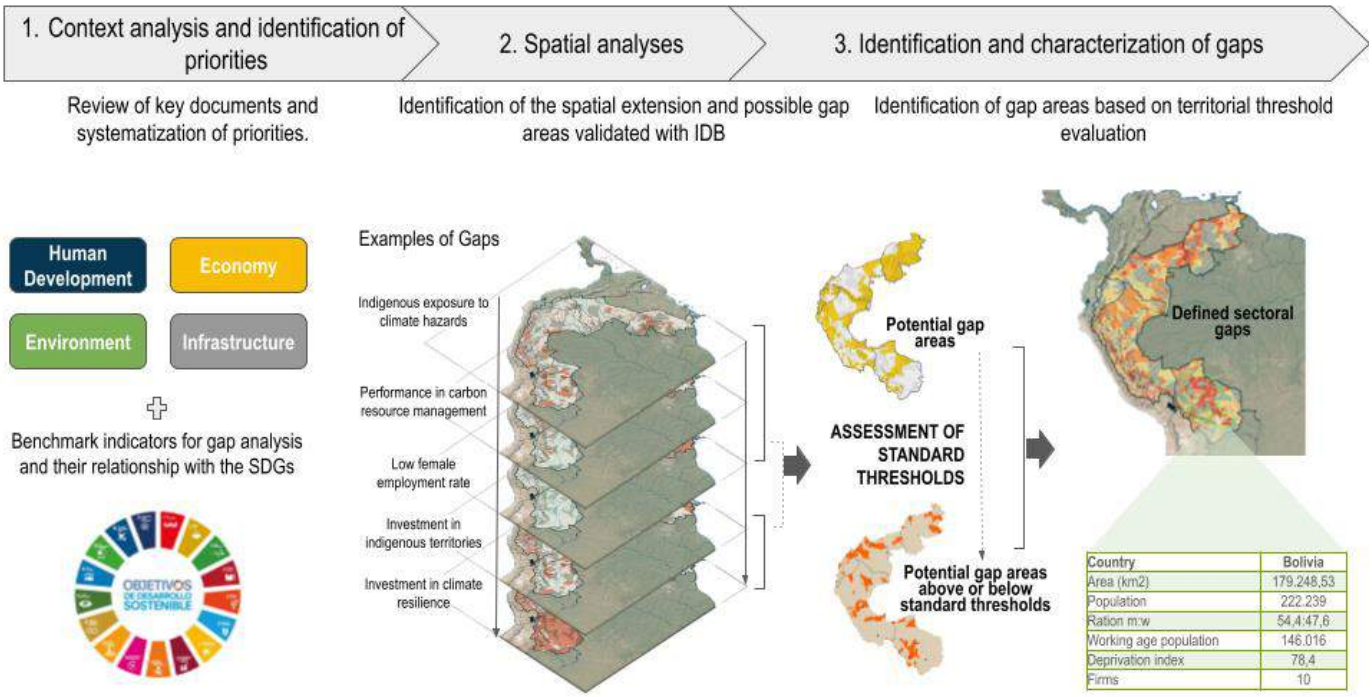
| | | | | |
|---|---|---|---|---|
| 20 | **Limited access to electrical substations** | Areas with low access to electrical substations | > 4.5 km urban radius, > 20 km rural radius | Kavuma, C., et al (2021); Csanyi. E (2017) |

Note: the colors correspond to the colors of the 4 axes in Figure 1 and to which each gap is associated. Prepared by the authors.

**After defining the gaps and their thresholds, a data-driven geospatial analysis was conducted.** This process allowed the representation and evaluation of sector-specific thresholds and a mapping for the gaps was developed. This led to the creation of a geospatial index of the 20 prioritized gaps and 3 opportunity zones. Based on the gap analysis, the sectoral priorities were also compared to other prioritization mechanisms, such as the United Nations Sustainable Development Goals. This process is shown in Figure 2.

**Once the gaps were identified, a territorial model of development nodes and networks was developed to provide ideas on how interventions could be organized in the AAR.** The nodes are centers with economic and social potential and are susceptible to generating economies of scale. This model builds on these productivity centers and proposes a territorial model based on the idea of enhancing existing opportunities, such as the nearly 24 million inhabitants, the more than 2.7 km$^2$ of territory and the nearly 400 firms currently engaged in activities linked to green, inclusive and sustainable activities.

**Figure 2. General description of the steps involved in the gap analysis.**




Prepared by the authors.

**In order to define the development nodes, a process was conducted to identify the settlements and their functional areas.** The concept of Urban Functional Area[6] was used to determine the urban areas in the Amazon (Figure 3). The area is composed of densely inhabited urban centers, plus areas of transit to urban centers. FAO urban-rural watershed data are used to capture densely populated urban centers and within a 1-hour travel distance to these centers. Urban centers are then filtered by total population and placed into hierarchies: large/intermediate cities (population > 250,000), emerging cities (20,000 - 250,000), and dispersed settlements (200 - 20,000).

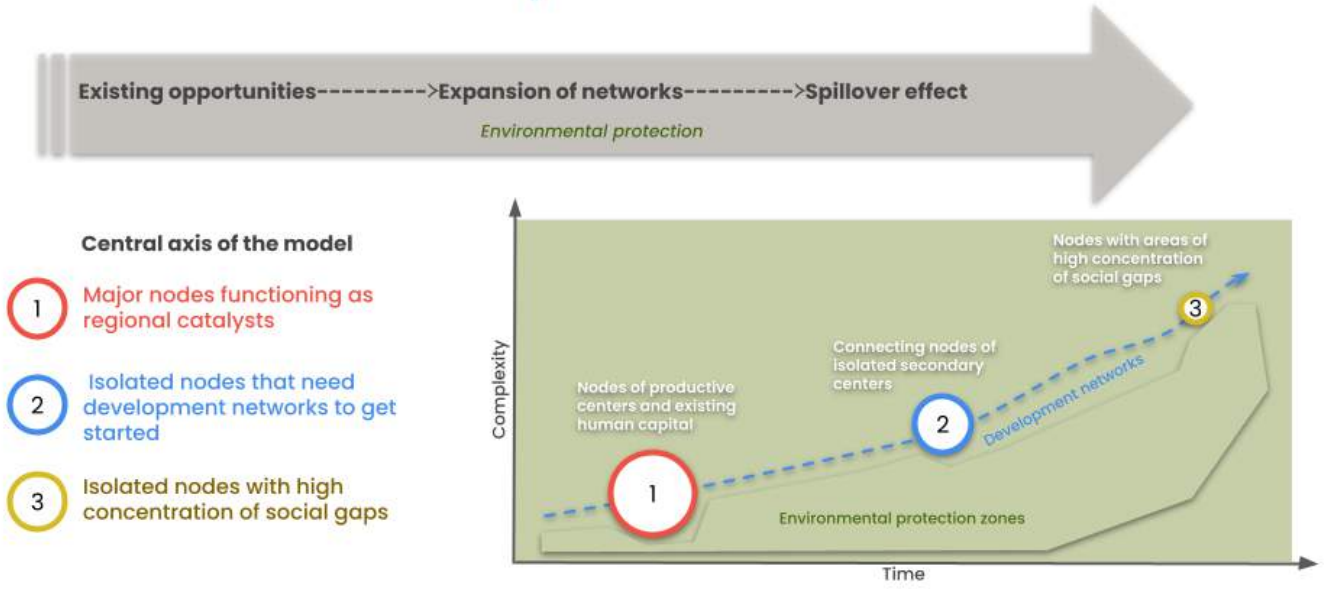
**The next step involves the design of intervention units based on spatial conditions conducive to sustainable, inclusive and green development, which will give rise to the productive nodes of the three phases of the action sequence.** The spatial conditions conducive to a green and inclusive economy are defined based on the presence of a population and business cluster working on green and sustainable productive issues.

[6] Functional urban areas are developed to understand the economic impact of cities outside their administrative boundaries and are defined by densely populated cities and travel distance to cities (OECD, 2012).

**The ranking of these areas identifies zones into three types**. The first are those that are currently connected, either by road or river networks, and that also have a concentration of human and productive capital, without acting on areas of the territory that should be protected[7]. Secondly, there are the areas that are more distant and are expected to have positive externalities from the first group of areas, as well as a connection between nodes.[8] Thirdly, there are the dispersed settlements which are characterized by a high presence of human development gaps, a lower presence of human capital and scarce development opportunities[9].

**This model focuses interventions allowing the scaling up of development through a spillover effect to other nodes with potential due to development networks, while at the same time having environmental protection as a fundamental pillar**. It is important to emphasize that this model does not address all the problems of all sectors, however it does present an idea of a model that works well in a rich and complex territory such as the Amazon (Figure 3).

**Figura 3. Territorial development model for the Amazon based on nodes and networks.**




Prepared by the authors.

[7] There are at least 2 cities that are within 3 hours driving distance of each other, with the exception of cities that are considered large/intermediate in the previous step. There is land use around the functional areas aligned with the pillars and products of a green, resilient and inclusive economy - that supports production without harming the environment. For each continuous functional area of a city, there is at least 1 enterprise engaged in green activities located within 1 hour driving distance from the urban center of the city, and at least a total of 3 enterprises within this functional area plus 1 hour driving distance from the urban functional area boundary..

[8] Cities that are within 3 hours driving distance of each other and have a green business enterprise within the functional area or within 1 hour driving distance from the urban functional area boundary. The limit of up to 1 hour drive from the functional area of each city, if there is a land use aligned with a green, resilient and sustainable approach.

[9] Cities that are within 3 hours driving distance from each other, no green business presence is required, as it is assumed that the territories are dedicated to agricultural activities

# 3 Sectoral gaps results

**This section shows the results of the analysis of 20 sectoral gaps and 3 opportunity zones**. Following the methodology described in the previous section, the analysis shows areas of the AAR that have a gap (or deficiency) in each of the indicators analyzed (in red), compared to areas that do not (green).[10] For each indicator, this enables showing which areas of the AAR territory have the greatest needs in each of the indicators analyzed. As described in Section 2, gaps are ordered by axis.

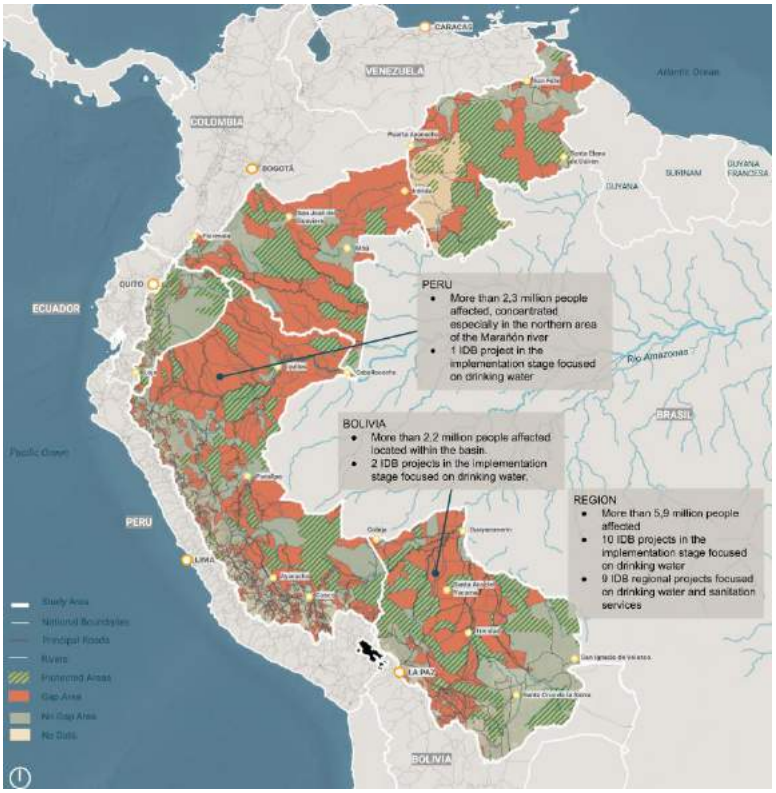
**Results show that 85.6% of the population and 94% of the territory under study experience at least one development gap**. In terms of area affected, the gaps in access to drinking water, access to primary and secondary education in rural areas and investment in green and inclusive activities are the most severe, affecting 45.9%, 45.2% and 52.1% of the area respectively. While investment in climate resilience, access to electrical substations, and investment in green and inclusive activities are the gaps affecting the greatest number of people, namely 54%, 41.9% and 35.7% of the population, respectively.

## Axis: Human Capital

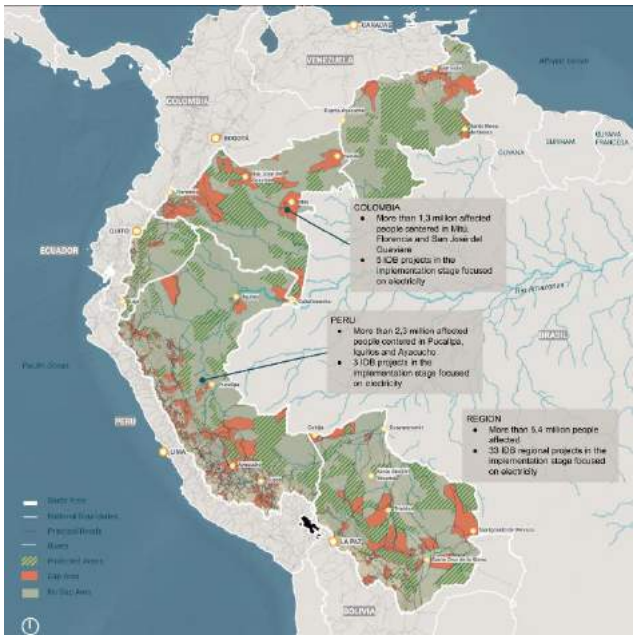
### 1. Limited access to drinking water

Despite the fact that the Amazon basin holds one-fifth of global freshwater, 24.2% of the region's population lives without a good quality supply.

- 24.2% of the population has limited access to safe drinking water.
- About 43.9% of the territory has low access to drinking water.
- The country with the lowest access is Peru, with 2.3 million people in the gap area.




[10] See Section 2 for more information on how a gap is defined.




## 2. Limited access to electricity in urban areas

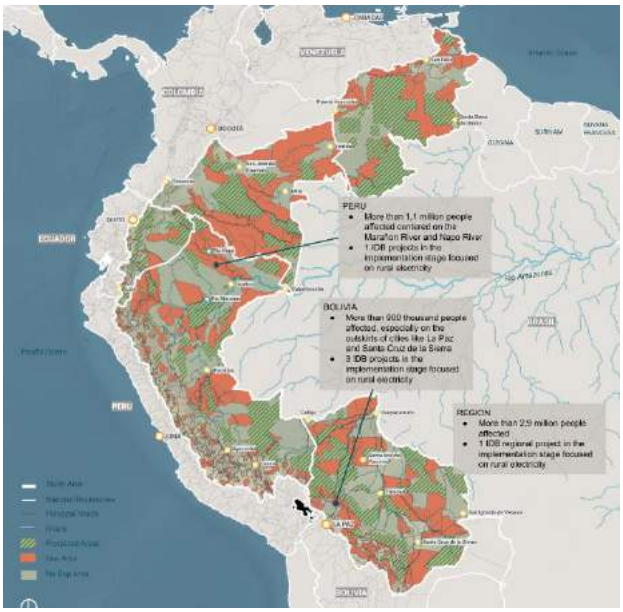
Despite high rates of access to electricity, there are urban areas where intermittent service affects the daily lives of the population. Ensuring access to electricity will allow the countries of the East-Andean Amazon to prosper and face challenges such as population growth, urbanization and climate change.

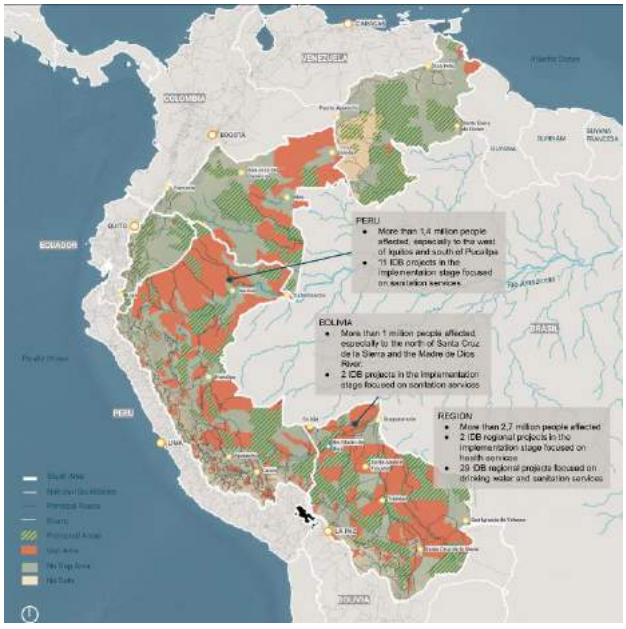
- Nearly 15.4% of the urban territory has an electricity access gap.
- About 22.3% of the region's population could benefit from addressing this gap.
- The country with the lowest access to electricity in urban areas is Colombia, with 24.2% of its territory in the gap zone

## 3. Limited access to electricity in rural areas

Lacking access to electricity means missing opportunities for progress for communities. This has been a challenge for decades in the rural areas of the Amazon, since the vast extension of the territory and the lack of connectivity structures make it difficult to produce and distribute electricity in a conventional way.

- Nearly 36% of the rural territory has a gap in access to electricity.
- About 11.9% of the region's population could benefit from managing this gap.
- The country with the least access to electricity in rural areas is Colombia, with 52.2% of its territory in the gap zone.




## 4. Limited access to sanitation services

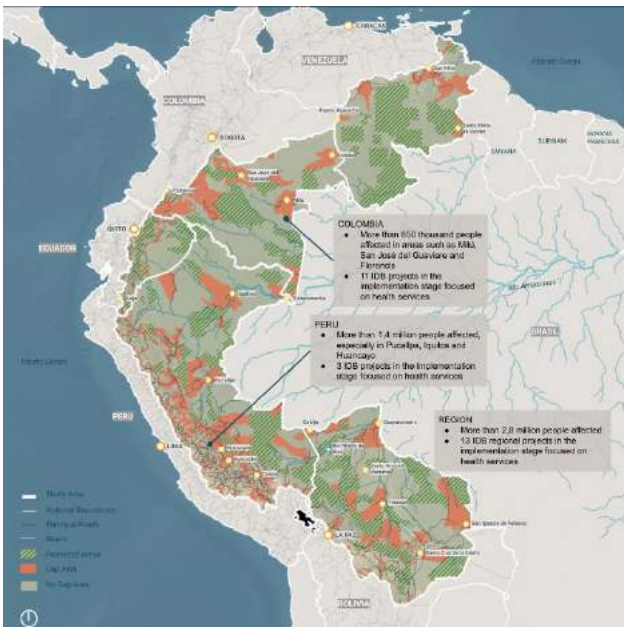
The situation of the sewerage system in the Amazon region is highly variable, depending on the geographic area and population density. In general, access to sewage and waste disposal services is limited, especially in rural areas.

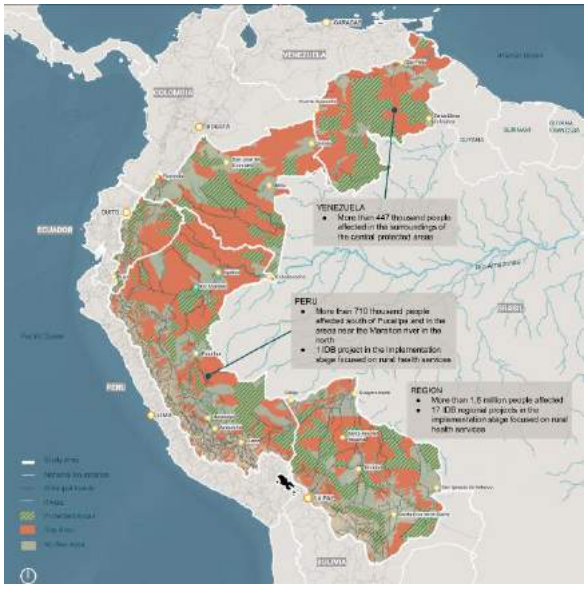
- About 31% of the territory has a gap in access to sanitation services.
- Around 11.2% of the population of the region could benefit from addressing this gap.
- The country with the least access to sanitation services is Peru, with 40.9% of its territory in the gap zone.

## 5. Limited access to health centers in urban areas

Access to health centers in urban areas is better than in rural areas, but is still at a disadvantage with respect to areas outside the basin: the Health Index of the Amazonian departments of the region averages 3.0% less than the national regional level.

- About 19% of the urban territories in the study area are more than 30 minutes away from any health center.
- Approximately 11.7% of the region's population could benefit from managing this gap.
- The country with the least access to health centers is Colombia, with 23.9% of its rural Amazonian territory more than 2 hours away by car.




## 6. Limited access to health centers in rural areas

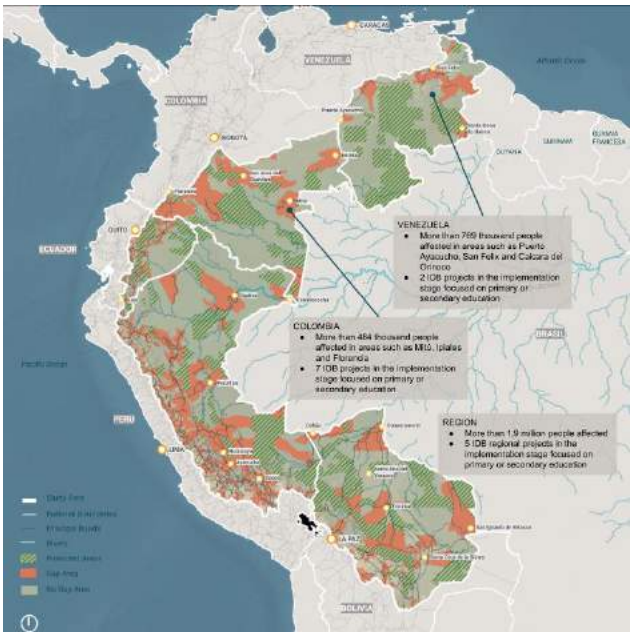
The rural Amazon region has the lowest proportion of health centers in the entire populated area of the region under study, which, together with deficiencies in accessibility, generates even more inequalities in terms of access to health care.

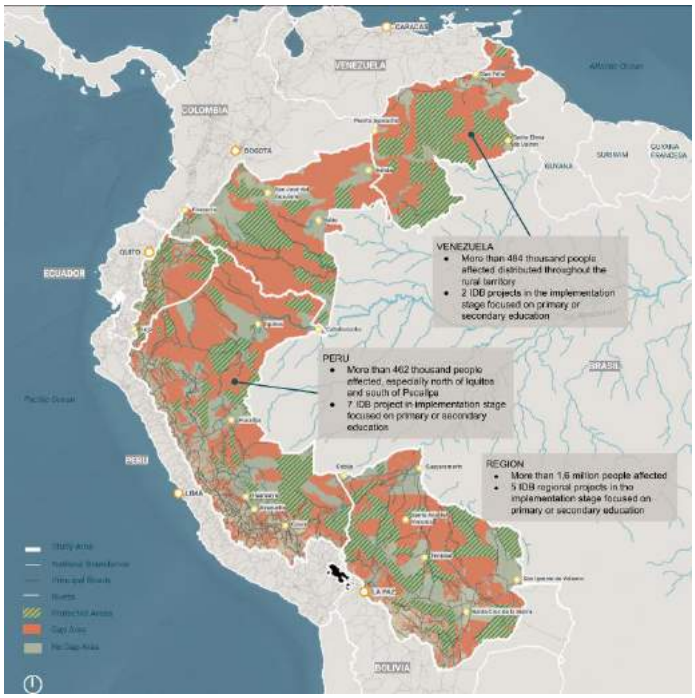
- Nearly 42.1% of the rural territories in the study area are more than 2 hours away from a health center.
- Approximately 6.6% of the region's population could benefit from addressing this gap.
- The country with the least access to hospital centers or clinics is Colombia, with 52% of its rural Amazonian territory more than 2 hours away by car.

## 7. Limited access to primary and secondary education in urban areas

The lack of access to education in urban areas of the Amazon is due to several factors, such as lack of schools in remote areas, shortage of trained teachers, limited resources, and lack of opportunities for children and youth in these areas.

- Approximately 17.9% of the study area has gaps in primary and secondary education.
- About 7.9% of the area's population could benefit from managing this gap.
- The country with the lowest access to primary and secondary education is Colombia with 23.3% of its territory in gap areas.






## 8. Limited access to primary and secondary education in rural areas

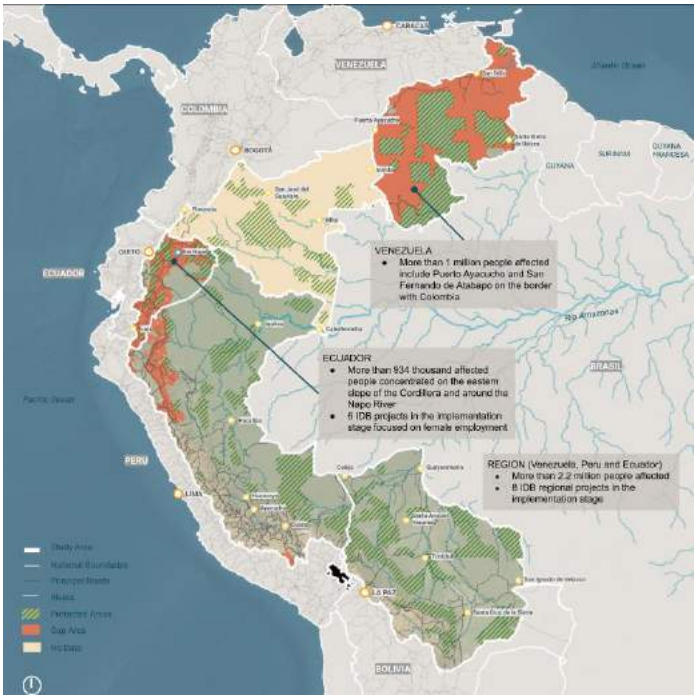
The gap in access to primary and secondary education in rural areas of the Amazon is one of the largest in Latin America. This is serious, considering that education is considered one of the most powerful drivers of development. Through it, poverty is reduced, health is improved and gender equality is supported.

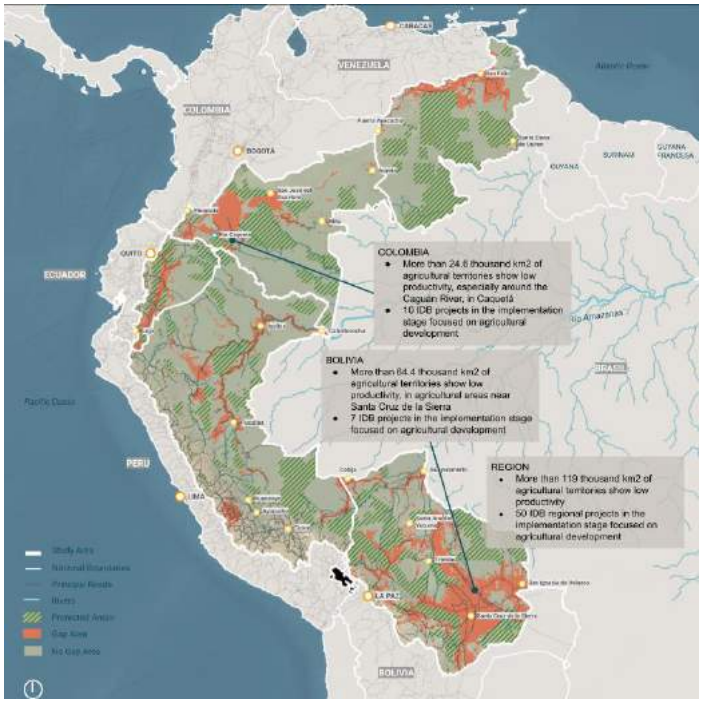
- About 45.2% of the study area has education gaps in rural areas.
- About 6.5% of the area's population could benefit from managing this gap.
- The country with the lowest access to education is Colombia, with 52.2% of its territory in the gap area.

## 9. Low female employment rate

According to ECLAC data (2021) the COVID-19 pandemic generated a setback of more than ten years in female labor participation due to different factors, such as the female labor force being concentrated in sectors with a higher risk of contraction, such as tourism.

- Nearly 11.5% of the study area has a low female employment rate.
- Around 9.1% of the female population in the area could benefit from managing this gap.
- The country with the lowest female employment rate corresponds to Venezuela, with 94.3% of its population in the gap area.






## 10. Low productivity of agricultural lands

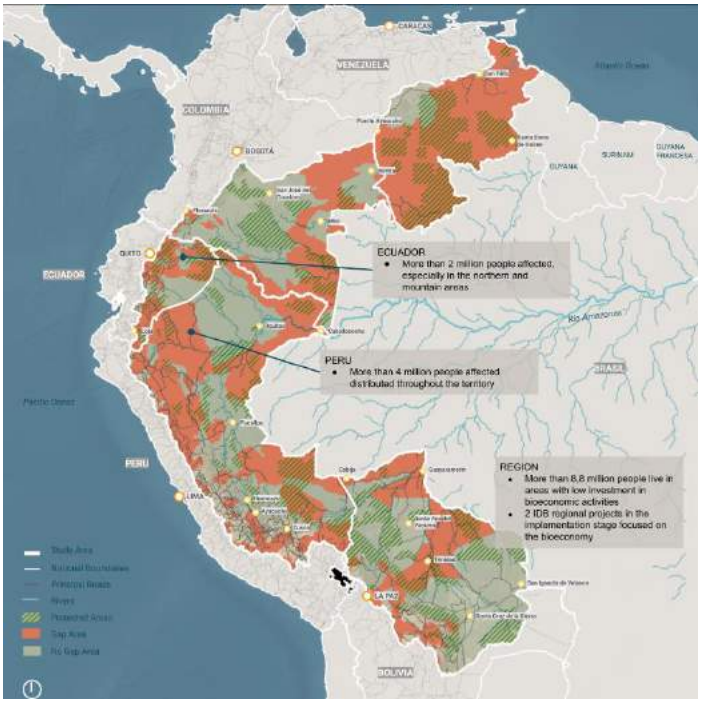
Agricultural production has faced various challenges that have increased in recent decades in the face of growing rural population pressures, migratory patterns, recurrent natural disasters, and farmers' limited access to information, modern technology and best practices, increasing food insecurity and putting at risk the sustainable exploitation of the medicinal potential of native plants in the region.

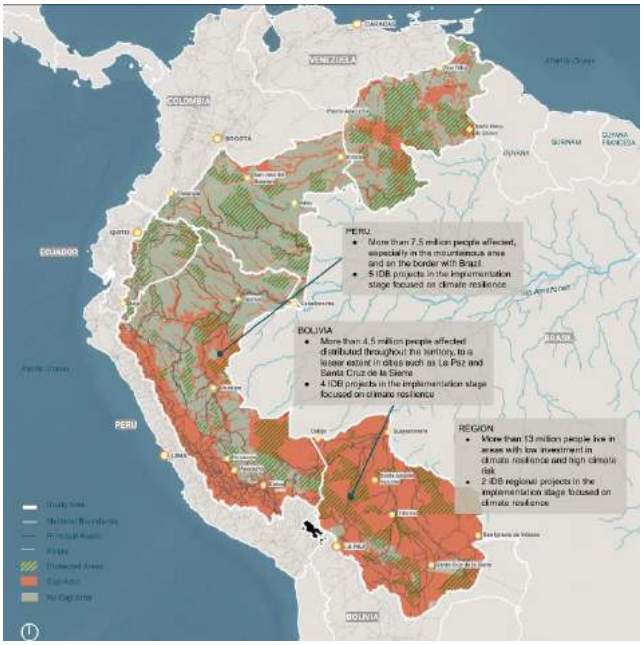
- Around 4.3% of the agricultural territory of the study area has low agricultural productivity.
- Approximately 8% of the population of the area could benefit from the management of this gap.
- The country with the lowest agricultural productivity corresponds to. Bolivia, with 9%.

## 11. Limited investment in green and inclusive economic activities

In order to boost the development of green and inclusive activities, different alternatives should be promoted where public and private agents establish a symbiotic relationship with the natural environment, allowing its conservation while the population reaps economic benefits from it.

- Approximately 52% of the study area has little or no presence of green and inclusive economic activities.
- About 35.8% of the area's population could benefit from the management of this gap.
- The country with the lowest proportion of investments in green and inclusive economic activities is Venezuela, with 89.5% of its territory with no or low presence of activities.






## 12. Low investment in climate resilience

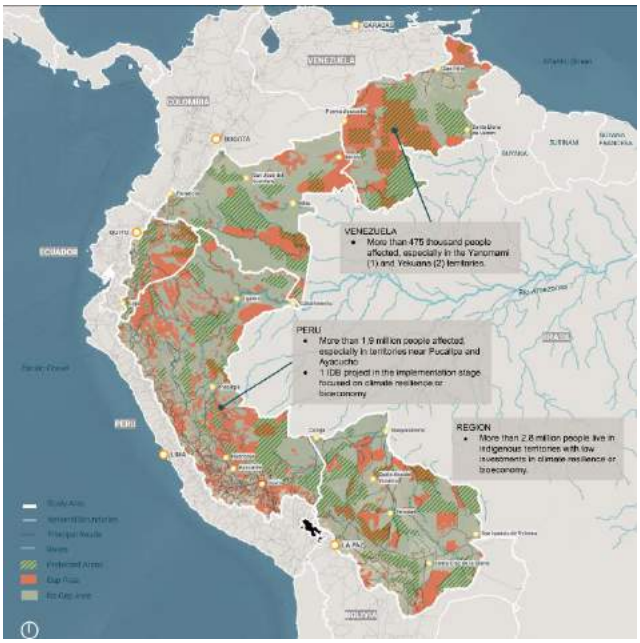
The East Andean region of the Amazon is currently facing numerous environmental risks that will be exacerbated by climate change. Investments in agriculture, environment and disaster management must have a cross-sectoral impact to build the resilience of communities engaged in climate-sensitive activities such as agriculture, forestry and livestock.

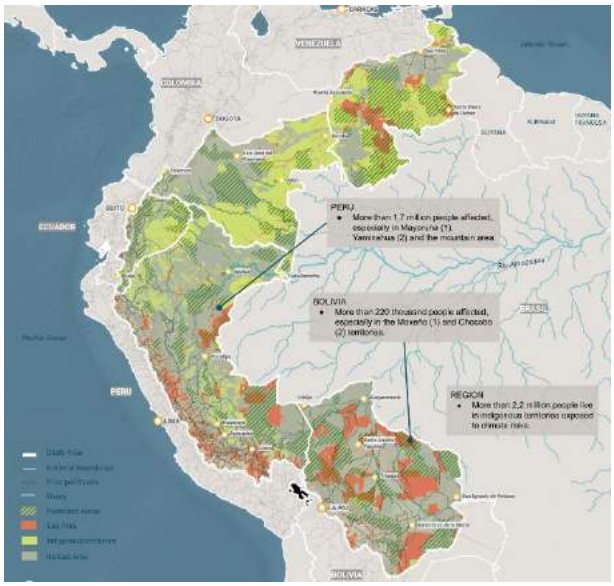
- Nearly 43% of the territory has low investment in climate resilience.
- Around 54% of the region's population could benefit from managing this gap.
- Bolivia is the country with the lowest investment, with 91% of its territory in the climate resilience gap.

## 13. Low significant investments in indigenous territories

Indigenous territories in the East-Andean Amazon are home to more than 2.8 million people. Indigenous communities are culturally diverse with around 200 recognized groups in the five countries; however, there are low investments related to climate resilience or green and inclusive economic activities.

- Some 29.5% of the territory has low relevant investments.
- Around 11.7% of the region's population could benefit from managing this gap.
- Venezuela is the country with the lowest investment, with 46.6% of its territory in the gap.






## 14. Indigenous territories exposed to climate hazards

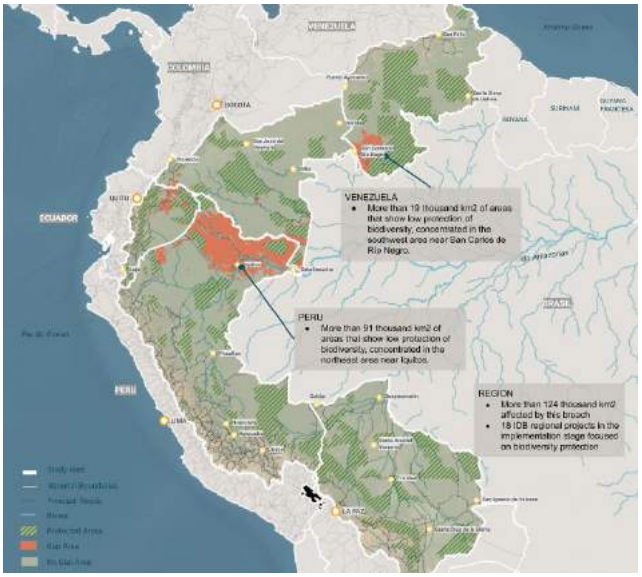
Deforestation rates in the Amazon are two to three times lower in indigenous territories than in non-indigenous territories (Global Forest Watch, 2020). Therefore, protected areas and the recognition of indigenous territories are two of the main tools to protect the Amazon biome and stop deforestation.

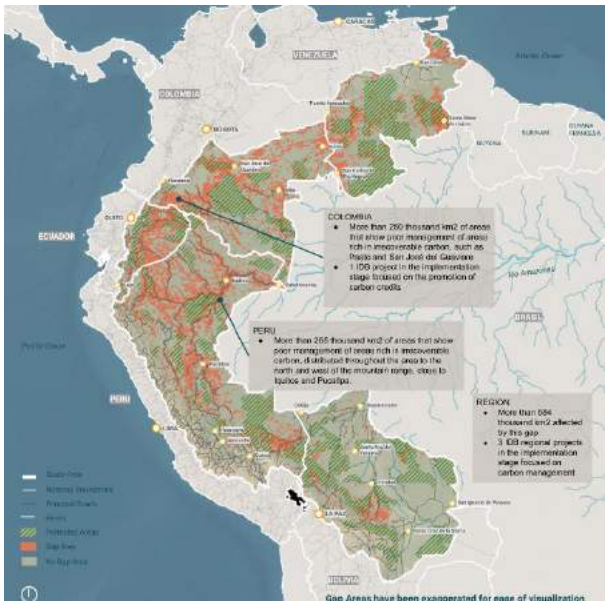
- About 15% of the territory has high exposure to climate hazards.
- Approximately 9.3% of the region's population could benefit from managing this gap.
- Bolivia is the country with the highest exposure to climate hazards in indigenous territories, with 25.2% of its territory in the gap.

## 15. Low biodiversity protection

The dichotomy between nature conservation and poverty alleviation are key factors in the high rate of biodiversity loss. A dialogue between stakeholders is needed to enable the economic development of the most vulnerable communities, while simultaneously protecting the environment.

- Around 4.5% of the unprotected or indigenous study area has low protection of areas with high biodiversity.
- Approximately 1.3% of the area's population could benefit from addressing this gap.
- Peru is the country with the largest area of unprotected high biodiversity, with 9.5%.






### 16. Low performance in the recent management of carbon resources

Carbon reserves refer to the amount of carbon stored in trees, vegetation and soil. Deforestation and degradation of these ecosystems can release large amounts of carbon into the atmosphere in the form of CO2, which contributes to climate change.

- About 0.02% of the study area has poor management of carbon resources.
- Approximately 0.01% of the area's population could benefit from managing this gap.
- Colombia, with 0.05% of its territory in the gap area, has the poorest management of this gap.

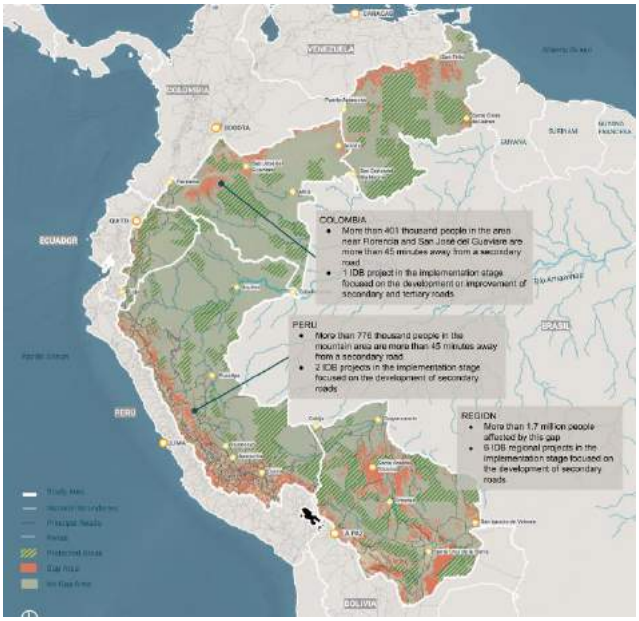
## Axis: Infrastructure[11]

### 17. Limited access to main roads

Deficiencies in the road network result in challenges linked to the lack of connectivity in the most isolated territories with markets, financial resources, basic services, and labor markets, greatly affecting the region's productive capacity and opportunities; however, at the same time, uncontrolled expansion threatens some of the planet's most valuable natural resources.

- About 11.3% of the populated area of the study area has gaps in access to major roads.
- Around 10.1% of the area's population could benefit from managing this gap.
- Bolivia is the country with the highest percentage of territory affected by this gap, with 19.1%.


[11] Due to the regional nature of the study, accessibility to the primary and secondary road network was analyzed with geographic data from the most complete and current open sources available during the development of the project (OpenStreetMap). The analysis does not consider bridge infrastructure, nor the state of roads, as this information is not available for the five countries, and if it is available, the information is avilabale at the national level only. If the condition of the roads were also considered, the gap would likely be larger, since the existence of a road does not imply that it is of good quality. Future studies that consider the quality of the road network at the regional level would shed more light on this gap.




## 18. Limited access to secondary roads

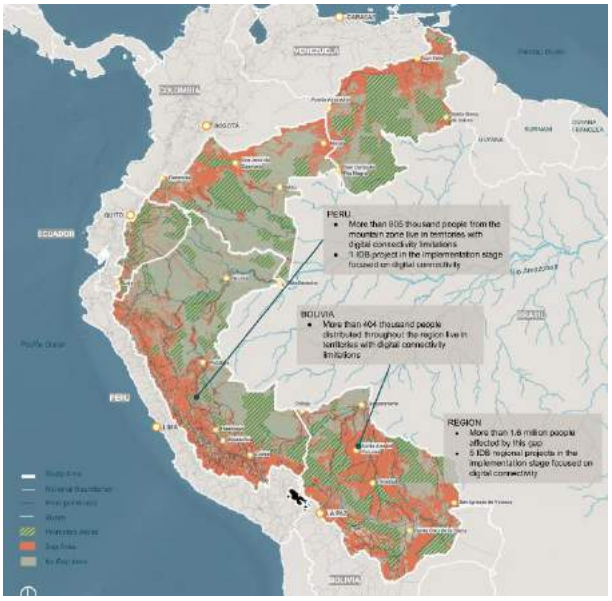
Whether they arise as a result of careful planning or as a result of illegal activities, secondary roads play an important role in shaping the connectivity of the region, providing alternatives to the main roads after the occurrence of climatic hazards such as forest fires, floods or landslides.

- Approximately 10% of the populated area of the study zone has access gaps to secondary roads.
- About 7.3% of the area's population could benefit from managing this gap.
- The country with the highest percentage of territory affected by this gap is Bolivia, with 16.4%.

## 19. Limited digital connectivity

Digital connectivity is a vital tool for promoting the sustainable development of a region, especially in a region with such a high level of disaggregation as the Amazon.

- About 11.1% of the study area has limited digital connectivity.
- Some 6.8% of the population of the area could benefit from managing this gap.
- The country with the greatest limitations in digital connectivity is Bolivia, with 18.5% of its territory in the gap area.





## 20. Limited access to power substations

Many communities in the region lack access to electricity and rely on expensive and unreliable energy sources, such as diesel generators. The construction of power substations would allow for more efficient and reliable distribution of electric power.

- Approximately 17.6% of the studied area has limited access to electrical substations.
- Nearly 41.7% of the area's population could benefit from managing this gap.
- Bolivia is the country with the greatest limitations in terms of access to substations, with 28.2% of its territory within the gap zone.

# 4 Multisectoral gaps results

**The above analysis provides a useful insight in terms of identifying where the areas of greatest need are by sector**. However, sectoral gaps are not isolated, but are often linked to challenges in other sectors. While sectoral gaps provide a regional-level picture of the severity of challenges related to development indicators, these challenges are multifaceted and linked across sectors. The sectoral approach can overlook many of these complexities, especially in a territory as large and challenging as the Amazon; therefore, the goal of multi-gap analysis is to broaden the analytical lens and examine possible correlations between gaps in different sectors.

**From a multi-sector standpoint, interrelationships between sectors can be strengthened when there are a large number of potential beneficiaries and overlapping gaps**. This perspective opens possibilities to create efficiencies in implementation and increase the return on investment by capitalizing on the indirect effects between interventions on gaps. For this purpose, it is necessary to implement a territorial model that considers the singularities of the Amazon.

**The multi-gap index allows analyzing the results of development gaps with a multi-sectoral approach**. Through three instances, it captures the concentration (measured in terms of spatial overlap: low, medium and high) of sectoral gaps throughout the study area. These three instances respond to the three major challenges presented in the introduction: human capital gaps, environmental protection gaps and productive opportunity areas.

**This process reveals the prioritization of key areas of intervention for multisectoral action that allows to comprehensively and efficiently address the challenges of developing a green, inclusive and sustainable economy**. This is the first approach as to "where", in order to focus the efforts of the multisectoral and governments of the region.

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**The analysis shows that more than 1 million people experience at least 6 human development gaps**.[12] Peru is the most affected country. This means that almost 5% of the regional population experiences simultaneous challenges in access to basic services such as electricity or sanitation, but also lack access to educational and digital infrastructure. Within these areas of high gap concentration, more than 635,000 people are of working age, but without support to counteract the combined effects of highly concentrated gaps; the human capital of this potentially productive population is constrained by limitations in health, education and connectivity.

**It is estimated that more than 14 million people live in areas with natural capital conservation gaps**.[13] More than half of the affected population (7.8 million) is located in Peru, experiencing problems in areas of high irrecoverable carbon density, areas exposed to high climate risk and areas with low biodiversity protection. Within these areas, more than 8.7 million people (35.6%) are of working age. A large number of areas with a medium concentration of these gaps coincide with indigenous territories (IT), highlighting the important role of these areas as a means of conserving natural capital. These include the Isoso IT of the Guaraní Isoseño ethnic group in southern Bolivia, the Putumayo estate of the Witoto ethnic group between Peru and Colombia, and the traditional territory of the Kurripaco ethnic group on the banks of the Casiquiare River in Venezuela.

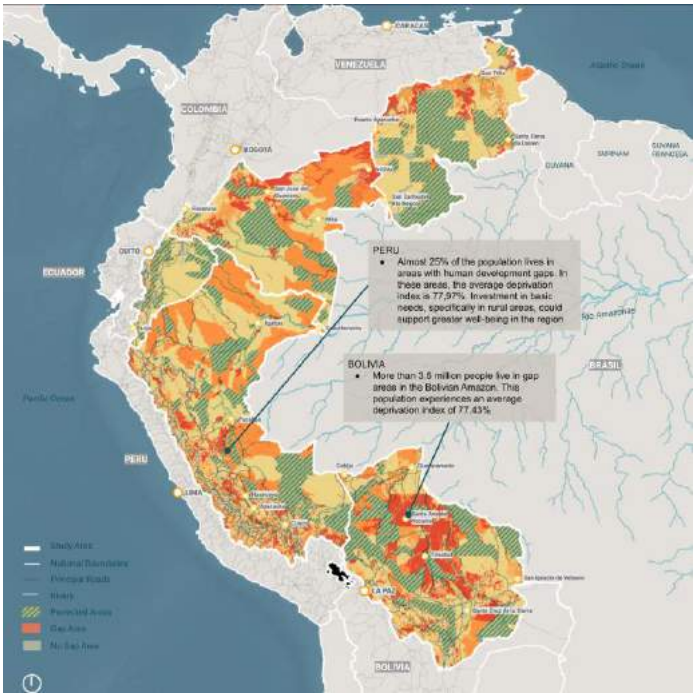
**Over 14 million people of working age live in areas with production potential in sectors linked to sustainable, green and inclusive development**.[14] Within these areas, 371 companies linked to the pillars of green, sustainable and inclusive economic resilience are already operating. These areas also show potential for the expansion of these types of companies. Santa Cruz de la Sierra in Bolivia, Pucallpa in Peru and San José de Guaviare in Colombia stand out.

12 This multi-gap analysis includes 11 sectoral gaps that are directly related to human development through the fulfillment of basic needs or access to basic services. The degree of intersection is classified into three groups depending on the number of overlapping gaps in a given area: high (7 to 11 gaps), medium (5 to 6 gaps) and low (1 to 4 gaps).

13 This analysis includes 5 layers of information, including 3 sectoral gaps associated with areas where natural resources require protection. The degree of intersection is classified in three groups depending on the number of overlapping gaps in a given area: high (4 to 5 gaps), medium (2 to 3 gaps) and low (1 gap).

14 This multi-gap analysis includes 4 layers relevant to potential green, inclusive and resilient development through the connective capacity and qualities of productive territories. This multi-gap is revisited in the next stage that promotes interventions based on productive centers with the potential to reduce social gaps and protect the environment

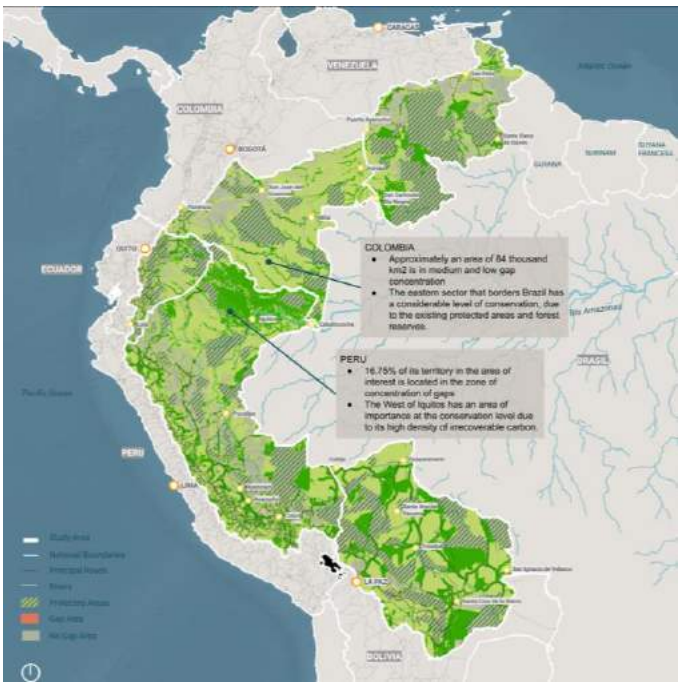
## Multi-gap analysis of human development



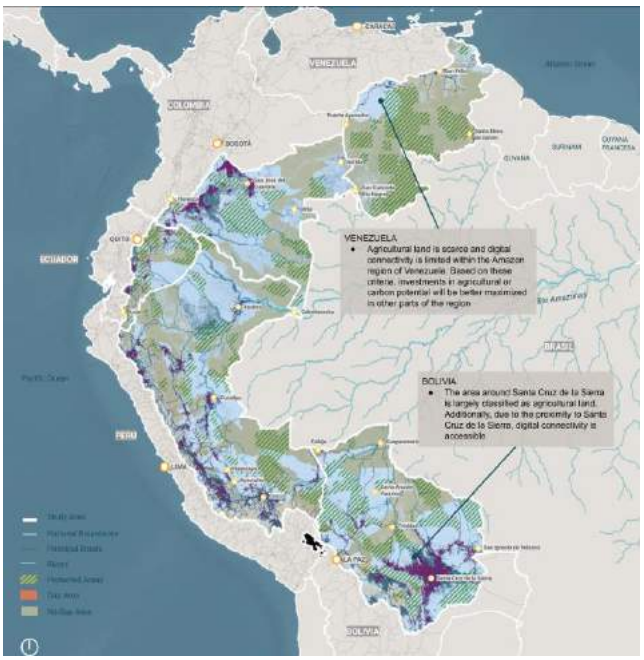

- More than 12.2 million people (49.68% of the population) experience lagging conditions in at least one of the gaps included.
- More than 500,000 people (2.15% of the regional population) live in areas where at least six human development gaps intersect.
- Nearly 3% of the regional population experiences simultaneous challenges in accessing basic services such as electricity or sanitation, as well as lacking access to educational and digital infrastructure.
- Within these areas of high concentration of gaps, more than 319 thousand people are of working age.

## Multi-gap analysis of natural capital and environmental conservation

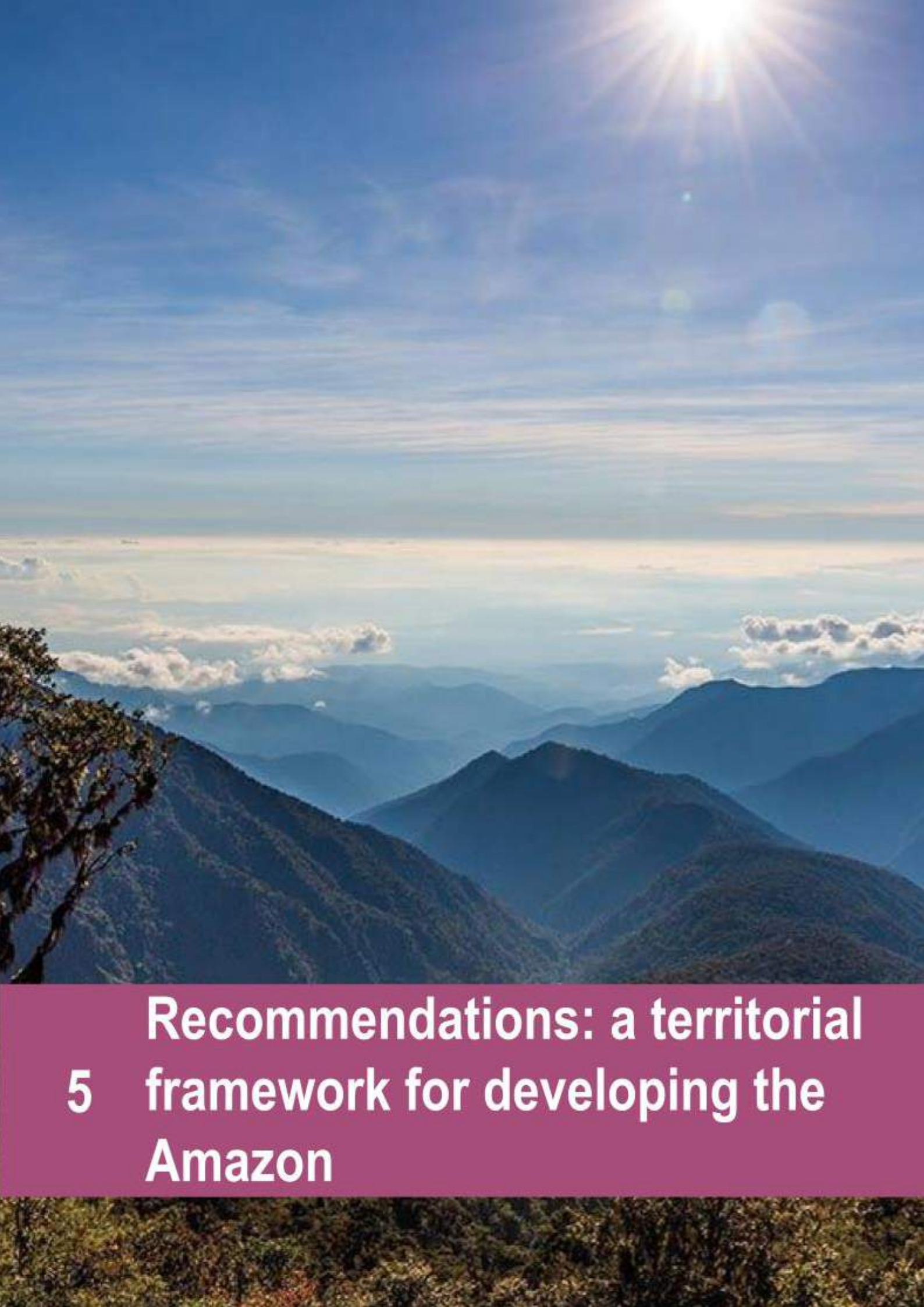
- The multisectoral analysis of natural capital conservation covers areas with high density of irrecoverable carbon, areas exposed to high climate risk and areas with low biodiversity protection.
- Peru with 50.91% and Bolivia with 64.54% have the highest gap concentration percentages.
- Regarding Colombia and Venezuela, approximately 30% and 17% of their respective populations live in multi-gap areas.
- Most of the areas with a high concentration of gaps do not show a defined pattern and are generally located along riverbanks.
- As for medium and low concentrations, these are associated with areas where companies are mostly engaged in livestock farming.
- A large number of areas with a medium gap concentration coincide with indigenous territories, emphasizing the important role of these zones as a means for the conservation of natural capital.



## Multi-gap analysis of inclusive, sustainable and green economic potential




- 11.05% of the region evidences potential for the development of high to medium inclusive, sustainable and green economic development.
- These areas fulfill at least two of the requirements of having agricultural land, a previous limited inclusive, sustainable and green investment, presence of irrecoverable carbon, and the capacity for digital connectivity.
- Within these areas, 244 inclusive, sustainable and green businesses are already operating; nevertheless, these areas also show potential for the expansion of these activities.
- Within these potential areas live more than 10.5 million people of working age, thus presenting a labor force for any economic development that may arise.
- Inclusive, sustainable, and green economic investment in the high to medium potential areas would support the growth of a resilient economy in some of the best prepared regions of the territory, allowing for results in the short to medium term.

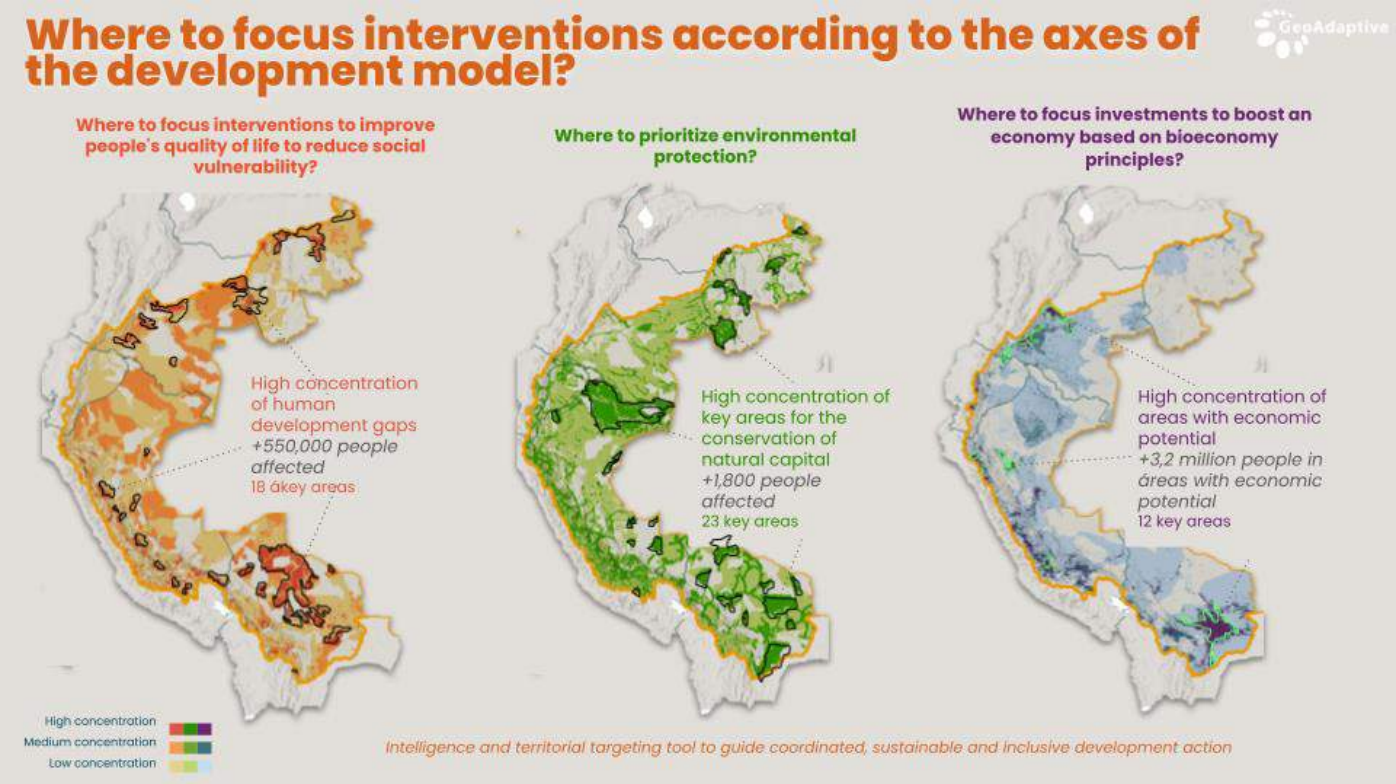


# 5 Recommendations: a territorial framework for developing the Amazon

**Having reviewed the results of the sectoral gaps and the thematic multi-gaps, the question is, where should interventions be focused?** In attempting to answer this question, it is necessary to take into account human, productive and natural aspects in order to allocate resources where they can be best utilized and where economies of scale can be generated.

**The following figure shows the areas of greatest need or potential in the territory, and where interventions could be focused**. Some of the regions highlighted are La Macarena (Colombia) for social interventions, Autónomo Rio Negro (Venezuela) for conservation initiatives and Andrés Ibáñez (Bolivia) for the promotion of productive activities. However, it is important to work from a model that considers all aspects, and that can build on existing opportunities in this territory.

**Figure 4. Initial vision introducing the idea of targeting investments based on the need to be addressed.**




Prepared by the authors.

**While this study does not develop a menu of investments or specific interventions, it proposes a development model based on nodes and networks that allows for a gradual and less invasive development in the territory and that capitalizes on economies of scale**.[15] Due to the large extension of the region, an efficient way of thinking about interventions is to focus on productive nodes that are then disaggregated within the territory. It should be emphasized that this approach requires a multisectoral and long-term view, where existing human capital and productive activity is developed to boost nodes, thus generating a spillover effect to other settlements in the region - starting with a productive development that then leads to an improvement of social gaps.

**The first objective is to build opportunities starting from productive centers that already have existing human capital**. By starting from the zones with the greatest productive capacity and human capital, 18 nodes have been identified that include 12.7 million inhabitants, spread across 67 settlements and covering more than 107,000 km$^2$ of urban areas in the region.

**These zones correspond to territories with a high concentration of productive inputs and human capital**. There are 3 sites in Bolivia, 9 in Peru, 2 in Ecuador, 1 in Colombia and 1 in Venezuela. There are also 2 cross-border zones between Colombia-Ecuador and Colombia-Peru, which is home to more than 790 thousand people. For more details, see Annex 1.2.

15 Some of the sources indicating the benefits of this approach include a FAO study published in 2018 on agricultural clusters in the Amazon, a World Bank report published in 2022 concluding that networks of companies and organizations are essential for sustainable development in the region, and an article published in Sustainability magazine in 2020 where a systematic review of the literature on the role of networks in sustainable development in the Amazon is undertaken. The article concludes that a network-based approach is necessary for sustainable development in the region.

**These nodes are connected to others through nearly 34 thousand km of existing land and river networks, allowing an expansion to nearby areas with productivity gaps**. This process allows connecting through existing networks (roads and rivers) as well as potential ones (digital and aerial) reaching 22 secondary nodes, with an estimated 16.1 million beneficiaries, 112 settlements and more than 141 thousand km$^2$.

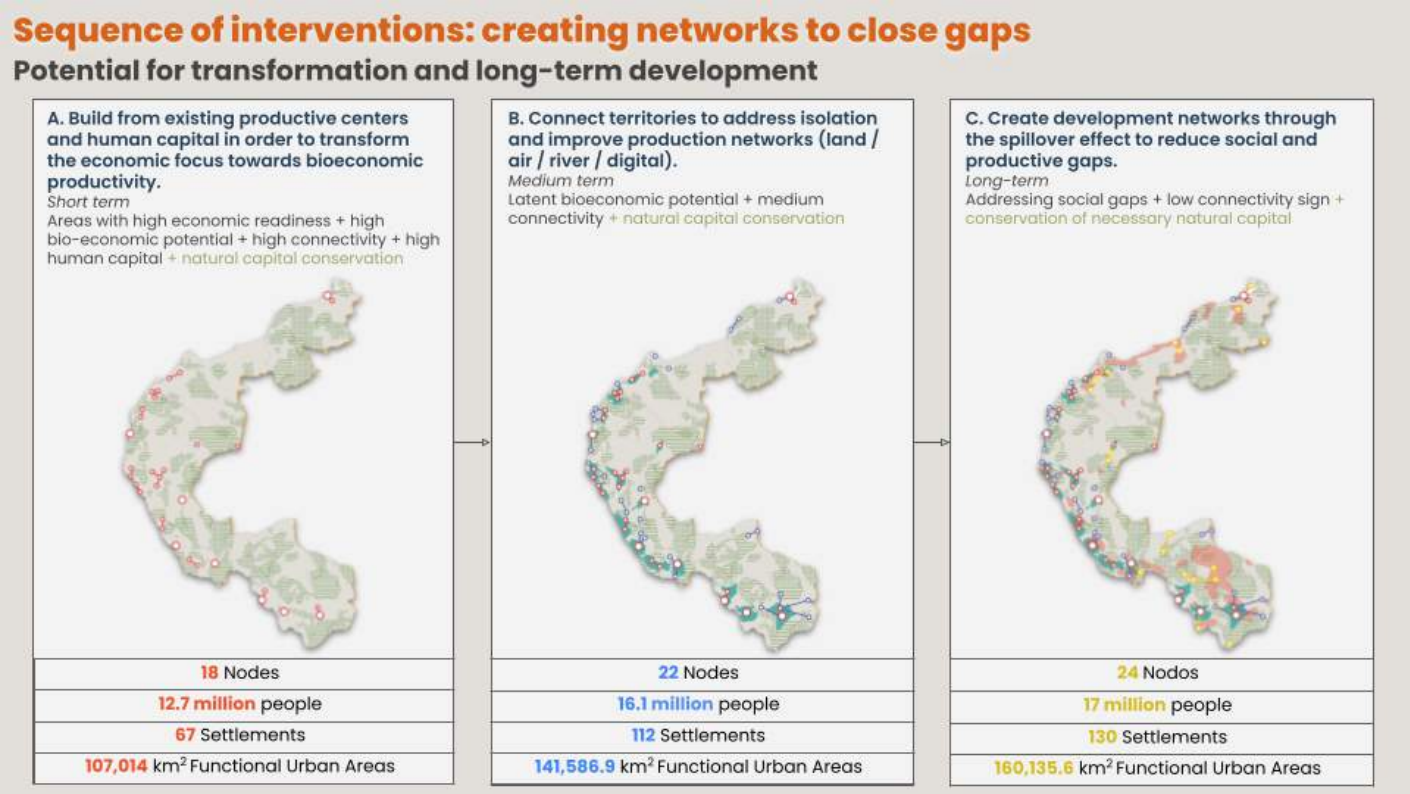
**These new territories could benefit in the medium term from economies of scale, due to their proximity to the initial nodes**. By unleashing the green, sustainable and resilient economy potential that is currently deemed to be latent, production networks could be enhanced, supporting future innovations, new jobs, including a larger number of vulnerable populations, while managing environmental protection.

**As the model develops, these value chains reach areas with the greatest number of unmet basic needs**. By taking advantage of the spillover effect mentioned above, more and more isolated territories are included, reaching populations further into the jungle.

**The final step seeks to stabilize and address social gaps, focusing on the 18 most vulnerable areas, among which Mamoré, Mapiripán, La Macarena and Valparaíso can be mentioned**. At this stage, the approach is long term, capable of reaching 24 nodes, 17 million beneficiaries, 130 settlements and approximately 160 km$^2$ of functional urban areas. While the development model proposed in this study is based on a phased territorial development, starting with productive development that supports social development, by no means does it rule out that agencies that prefer to focus on humanitarian activities may first focus on supporting these nodes with social interventions.

**The proposed territorial model of nodes and networks seeks to maximize benefits for the largest population possible, identifying the current needs and opportunities of the people and territory**. This model allows decision-makers to target areas that are ready for transition given their existing conditions in productive centers and human capital, and therefore addressing areas of gaps and natural capital.

**Figure 5. Sequence of the Nodes and Networks Development Model.**




Prepared by the authors

**For example, between the departments of Cajamarca and Amazonas in Peru, there are 4 productive nodes: Jaén, Bagua, Cutervo and Bambamarca, an area known for its aquaculture and agricultural potential.** This area with potential has a road and river system that connects with other nearby areas, generating development networks in more isolated localities, without intervening in the nearby protected areas. As the model advances, these value chains reach the areas with the greatest unsatisfied basic needs, taking advantage of the spillover effect, hoping in the future to improve the lives of more than 750,000 people only in this small area of Peru of almost 12,000 km$^2$, allowing more women to have access to decent jobs, children to stay in school and, for example, the homes of these people to have access to drinking water and electricity.

**The regional approach followed by this model makes it possible to think of strategies at both the national and regional levels**. The proposed exercise has the advantage that it can be conceptualized from a national point of view, in which each government maps its productive nodes and develops relevant interventions in its territory (each country has at least one node). Nonetheless, it also opens the possibility of taking a more regional approach and to conceptualize models of economies of scale and growth regardless of borders.

**Despite these possibilities, there are limitations to the study that should be addressed in future research.** This study has presented a quantitative approach to the question of how to target interventions in the AAR, both sectorally and territorially. Although the documentation analysis was exhaustive, no qualitative sources of information were used and no fieldwork was carried out during the elaboration process. Likewise, as highlighted in the methodological section, the variables used cover only a select group of information on the 4 thematic axes addressed. These variables were selected both in terms of representativity and data availability for all the countries in the study. Building on this first baseline, future analysis could complement these findings in different fronts: i) studies on sociocultural and policy factors, with a more qualitative approach, or that address issues that cannot be approached from a purely quantitative perspective; ii) the development of action or investment plans focused on specific areas, including sustainability analyses, environmental and social impact assessments, and the development of sector-specific lines of action; iii) analysis of the relationship between gaps and other sectors, and how these may have externalities; iv) further efforts to generate data in other fields that inform public policy in the region - for example, infrastructure quality; v) the inclusion of other countries in the Amazon Region. Finally, this study proposes a possible intervention model - without claiming to be prescriptive, due to the large number of interventions across the territory - that can be conceptualized with the maps produced. These results are expected to provide one more tool to the toolkit used by governments, donors and other policy makers, informing the possible design of different types of interventions in different areas of the territory. The results should then be complemented with other more qualitative and community-based diagnoses and approaches.

**These results allow us to rethink strategies on how to target better interventions to promote an integrated development of the AAR**. The results of the gap analysis allow focusing on the areas with the greatest needs and opportunities in the territory; while the proposed model of nodes and networks enables thinking, both nationally and regionally, about possible sequences of interventions that promote sustainable, inclusive and green development of the region without losing this precious natural asset. The results are not only useful for local and subnational authorities. They allow all stakeholders involved in the region's development to have a global vision of the challenges and opportunities, encouraging greater regional cooperation and coordination and to think about these challenges in a holistic manner. The development of the AAR therefore depends on this sustainable and collaborative approach that takes advantage of its riches, protects its environment and promotes an inclusive and green development model with targeted and gradual interventions. Only through these actions can a prosperous and sustainable future for this unique region be guaranteed.

# 6 Annexes

# A. 1

**Table 2. Summary of results of the Node and Development Network Model by country for the initial group of 18 nodes.**

| Country | Node | # Firms | Sector | Area (km²) | Total Population | | | | Area (km²) | Urban Population | | | | Area (km²) | Rural Population | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Density | Total | Men | Woman | | Density | Total | Men | Woman | | Density | Total | Men | Woman |
| | | | | | Total | | | | | Urbana | | | | | Rural | | | |
| Venezuela | 1 | 9 | Forestry | 2.513 | 336,40 | 872.190 | 409.909 | 435.533 | 2.404 | 351,02 | 843.732 | 409.099 | 434.633 | 110 | 15,61 | 1.710 | 810 | 900 |
| Colombia | 2 | 17 | Sustainable Agriculture | 7.406 | 39,88 | 272.347 | 149.943 | 145.361 | 4.727 | 59,96 | 283.418 | 144.023 | 139.395 | 2.679 | 4,44 | 11.886 | 5.920 | 5.966 |
| Colombia - Peru[16] | 3 | 0 | Sustainable Agriculture and Tourism | 204 | 227,92 | 46.612 | 24.148 | 22.464 | 171,2 | 252,12 | 43.163 | 22.379 | 20.784 | 33 | 103,96 | 3.443 | 1.769 | 1.674 |
| Ecuador - Colombia | 4 | 17 | 5 sectors with equal value | 12.128 | 61,35 | 743.919 | 384.688 | 359.423 | 7.892 | 81,33 | 641.859 | 329.686 | 312.173 | 4.236 | 24,14 | 102.252 | 55.002 | 47.250 |
| Ecuador | 5 | 21 | Sustainable Livestock / Agriculture | 4.594 | 59,29 | 295.919 | 137.664 | 134.683 | 1.551 | 119,74 | 185.738 | 93.317 | 92.421 | 3.043 | 28,47 | 86.609 | 44.347 | 42.262 |
| | 6 | 10 | 5 sectors with equal value | 5.277 | 165,29 | 845.422 | 410.237 | 461.953 | 2.758 | 283,71 | 782.458 | 367.989 | 414.469 | 2.519 | 35,62 | 89.732 | 42.248 | 47.484 |
| Peru | 7 | 6 | Ganadería | 11.966 | 63,82 | 763.639 | 386.352 | 377.305 | 6.234 | 88,57 | 552.211 | 279.795 | 272.416 | 5.731 | 36,89 | 211.446 | 106.557 | 104.889 |
| | 8 | 6 | Forestry / 5 sectors with equal value | 9.838 | 72,58 | 714.409 | 352.554 | 361.530 | 5.599 | 105,32 | 589.692 | 290.597 | 299.095 | 4.239 | 29,34 | 124.392 | 61.957 | 62.435 |
| | 9 | 16 | Livestock | 12.238 | 73,13 | 894.932 | 466.714 | 428.165 | 9.641 | 87,49 | 843.451 | 439.454 | 403.997 | 2.597 | 19,80 | 51.428 | 27.260 | 24.168 |
| | 10 | 5 | Forestry / Ecotourism | 2.890 | 90,38 | 261.253 | 132.775 | 128.478 | 2.518 | 95,32 | 240.057 | 122.067 | 117.990 | 372 | 56,97 | 21.196 | 10.708 | 10.488 |
| | 11 | 4 | Forestry | 5.174 | 93,24 | 482.492 | 248.221 | 234.218 | 3.852 | 119,94 | 462.067 | 237.597 | 224.470 | 1.322 | 15,41 | 20.372 | 10.624 | 9.748 |
| | 12 | 11 | Forestry | 16.078 | 48,79 | 784.434 | 391.401 | 393.084 | 9.810 | 66,06 | 647.987 | 322.623 | 325.364 | 6.268 | 21,78 | 136.498 | 68.778 | 67.720 |
| | 13 | 18 | Livestock | 14.117 | 69,92 | 987.189 | 475.371 | 511.677 | 4.230 | 199,38 | 843.444 | 405.043 | 438.401 | 9.887 | 14,52 | 143.604 | 70.328 | 73.276 |
| | 14 | 11 | Sustainable Agriculture | 18.348 | 51,63 | 947.903 | 463.317 | 483.910 | 6.710 | 107,83 | 723.510 | 353.918 | 369.592 | 11.638 | 19,22 | 223.717 | 109.399 | 114.318 |
| | 15 | 11 | Ecotourism | 13.708 | 67,09 | 920.003 | 450.323 | 469.421 | 8.060 | 102,32 | 824.739 | 402.742 | 421.997 | 5.648 | 16,82 | 95.005 | 47.581 | 47.424 |
| Bolivia | 16 | 6 | Aquaculture/ Sustainable Agriculture | 10.927 | 99,41 | 1.087.226 | 551.158 | 535.096 | 4.590 | 188,72 | 866.208 | 439.514 | 426.694 | 6.337 | 34,72 | 220.046 | 111.644 | 108.402 |
| | 17 | 9 | 5 sectors with equal value | 17.653 | 95,50 | 1.685.738 | 855.208 | 830.530 | 7.688 | 199,26 | 1.531.932 | 776.959 | 754.973 | 9.964 | 15,44 | 153.806 | 78.249 | 75.557 |
| | 18 | 14 | 5 sectors with equal value | 28.273 | 89,43 | 2.528.174 | 1.321.918 | 1.206.434 | 16.701 | 143,81 | 2.401.720 | 1.255.760 | 1.145.960 | 11.572 | 10,94 | 126.632 | 66.158 | 60.474 |
| Total | - | 191 | - | 193.560 | 2.236,95 | 15.180.413 | 7.636.049 | 7.541.729 | 105.307 | 2.904,04 | 13.350.549 | 6.714.941 | 6.635.608 | 88.229 | 608,06 | 1.827.217 | 921.108 | 906.109 |

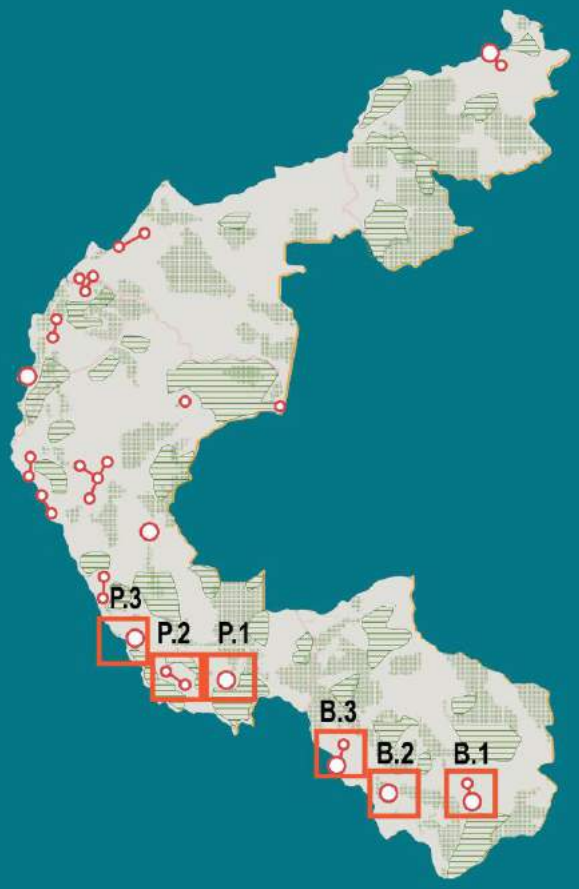
NB: Sectors and firms are selected based on sustainability, inclusion, and green growth criteria.
Sectors: Livestock, forestry, sustainable agriculture, ecotourism, aquaculture.
Prepared by the authors.

16 Node included due to political priorities

# A 1.2 Long-term transformation and Development Potential

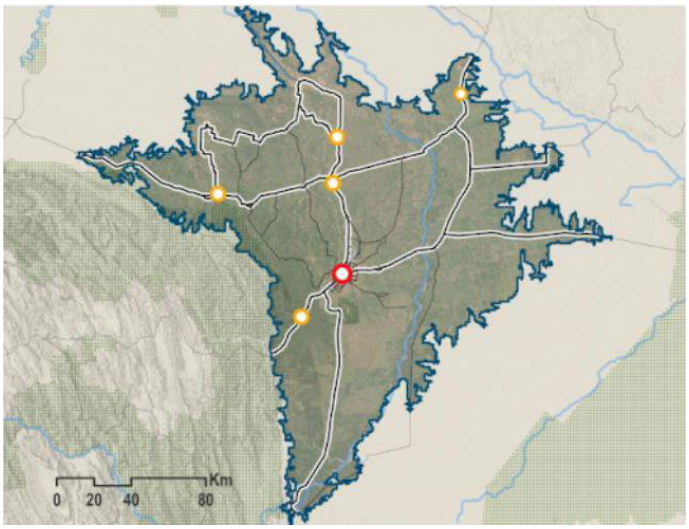
## Main Nodes

Environmentally friendly territorial model, which allows taking advantage of the existing opportunities of 18 nodes with productive potential and progresses towards closing social and productive gaps




### Node Bolivia 01

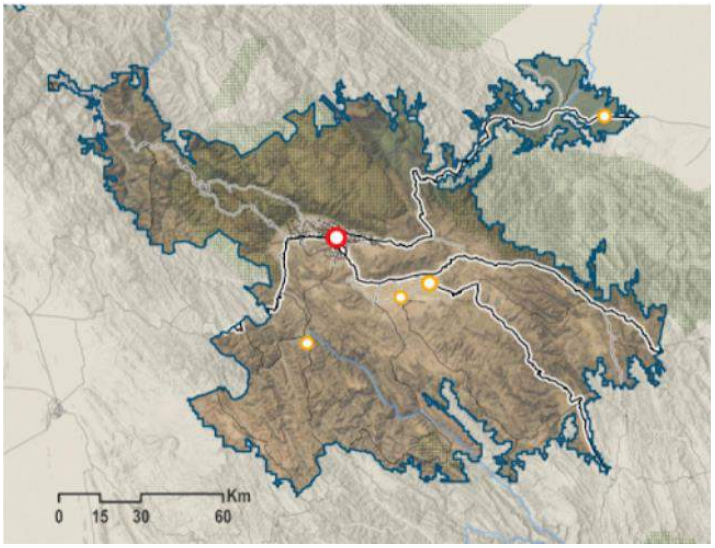
**Departments: Cochabamba, Santa Cruz**




| | |
|---|---|
| Total Population | 2,528,174 in 28,273 km$^2$ |
| Bioeconomy Firms | 14 |
| Potential | Green and inclusive activities |
| Main gaps | Limited access to power substations, low investment in climate resilience, limited access to sanitary services |

### Node Bolivia 02

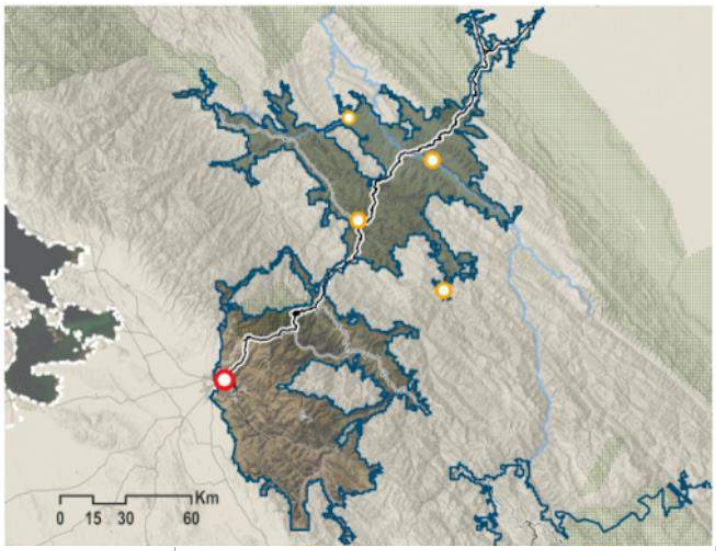
**Departments: Cochabamba, Santa Cruz**




| | |
|---|---|
| Total Population | 1,685,738 in 17,652 km$^2$ |
| Bioeconomy Firms | 9 |
| Potential | Green and inclusive activities |
| Main gaps | Limited access to power substations, limited access to drinking water, low investment in climate resilience |

## Node Bolivia 03

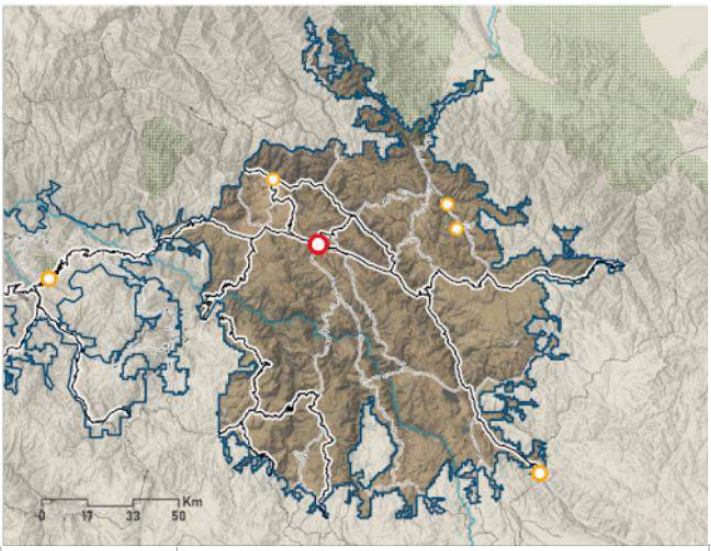
**Departments: Beni, La Paz**




| | |
|---|---|
| Total Population | 1,087,226 in 10,927 km$^2$ |
| Bioeconomy Firms | 6 |
| Potential | Aquaculture / Sustainable Agriculture |
| Main gaps | Low investment in climate resilience, limited access to electricity substations, limited access to health centers in urban areas |

## Node Peru 01

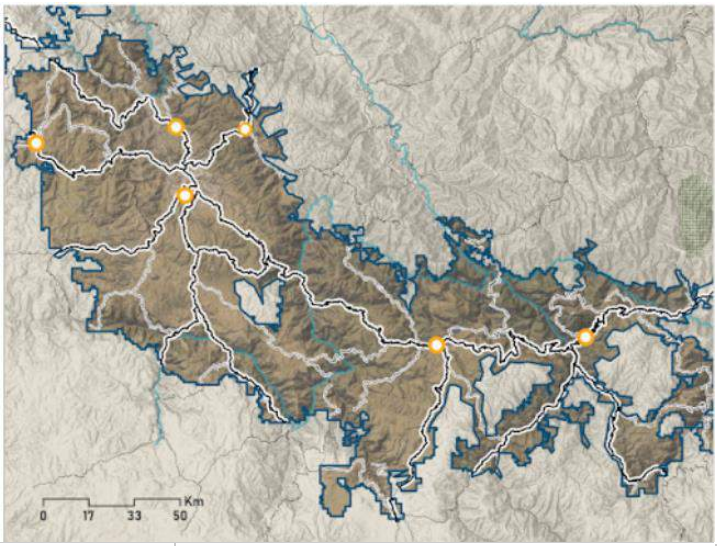
**Departments: Apurimac, Cusco**




| | |
|---|---|
| Total Population | 929,003 in 13,708 km$^2$ |
| Bioeconomy Firms | |
| Potential | Ecotourism |
| Main gaps | Indigenous territories exposed to climatic hazards, low investment in climate resilience, limited access to power substations |

## Node Peru 02

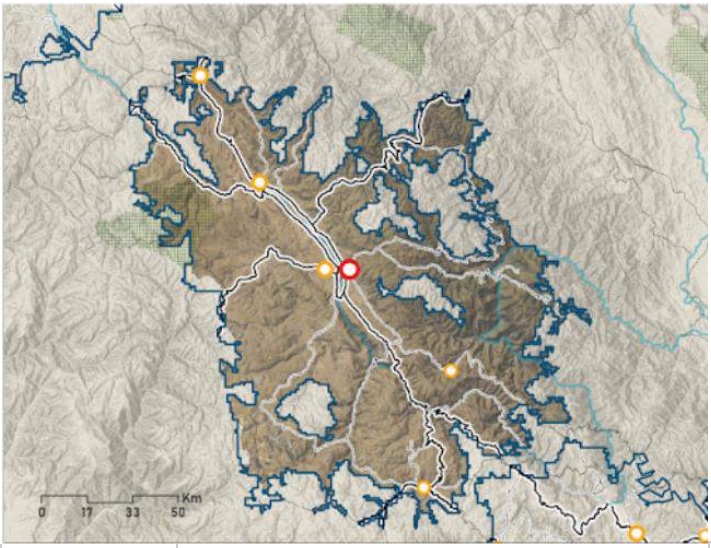
**Departments: Apurimac, Ayacucho, Cursco, Huancavelica**




| | |
|---|---|
| Total Population | 947,903 i 18,348 km$^2$ |
| Bioeconomy Firms | 11 |
| Potential | Sustainable Agriculture |
| Main gaps | Indigenous territories exposed to climatic hazards, low investment in climate resilience, limited access to power substations |

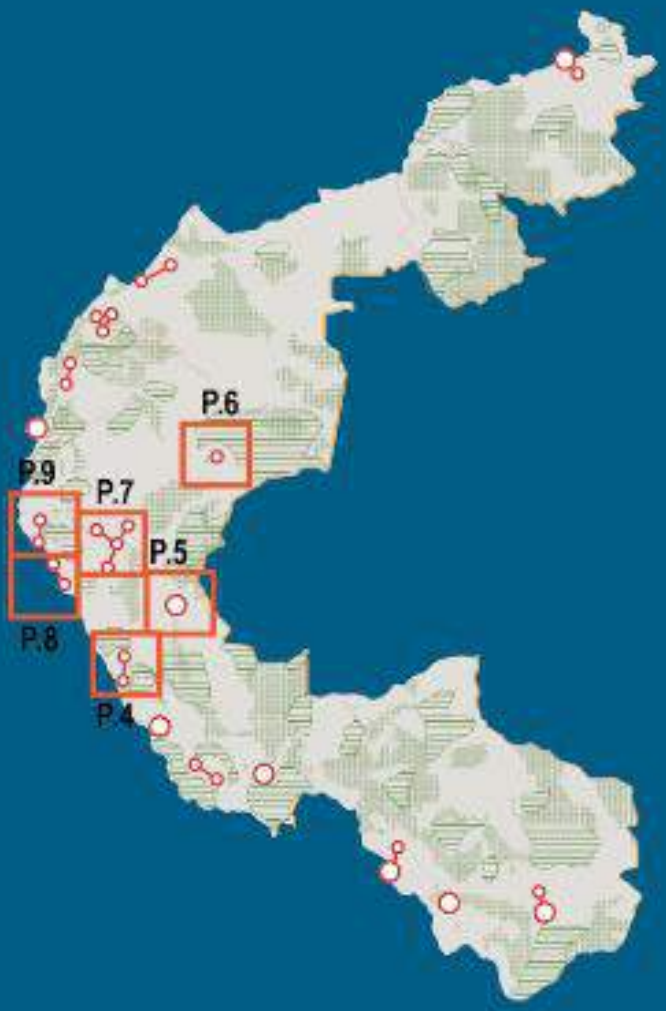
## Node Peru 03

**Departments: Huancavelica, Junin, Lima**



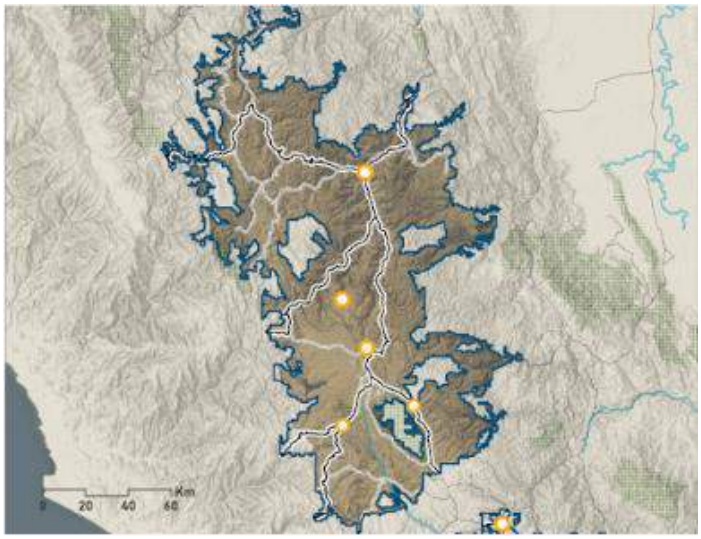

| | |
|---|---|
| Total Population | 987,189 in 14,117 km$^2$ |
| Bioeconomy Firms | 18 |
| Potential | Livestock |
| Main gaps | Low investment in climate resilience, limited access to power substations, limited digital connectivity |

# Main Nodes




## Node Peru 01

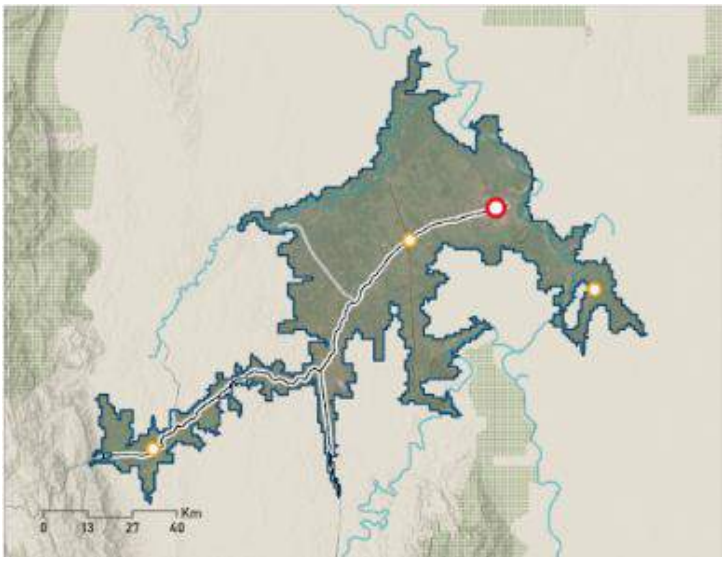
**Departments: Ancash, Huanuco, Junin, Lima, Pasco**




| | |
|---|---|
| Total Population | 784,434 in 16,978 km$^2$ |
| Bioeconomy Firms | 11 |
| Potential | Forestry |
| Main gaps | Indigenous territories exposed to climatic hazards, low investment in climate resilience, limited access to power substations |

## Node Peru 05

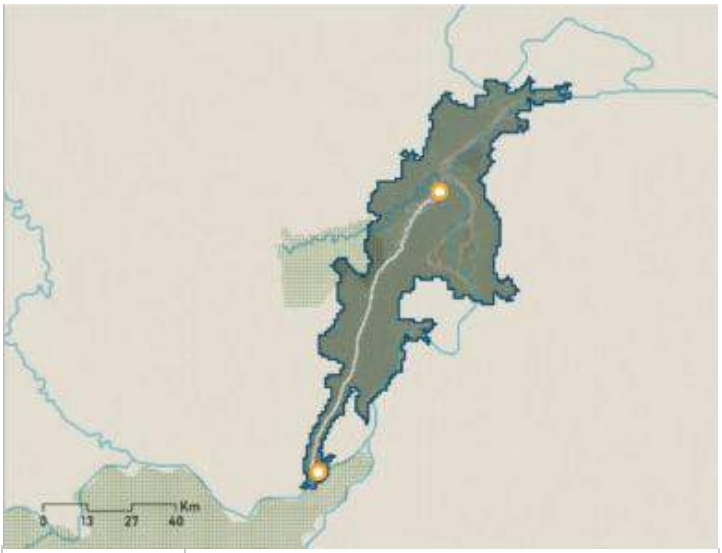
**Departments: Huanuco, Ucayali**




| | |
|---|---|
| Total Population | 482,492 in 5,174 km$^2$ |
| Bioeconomy Firms | 4 |
| Potential | Forestry |
| Main gaps | Limited access to health centers in urban areas, limited access to primary and secondary education in urban áreas, limited access to power substations |

## Node Peru 06

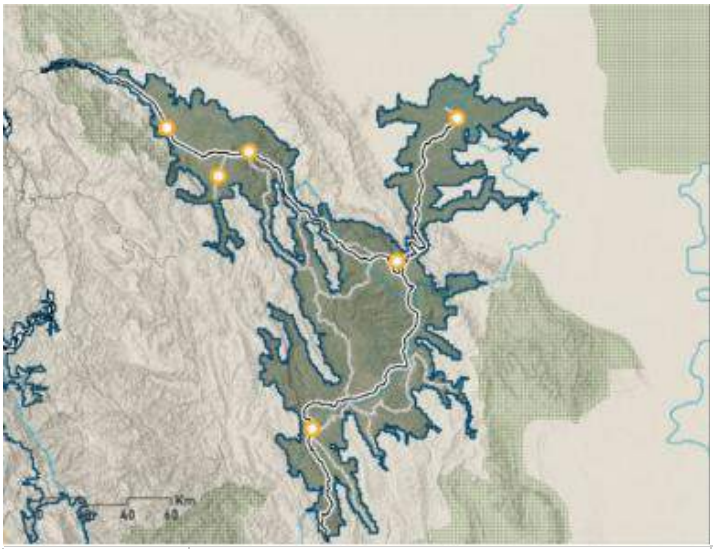
**Departments: Loreto**



| | |
|---|---|
| Total Population | 261,253 in 2,890 km$^2$ |
| Bioeconomy Firms | 5 |
| Potential | Forestry / Ecotourism |
| Main gaps | Limited access to health centers in urban áreas, limited access to primary and secondary education in urban areas, low investment in climate resilience |

## Node Peru 07

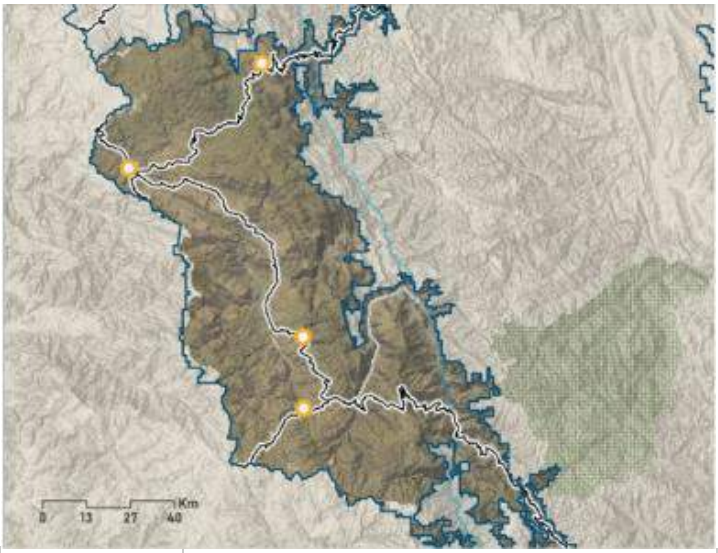
**Departments: Amazonas, Loreto, San Martin**



| | |
|---|---|
| Total Population | 894,932 in 112,238 km$^2$ |
| Bioeconomy Firms | 16 |
| Potential | Livestock |
| Main gaps | Limited access to power substation, limited access to health centers in urban áreas, limited access to primary and secondary education in urban areas. |

## Node Peru 08

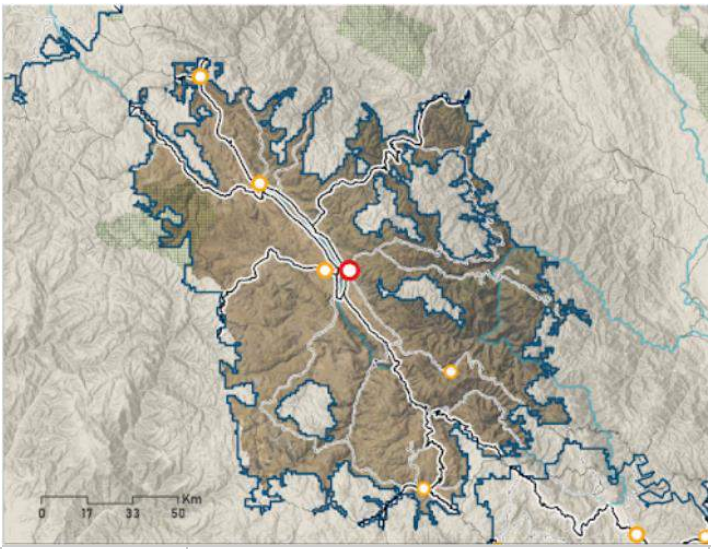
**Departments: Amazonas, Ancash, Cajamarca, La Libertad**



| | |
|---|---|
| Total Population | 714,409 in 72,58 km$^2$ |
| Bioeconomy Firms | 6 |
| Potential | Green and inclusive activities / Forestry |
| Main gaps | Limited access to power substations, low female employment rate, low investment in climate resilience |

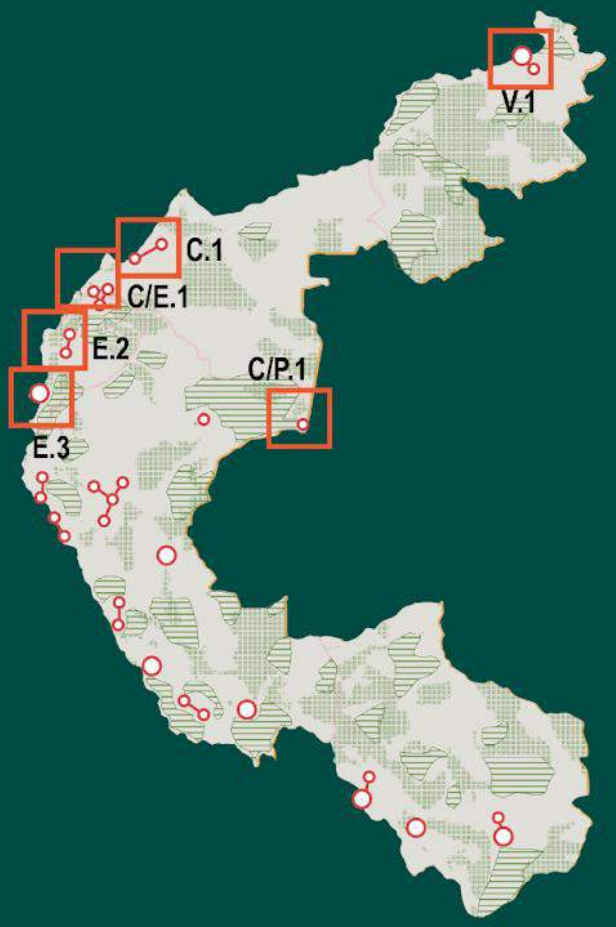
## Node Peru 09

**Departments: Amazonas, Cajamarca, Lambayeque, Piura**



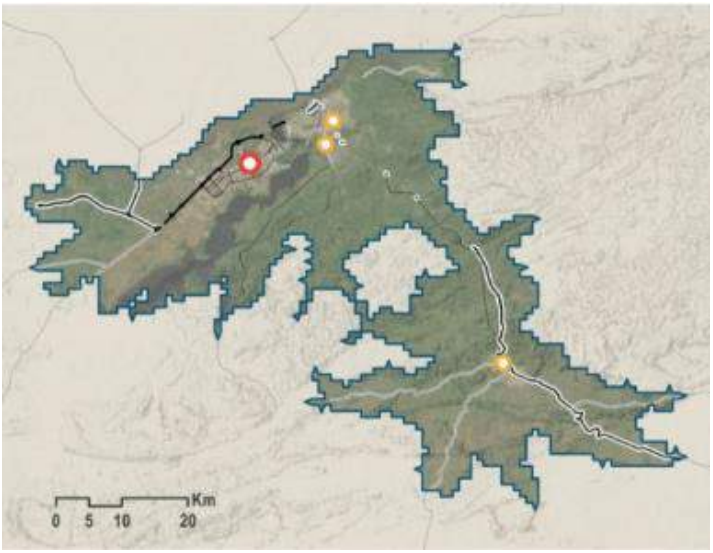
| | |
|---|---|
| Total Population | 763,639 in 11,966 km$^c$ |
| Bioeconomy Firms | 6 |
| Potential | Livestock |
| Main gaps | Limited access to power substations, low investment in climate resilience, limited access to health centers in urban areas |

# Main Nodes




## Node Venezuela 01

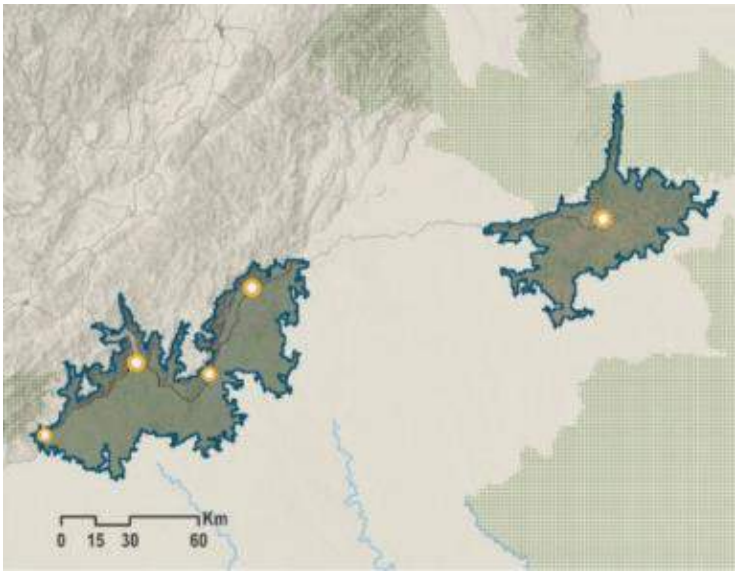
**Departments: Azuay, Cañar, Morona Santiago, Zamora Chinchipe**




| | |
|---|---|
| Total Population | 845,422 in 2,514 km$^2$ |
| Bioeconomy Firms | 9 |
| Potential | Forestry |
| Main gaps | Low female employment rate, limited access to health center in urban areas, limited access to primary and secondary education in urban areas |

## Node Colombia 01

**Departments: Morona Santiago, Napo, Pastaza**




| | |
|---|---|
| Total Population | 295,919 in 7,406 km$^2$ |
| Bioeconomy Firms | 17 |
| Potential | Sustainable Agriculture |
| Main gaps | Limited access to main roads, limited access to power substations, limited access to electricity in urban areas |

## Node Colombia 02 - Peru 01

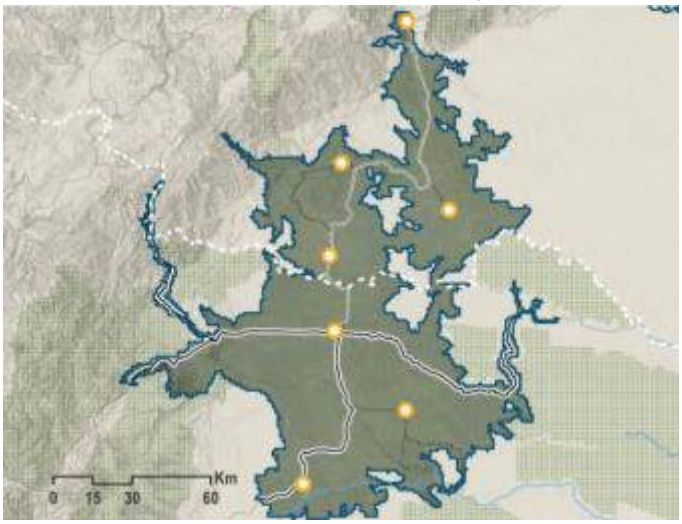
**Departments: Mariscal Ramon Castilla, Leticia**


| | |
|---|---|
| Total Population | 46.612 en 204.50 km$^2$ |
| Bioeconomy Firms | 0 |
| Potential | Sustainable agriculture and ecotourism |
| Main gaps | Limited access to electrical substations, Limited access to primary and secondary education in urban areas, Limited access to main roads |

*Node included due to political priorities

## Node Colombia 03 - Ecuador 01

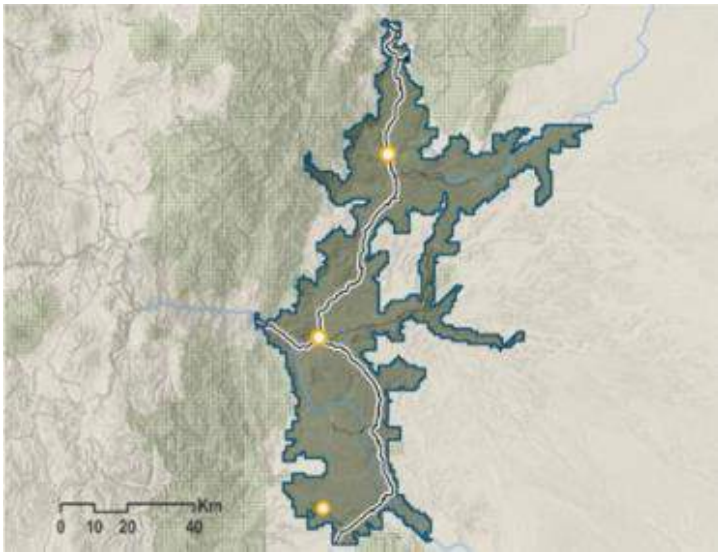
**Departments: Orellana, Sucumbis, Nariño, Putumayo**




| | |
|---|---|
| Total Population | 743,919 in 12,124 km$^2$ |
| Bioeconomy Firms | 17 |
| Potential | 5 equal-value sectors |
| Main gaps | Low female employment rate, limited access to primary and secondary education in urban areas, limited access to health centers in urban areas |

## Node Ecuador 02

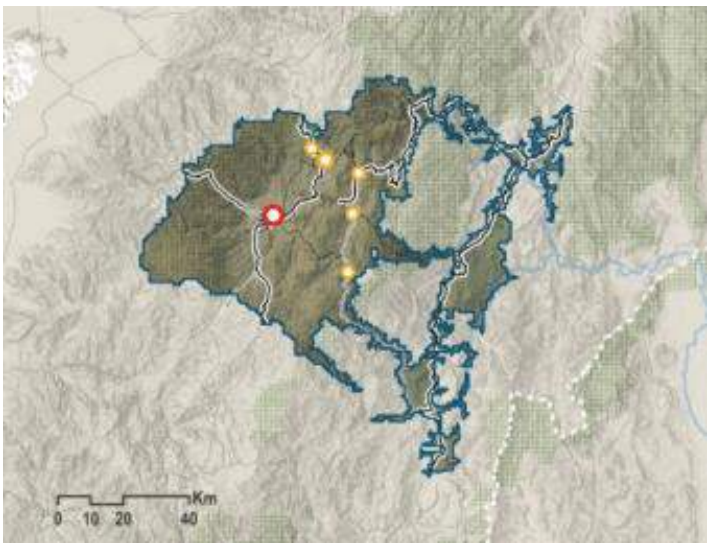
**Departments: Santa Clara, Tena, Huamboya, Palora, Huamboya**




| | |
|---|---|
| Total Population | 272,347 in 4,594 km$^2$ |
| Bioeconomy Firms | 21 |
| Potential | Livestock / Sustainable Agriculture |
| Main gaps | Low female employment rate, low productivity of agricultural lands, limited access to health centers in urban areas. |

## Node Ecuador 03

**Departments: Bolívar, Delta Amacuro**




| | |
|---|---|
| Total Population | 872,190 in 5,371 km$^c$ |
| Bioeconomy Firms | 10 |
| Potential | Green and inclusive activities |
| Main gaps | Low female employment rate, low productivity of agricultural lands, limited access to electricity substations |

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