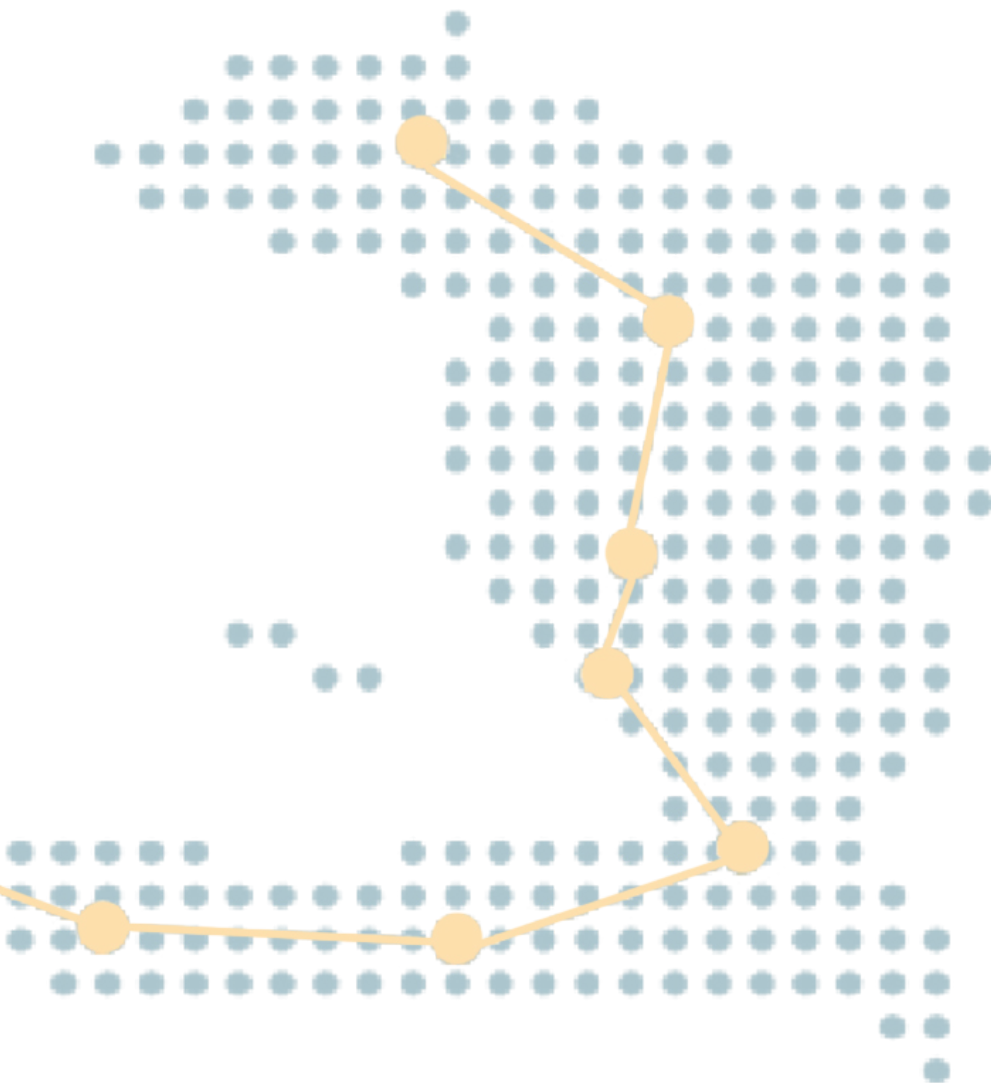


Maps for Gaps: A Geospatial Approach to Estimating Development Gaps in **Haiti**

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About **Haiti**

The country of Haiti is located in the Caribbean on the western third of the island Hispaniola. It is bordered by the Dominican Republic to the east, the Caribbean Sea, and the Northern Atlantic Ocean. The Inter-American Development Bank (IDB) strategy for the country seeks to contribute to higher, inclusive and more sustainable growth that supports a reduction in poverty, inequalities, and development gaps.

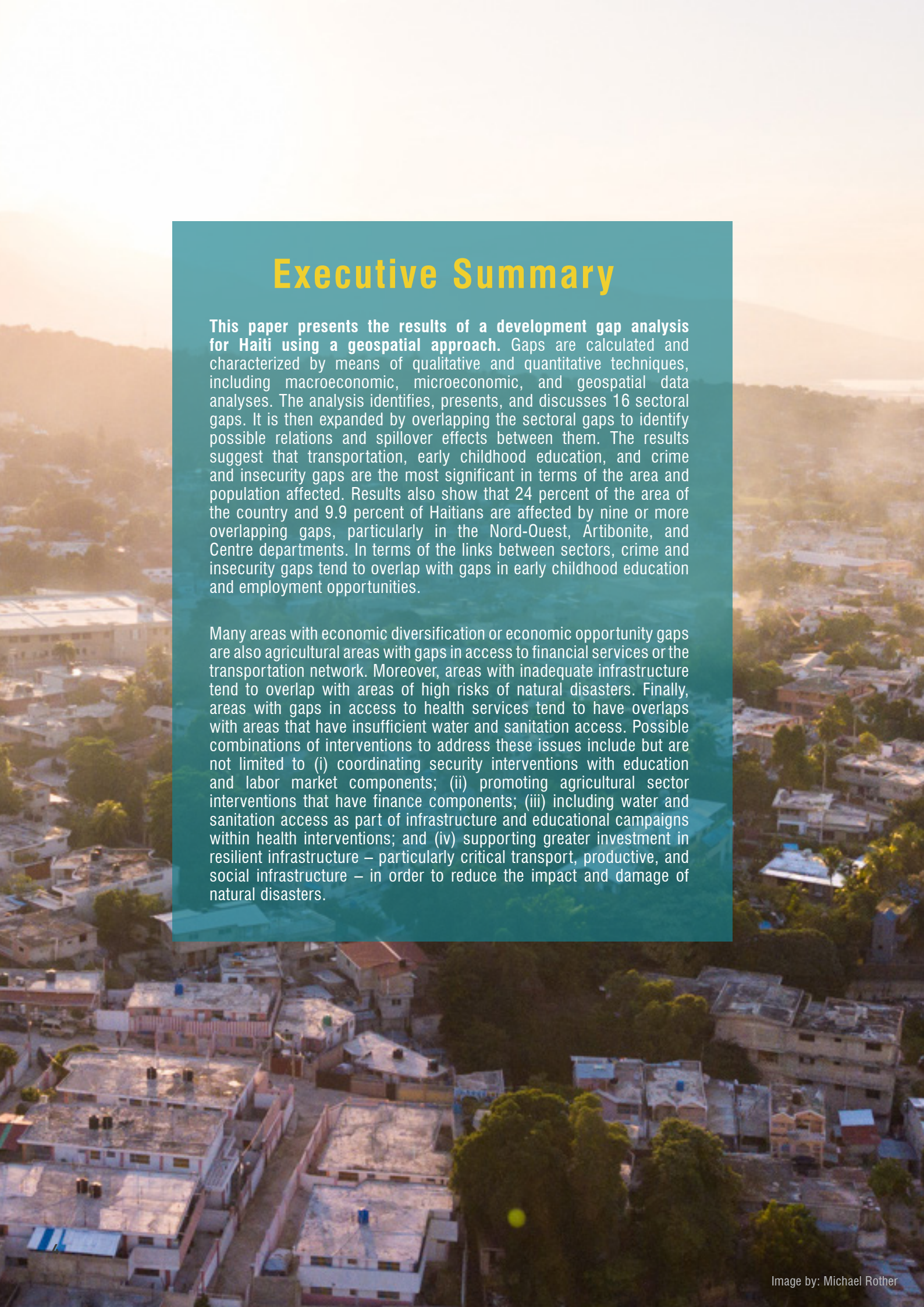
About the **Inter-American Development Bank**

The IDB works to improve lives in Latin America and the Caribbean. Through financial and technical support for countries working to reduce poverty and inequality, we help improve health and education, and advance infrastructure. Its aim is to achieve development in a sustainable, climate-friendly way. With a history dating back to 1959, today we are the leading source of development financing for Latin America and the Caribbean. The organization provide loans, grants, and technical assistance, as well as the conduction of extensive 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 development planning consulting, strategy and technology firm. It specializes in solving complex economic, environmental, and social problems across a variety of industries and scales using advanced territorial intelligence analytics and technologies. By integrating locational data and analysis, spatial econometrics, design and planning, we create strategies for our clients around the world, reducing their risk and maximizing their opportunities for inclusive and sustainable growth. In Haiti, GeoAdaptive supported IDB's strategy for the country by developing a spatial approach to map and prioritize development gaps.

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Executive Summary

This paper presents the results of a development gap analysis for Haiti using a geospatial approach. Gaps are calculated and characterized by means of qualitative and quantitative techniques, including macroeconomic, microeconomic, and geospatial data analyses. The analysis identifies, presents, and discusses 16 sectoral gaps. It is then expanded by overlapping the sectoral gaps to identify possible relations and spillover effects between them. The results suggest that transportation, early childhood education, and crime and insecurity gaps are the most significant in terms of the area and population affected. Results also show that 24 percent of the area of the country and 9.9 percent of Haitians are affected by nine or more overlapping gaps, particularly in the Nord-Ouest, Artibonite, and Centre departments. In terms of the links between sectors, crime and insecurity gaps tend to overlap with gaps in early childhood education and employment opportunities.

Many areas with economic diversification or economic opportunity gaps are also agricultural areas with gaps in access to financial services or the transportation network. Moreover, areas with inadequate infrastructure tend to overlap with areas of high risks of natural disasters. Finally, areas with gaps in access to health services tend to have overlaps with areas that have insufficient water and sanitation access. Possible combinations of interventions to address these issues include but are not limited to (i) coordinating security interventions with education and labor market components; (ii) promoting agricultural sector interventions that have finance components; (iii) including water and sanitation access as part of infrastructure and educational campaigns within health interventions; and (iv) supporting greater investment in resilient infrastructure – particularly critical transport, productive, and social infrastructure – in order to reduce the impact and damage of natural disasters.

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INTRODUCTION

Haiti's strengths offer a diverse range of opportunities for inclusive and long-term development. For example, a wide range of microclimates provide an opportunity for different crops to grow, and Haiti's vast coastal resources provide opportunities for the blue economy to expand. The country also has enviable market access, with potential for sizable national demand, proximity to large consumer markets, and preferential trade treaties with the United States. Additionally, the Haitian diaspora of approximately 2 million people maintain strong linkages with their home country through remittances, which are an important source of household income and investment. Finally, 85 percent of the population is under age 65, providing latent human capital that could boost the labor market and productivity going forward.

Despite these opportunities, Haiti is struggling with deep, systemic challenges to growth and development. These challenges are numerous, complex, and multifaceted. The country suffers from recurring periods of political uncertainty and high insecurity, leading to mobility restrictions, supply chain bottlenecks, and the erosion of the social contract between citizens and the state. This in turn contributes to lower investor confidence. In addition, social development indicators are concerning. Over 58 percent of the population lives below the national poverty line of US\$2.41/day, according to a 2012 household survey (Enquête sur les Conditions de Vie des Ménages Après le Séisme – ECVMAS), Haiti is one of the most unequal countries in the region with a Gini coefficient of 0.61 in 2012, and it ranks 170th out of 189 countries on the Human Development Index of the United Nations Development Programme (UNDP).

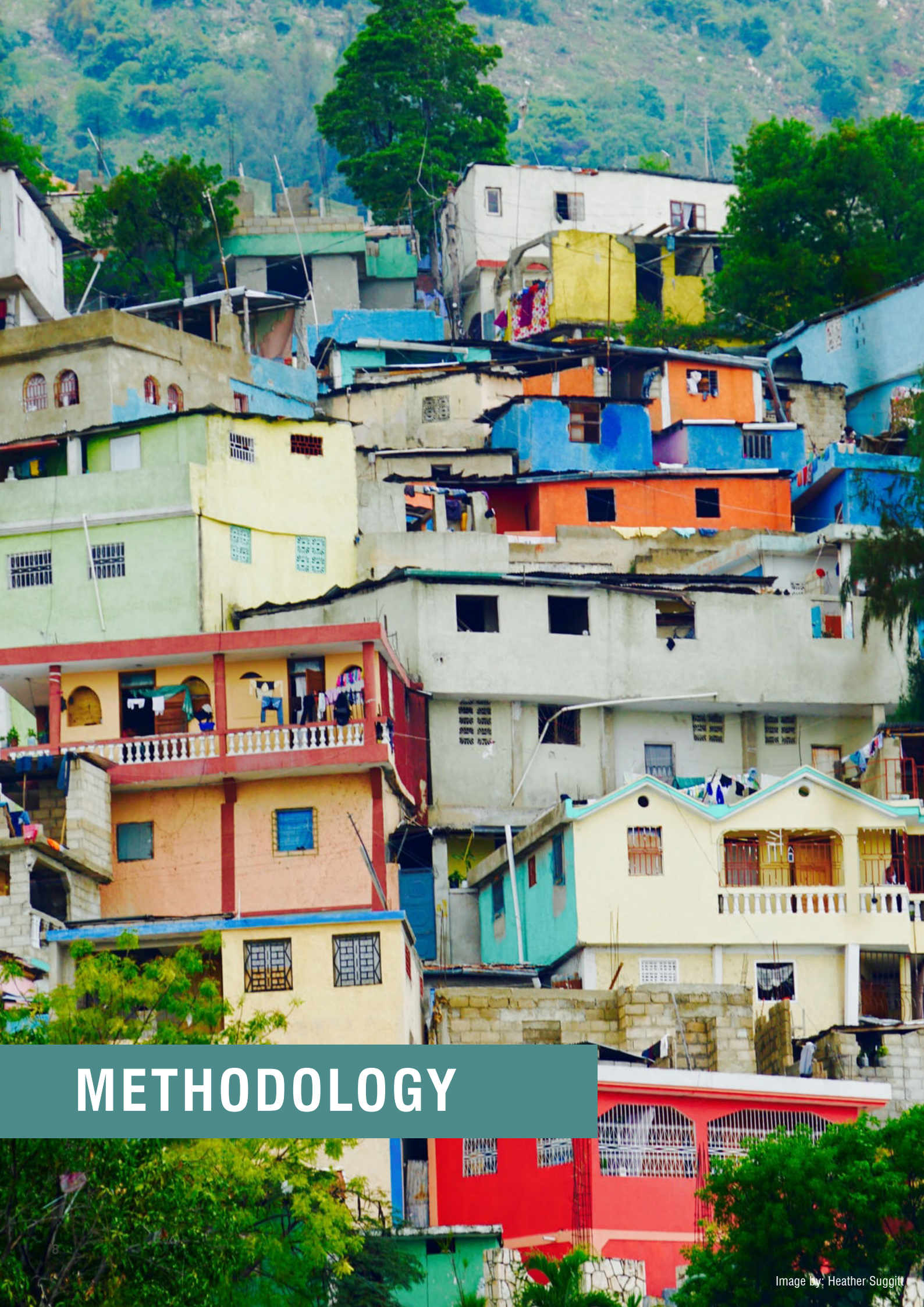
Additionally, there are significant gaps in access to basic services. According to the UNDP, the quality of education is generally low and 85 percent of schools are run by private entities whose fees are too expensive for the overall population. Health services are also only accessible to 40 to 60 percent of the population, and at least 40 percent of Haitians rely mainly on traditional medicine. The country is also vulnerable to natural disasters. This vulnerability is exacerbated by extreme environmental degradation, buttressed by unplanned and informal development. According to the 2021 Global Climate Risk Index, Haiti was among the three most affected countries by the impacts of extreme weather events worldwide between 2000 and 2019 (Eckstein, Kunzel, and Schafer 2021).

The COVID-19 pandemic, the country's political and insecurity challenges, and the 2021 earthquake exacerbated these constraints, potentially widening Haiti's development gaps. The virus poses a considerable health risk to the population, given the limited access to health services, low testing capacity, lack of personal protective equipment, and slow vaccination rollout. The socioeconomic and health context has also had an impact on the economy due to a lengthy economic recession triggered by reduced exports, rising unemployment, and loss of income, impacting household purchasing power. The closure of international borders and the disruptions in supply chains worldwide have had effects on value chains in Haiti, particularly in agriculture, and those effects in turn have fueled already high levels of food insecurity. The escalating political and insecurity crises, which peaked with the assassination of the president in July 2021, further exacerbated mobility restrictions in the country, contributing to bottlenecks for business and production. Finally, the 2021 earthquake had a large cost, both in terms of human lives and the economy in the south of the country. The resulting compound effects stemming from this natural disaster as well as from the country's health, insecurity, and political crises have thus had an impact on the capacity of the state to respond to such events. The consequences are severe, with worsening social outcome indicators and hindered livelihoods, potentially widening development gaps. For example, food insecurity has increased from 35 percent of the population during the period from October 2019–February 2020 to 44 percent of the population from September 2021–February 2022.¹

Conceptualizing a path for Haiti's post-COVID recovery and long-term development thus requires a nationwide, multifaceted perspective. In order to address the complex challenges and bolster the island's potential, it is necessary to look at Haiti's diverging complexities and examine multiple and interlinked factors. To contribute to this objective and inform such strategies, this study presents the results of a development gap analysis using a geospatial approach. Specifically, the study develops a spatial baseline that identifies development gaps across the entire country by sector and department to provide location-specific diagnostics. It then spatially overlaps sectoral gaps at the department and commune levels to assess possible links between sectors and thus gaps. The next section presents the methodology used, while Section 3 details the gap analysis results by sector and department. Section 4 puts forth overall conclusions and discusses policy recommendations based on the results of the gap analysis.²

¹ See Integrated Food Security Phase Classification (IPC), "Haiti: Acute Food Insecurity Situation September 2021 - February 2022 and Projection for March - June 2022," available at: <http://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/1155096/?iso3=HTI> (accessed November 15, 2021).

² The recommendations and proposed prioritized sectors in this paper do not reflect the current operational pipeline of the government of Haiti, the Inter-American Development Bank, or any other international development agency working in Haiti.



METHODOLOGY

A combination of quantitative and qualitative techniques is used to identify and measure development gaps across the country. Compared to other gap analysis methodologies – such as those developed by Borenzstein et al. (2014) and Acevedo, Borenzstein, and Lennon (2019) – a geospatial analysis of gaps adds a geographical dimension to the analysis of development needs. It allows for greater disaggregation of gaps across the territory and for location-specific insights. It also allows for a detailed quantification and characterization of the social groups located in the gap area. This provides crucial information to decision-makers and allows them to prioritize and focus efforts to address lagging conditions. The analysis is then expanded by overlapping sectoral gaps and identifying specific areas and people across Haiti affected by multiple lagging conditions.

The study follows three methodological steps:

- (i) Identification of sectoral gaps by means of a comprehensive document review, the Method of Cross-Impact Matrix Multiplication Applied to Classification (known as Micmac for its acronym in French) analysis, and a consultation process with Inter-American Development Bank (IDB) specialists;
- (ii) a sectoral gap analysis using geospatial data to identify disaggregated gaps and their concentration by department;
- (iii) a multiple gap analysis using the geographic extent of the sectoral gaps to pinpoint areas where multiple sectoral gaps overlap in Haiti.

Literature Review, Identification of Sectoral Gaps, and Classification of Priorities

Sectoral gaps were identified by means of a comprehensive document review, a Micmac analysis, and a consultation process with IDB specialists (Figure 1). Twenty priorities were identified based on recurrent themes and challenges highlighted across 32 documents. These priorities were then systematized into four dimensions: productivity, human capital, resilience and governance.

Figure 1. Methodological Approach to Selecting Sectoral Gaps



Source: Authors' analysis

The 20 priorities were classified by means of the open-source Micmac tool, which allows for systematizing and identifying priorities, as well as for analyzing their interrelationships to determine the most relevant and binding priorities for the country. The information used to fill the matrix is qualitative in nature, with priorities assigned a rank

based on their influence (0 = no influence, 1 = weak, 2 = moderate, 3 = strong)³. From this analysis, 11 key priorities were determined to be the most binding for Haiti's development, and three of these were considered closely aligned to strategic challenges that require short-term strategies: (i) pursue macroeconomic stability; (ii) promote formal employment creation and conditions

³ Three key questions helped determine the link between priorities: (i) Can the priority have an influence on achieving or generating improvements in other priorities? (ii) Does COVID-19 have an impact on the interaction of these priorities? (iii) Is there a territorial link that can be mapped between priorities?

for development of young people; and (iii) diversify the economy. The other eight priorities were determined to be necessary to address inhibitors of change: (iv) improve rural infrastructure (roads, silos, cold chain, etc.); (v) improve irrigation, transportation, energy, and logistic and basic infrastructure; (vi) increase access and quality of education; (vii) increase access to essential services to enhance human development; (viii) build resilience to climate change in infrastructure and efficient use of land and water; (ix) improve credit provision, especially in rural areas; (x) promote good governance, transparency, and the fight against corruption; and (xi) improve regulations on land registration. From this process, 30 preliminary gaps were identified and

classified according to the four main dimensions, each with a specific set of indicators. There were two types of prioritized gaps: (i) physical accessibility gaps, representing availability of support services and infrastructure based on travel time standards and/or overall distribution; and (ii) outcome gaps, representing the level of performance (e.g., literacy rate, mortality rate, among others). Benchmarks for the evaluation of gaps were also determined based on a broad database of available indicators. The list of gaps and their respective benchmarks (outlined in Table 1) were then used to operationalize the geospatial analysis and gap identification.

Table 1. Identified Gaps and Benchmarks

	Sectoral Gap	Benchmark Descriptions	Standard Benchmark	Benchmark Source
Productivity	1. Limited access to current and planned electricity resources	Areas outside of 500-meter catchment zone of medium voltage grid line and mini-grids as of 2020	500 meters	Village Infrastructure Angels ⁴
	2. Limited access to 3G services and cell towers	Areas without 3G services from Natcome and Digicall; and areas with >= 45 minutes travel time from the cell tower (proxy calculated from the coverage from cell tower)	No service zone	OpenCellID ⁵
	3. Limited access to paved road network	Areas with >= 45 minutes travel time to primary road and paved secondary road	45 minutes	Mathon, Apparicio, and Lachapelle (2018)
	4. Limited access to agriculture support infrastructure	Areas with less than 4.3 percent of irrigated land; and with >= 45 minutes travel time to agriculture processing facilities	4.3 percent	Siebert, et. al (2013)
			45 minutes	Mathon, Apparicio, and Lachapelle (2018)
	5. Limited access to economic potential	Areas without human settlements; with <US\$1,272.5 GDP per capita; and with a Gini coefficient higher than 0.6	No settlement	European Commission ⁶
			US\$1,272.5	World Bank (2014)
			0.6	World Bank (2014)
	6. Low outcome in employability	Areas with <60 percent of working age population (16-54); and a > 55.1 percent unemployment rate	0.6	World Bank (2014)
			55.1 percent	Institut Haïtien de Statistique et d'Informatique (2012)
	7. Rural areas with limited access to sanitation	Areas without human settlements; and with >35 percent of households not having a toilet facility	35 percent	United States Agency for International Development ⁷

4 Village Infrastructure Angels (VIA). <http://www.villageinfrastructure.org/>. Data received from IDB specialists on February 2, 2021.
5 OpenCellID (2021, February 24). <https://opencellid.org/#zoom=16&lat=37.77889&lon=-122.41942>.
6 European Commission Global Human Settlement (2021, February 24). <https://ghsl.jrc.ec.europa.eu/index.php>.
7 Globalwaters.org, USAID (2021, February 24). <https://www.globalwaters.org/wherework/latinamericacaribbean/haiti>.

	Sectoral Gap	Benchmark Descriptions	Standard Benchmark	Benchmark Source
Human Capital	8. Rural areas with limited access to potable water	Areas without human settlements; and with <31.1 percent of households with improved water service	31.1 percent	Inter-American Development Bank (2020)
	9. Limited access to healthcare	Areas with >=45 minutes travel time to a primary and secondary level of healthcare; and with less than one primary care center per 3,000 people	45 minutes	Mathon, Apparicio, and Lachapelle (2018)
			2.125 ratio of primary care center / number of people	World Health Organization (2017)
	10. Low outcome in health	Areas that have >48 deaths/1,000 child mortality rate (under 5 years old); and a vaccination rate lower than 41 percent	48 deaths/1,000 child mortality rate	United Nations Children's Fund ⁸
			41 percent	Rainey, et al. (2012)
	11. Limited access to markets in food crisis areas	Areas with a catchment zone exceeding 10 miles (45 minutes travel time); and determined to be in a "food crisis" under the Integrated Food Security Phase Classification	45 minutes	Mathon, Apparicio, and Lachapelle (2018)
			Crisis zone	Integrated Food Security Phase Classification (IPC) ⁹
	12. Limited access to early childhood education	Areas with >= 45 minutes travel time to early childhood education (i.e., kindergarten); and that have a low ratio of primary education (for the population ages 6-15)	45 min	Mathon, Apparicio, and Lachapelle (2018)
			2nd bottom quintile out of 5	Bhuyan, Sahoo, and Suar (2020)
	13. Low outcome in women's education	Areas with < 50.8 percent women's secondary education attainment; and with a < 79 percent women's literacy rate	50.8 percent	United Nations Educational, Scientific and Cultural Organization ¹⁰
			79 percent	World Bank ¹¹
Resilience	14. Disaster risk access gap	Areas experiencing deforestation from 2001 to 2019; and where there is >45 minutes of travel time to access to shelters	45 minutes	Mathon, Apparicio, and Lachapelle (2018)
Governance	15. Limited access to financial services	Areas with >= 45 minutes travel time to reach a macro level of financial service; and communes with less than one microfinance institutions	45 minutes	Mathon, Apparicio, and Lachapelle (2018)
			One microfinance institution	Development Alternatives Inc. ¹²
	16. Crime and insecurity access gap	Areas with >45 minutes travel time to a police station; and with a higher tendency for strikes	45 minutes	Mathon, Apparicio, and Lachapelle (2018)

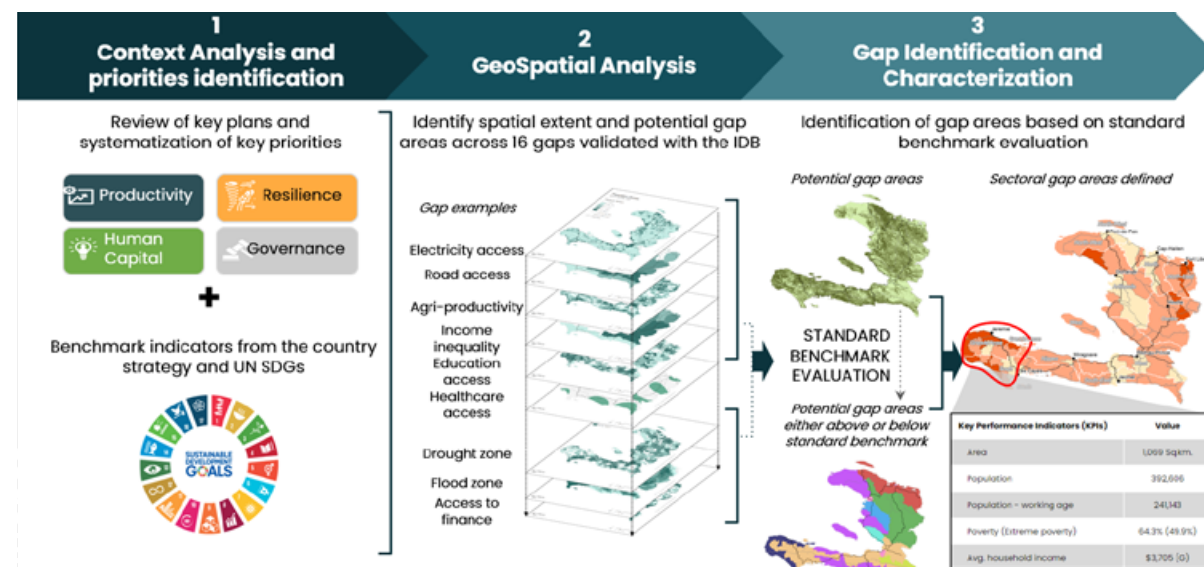
Source: Authors' calculations

8 United Nations Children's Fund (2021, February 24). <https://data.unicef.org/country/hti/>.
9 Integrated Food Security Phase Classification (2021, June 8). <http://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/1152816/?iso3=HTL>.
10 UNESCO Institute for Statistics (2021, February 2). <http://uis.unesco.org/en/country/ht>.
11 The World Bank Data (2021, February 2). <https://data.worldbank.org/indicator/SE.NENR.FE?locations=XJ>.
12 Development Alternatives Inc. (DAI). <https://www.dai.com/>. Data received from IDB specialists on February 2, 2021.

Geospatial Analysis

After the gaps and their benchmarks were defined, a data-driven geospatial process for representation and evaluation of sector-specific benchmarks was performed and cartography developed for those benchmarks. This led to the creation of a geospatial index of the 16 prioritized sectoral gaps. Sectoral priorities, as per the gap analysis, were also matched to other prioritization mechanisms such as the United Nations Sustainable Development Goals. This process is illustrated in Figure 2.

Figure 2. Methodological Approach: Geospatial Gap Analysis



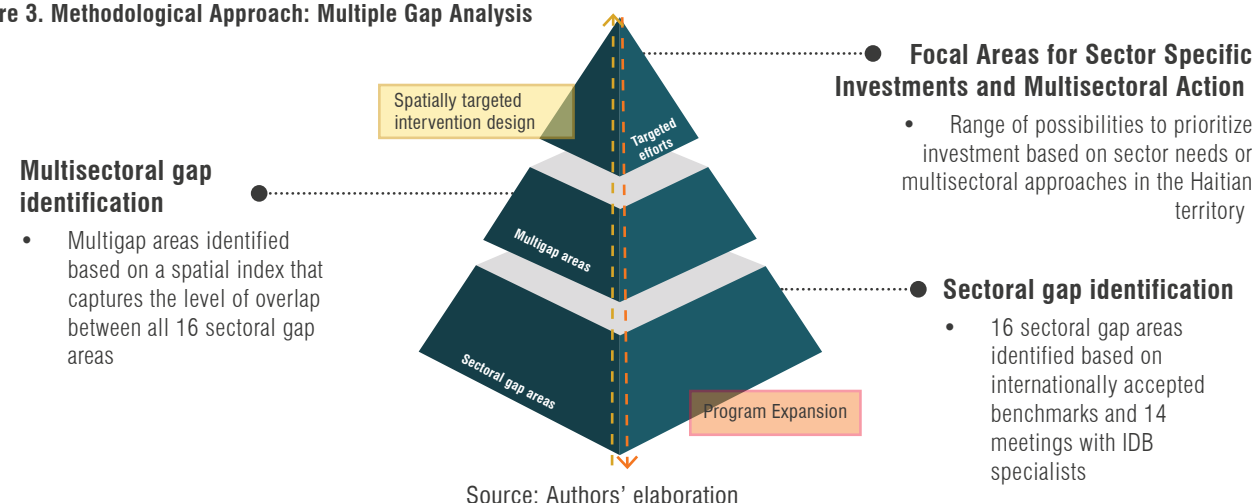
Source: Authors' elaboration

Note: Micmac: Method of Cross-Impact Matrix Multiplication Applied to Classification; UN SDGs: United Nations Sustainable Development Goals.

Multiple Gap Analysis

In order to provide an analytical approach that responds to the need to understand the relation and possible correlation between gaps across sectors, a multigap index was developed (Figure 3). The multigap index ranges from 1 to 13 and captures the level of overlap between physical access gaps. Those areas with only one or two sectoral gaps represent the lowest level of gap overlaps, whereas the highest level of overlap is represented by areas with 13 overlapping sectoral gaps. The multigap index covers the entire country, summarized by department and categorized into three groups depending on the number of overlapping gaps in any given area: high (9-13 gaps), medium (5-8 gaps), and low (1-4 gaps).

Figure 3. Methodological Approach: Multiple Gap Analysis



RESULTS

Sectoral Gaps

As previously described, this exercise involved the analysis of 16 sectoral gaps. The selection of the gaps and the analysis, which were carried out following the methodology outlined in Section 2, provide insights about the total area and population in Haiti affected by each gap. Figure 4 provides an overview of all 16 sectoral gaps evaluated, with a detailed description and map. Areas in orange in the maps are gap areas for a given sector (underperforming given the benchmark); areas in white are those where there is no gap (overperforming compared to the benchmark); and blue diamonds are locations where IDB projects are or have been carried out.

The country's most severe gaps are identified as those in transportation, security provision, and early childhood education. The results indicate that transportation and physical access are crucial across gaps given the state of Haiti's road network, with implications for social service delivery, productivity, and the mobility of people and goods. After transportation-related gaps, the most widespread gaps in the country were identified as security provision in unsafe areas and access to early childhood education.

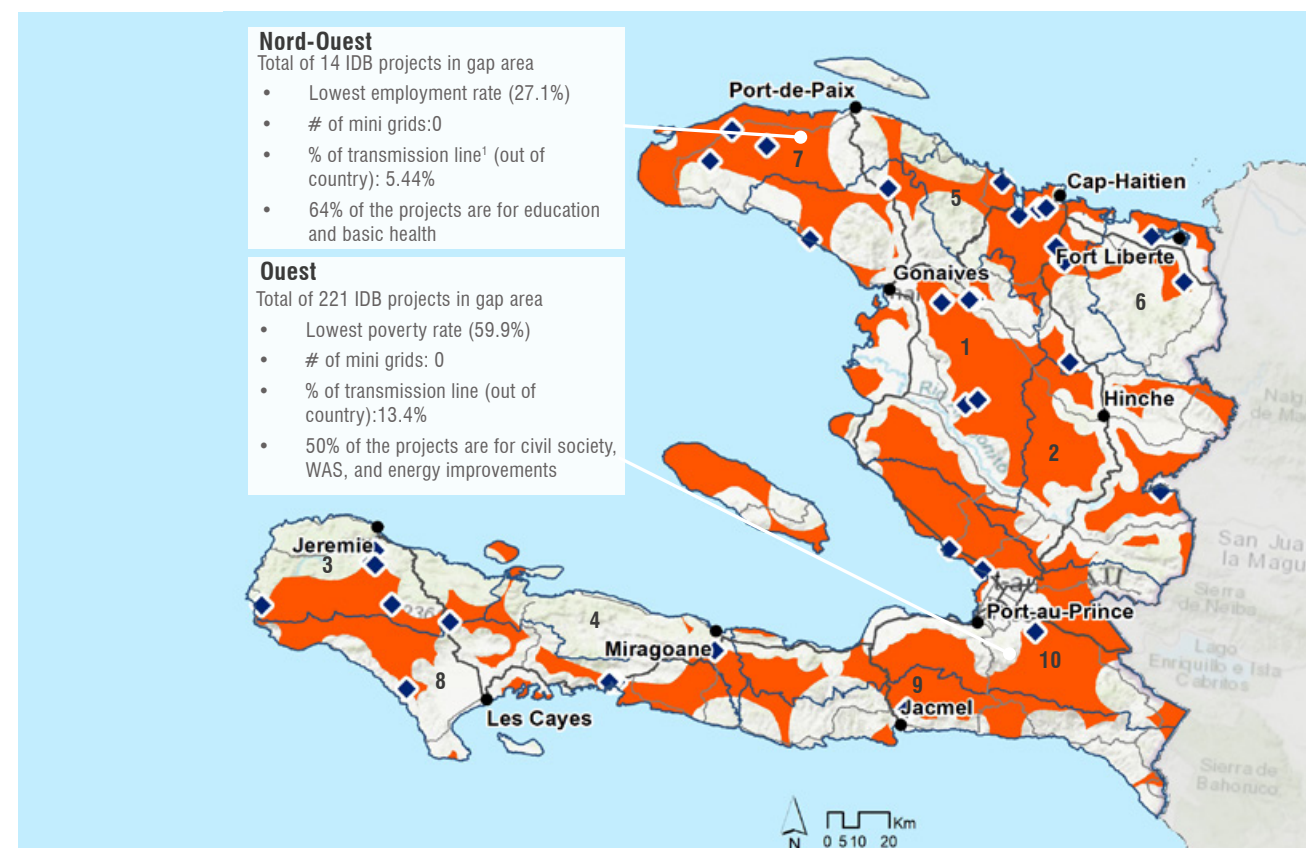
Figure 4. Sectoral Gaps in Haiti

Productivity

a. Limited access to current and planned electricity

The electricity sector faces some of the gravest challenges in the country, largely due to a weak distribution system, with many Haitians connected to the grid illegally, and to dependence on charcoal.

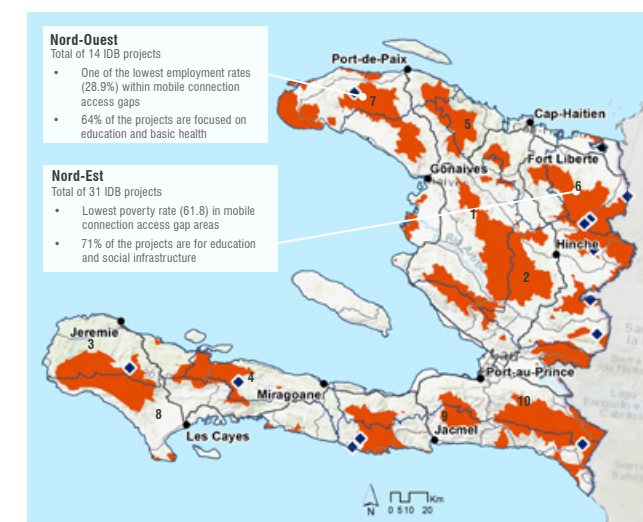
- 43.7 percent of the area of the country and 2.7 million people (23.7 percent of the population) are affected by the gap.
- The departments of Ouest, Nord-Ouest, and Nord have the largest gaps.



b. Limited access to 3G services and cell towers

Haiti faces significant barriers related to fixed-line broadband due to low access to personal computers and high rates of equipment theft. Furthermore, the legal and regulatory framework that governs cell service is currently weak and outdated (MTPTC 2019).

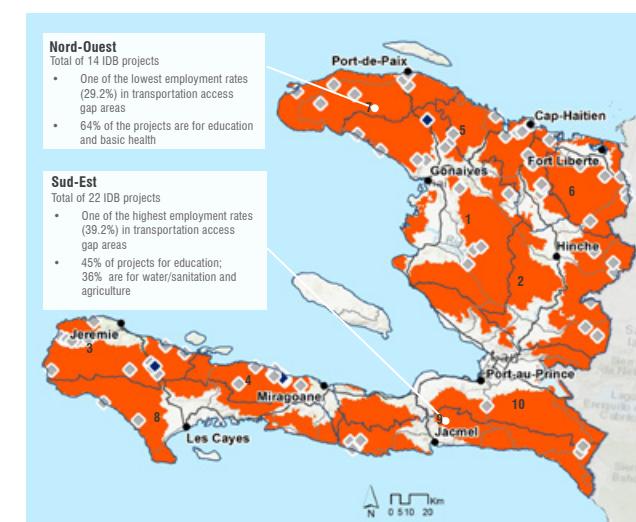
- 30.5 percent of the area of the country and 1.4 million people (12.3 percent of the population) are affected by the gap.
- The departments of Nord-Est, Nord-Ouest, and Sud-Est have the largest gaps.



c. Limited access to a paved road network

The poor conditions of Haiti's road network create substantial logistical and financial challenges, particularly for rural households, to access agricultural markets and engage in value chains. The conditions also limit access to basic health, education, and economic opportunities.

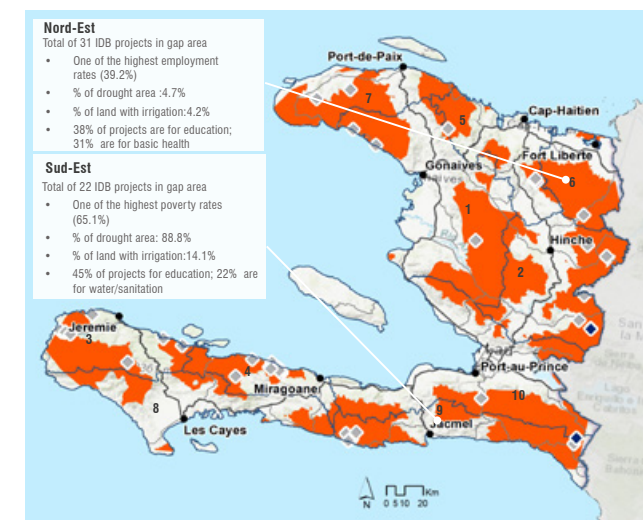
- 68.2 percent of the area of the country and 4.8 million people (42.1 percent of the population) are affected by the gap.
- The departments of Nord-Est, Nord-Ouest, and Sud-Est have the largest gaps.

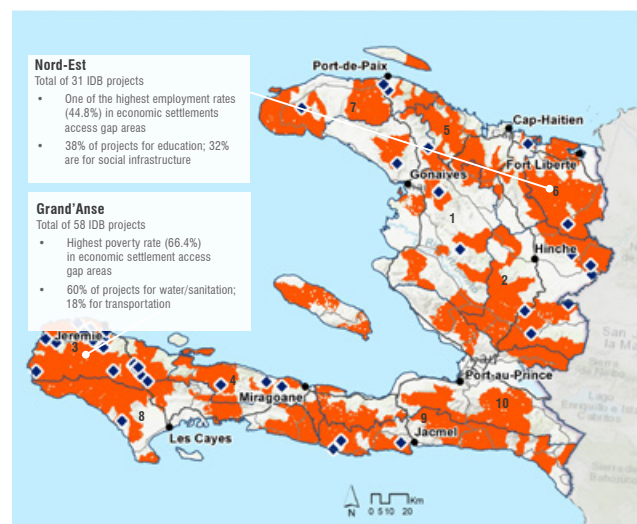


d. Limited access to agriculture support and infrastructure

Agriculture is largely informal and heavily dependent on small family farms that are focused on subsistence. Agricultural production has languished in the face of growing rural population pressures, migration patterns, recurrent natural disasters, extreme weather events (e.g., droughts), and farmers' limited access to information, modern technology, and best practices.

- 44.3 percent of the area of the country and 2.4 million people (21.1 percent of the population) are affected by the gap.
- The departments of Sud-Est, Nord-Est, and Centre have the largest gaps.

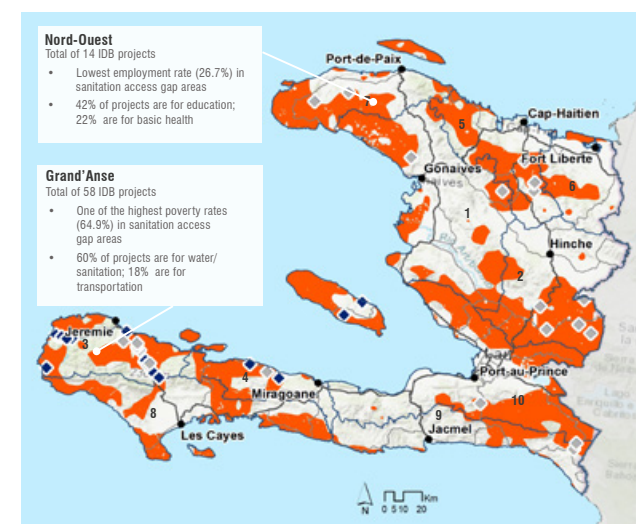




e. Limited access to economic potential

Income-generating opportunities are limited by the scarcity of jobs and prevalence of low-paid employment (World Bank 2014). The economy depends on remittances and trade, particularly with neighboring countries like the Dominican Republic and the United States.

- 50 percent of the area of the country and 2.6 million people (22.8 percent of the population) are affected by the gap.
- The departments of Grand'Anse, Nord-Est, and Sud-Est have the largest gaps.

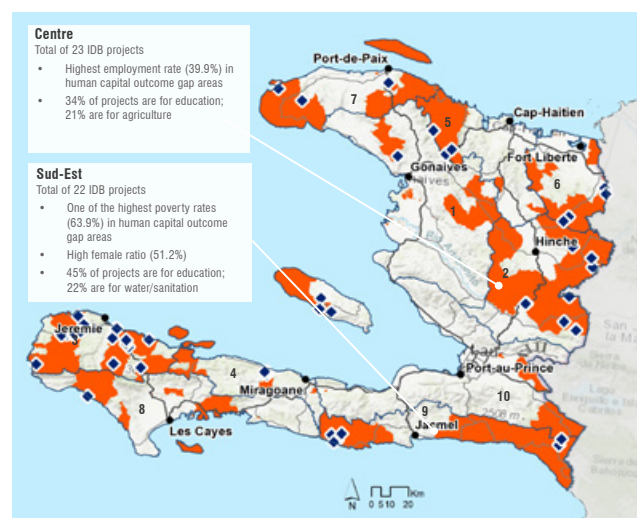


h. Rural areas with limited access to sanitation

Haiti faces several challenges in sanitation, including limited government capacity, low user demand for improved sanitation due to related expenses, lack of accessible financing, poor management of water resources, and vulnerability to natural hazards.

- 40.7 percent of the area of the country and 2.3 million people (20.2 percent of the population) are affected by the gap.
- The departments of Grand'Anse, Nord-Ouest, and Ouest have the largest gaps.

Human Capital



f. Low employability outcomes

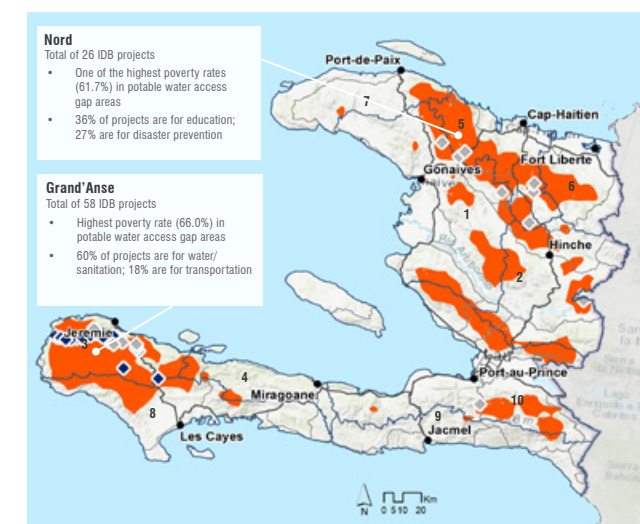
Haiti struggles to promote high levels of formal employment and suffers from widespread brain drain. Despite this context, about 60 percent of the population is currently of working age (between the ages of 15 and 54), and 36.2 percent of the population is under the age of 15, representing future growth potential (World Bank 2017).

- 34.8 percent of the area of the country and 2.2 million people (19.3 percent of the population) are affected by the gap.
- The departments of Sud-Est, Centre, and Grand'Anse have the largest gaps.

i. Rural areas with limited access to potable water

Haiti faces significant gaps in the provision of fresh, potable water due to an incomplete legal framework and a lack of planning, implementation, and supervision capacity. Water coverage outside the major cities is scarce, and water management is very limited. Many rural areas are only equipped with hand pumps or water kiosks.

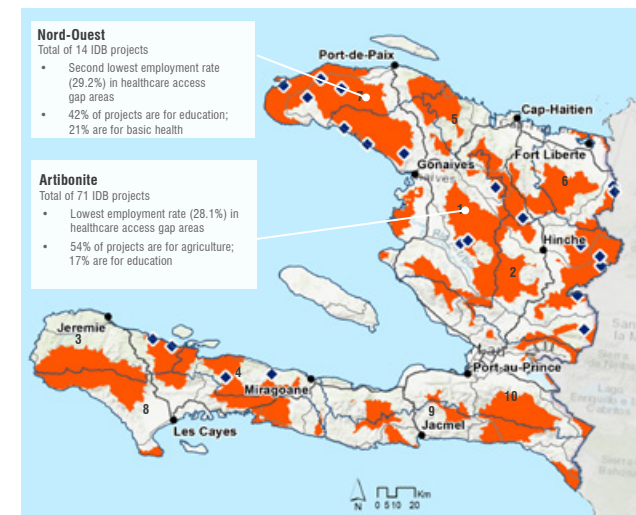
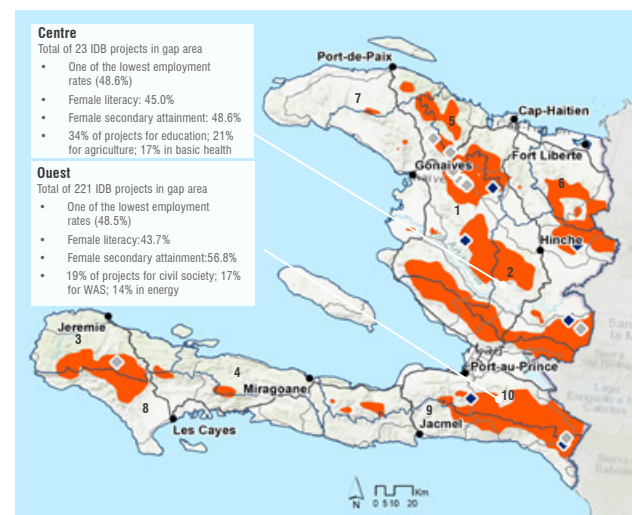
- 24.1 percent of the area of the country and 1.4 million people (12.3 percent of the population) are affected by the gap.
- The departments of Grand'Anse, Nord, and Centre have the largest gaps.



g. Low outcomes in women's education

Women are the backbone of Haitian society, but despite targeted initiatives to improve female education, disparities still exist: 15 percent of females ages 12–18 receive no education, compared to 11 percent of males. Additionally, only 45 percent of Haitian women over age 15 are literate, compared to 53 percent of men (World Bank 2014).

- 23 percent of the area of the country and 1.1 million people (9.6 percent of the population) are affected by the gap.
- The departments of Centre, Ouest, and Artibonite have the largest gaps.



j. Limited access to healthcare

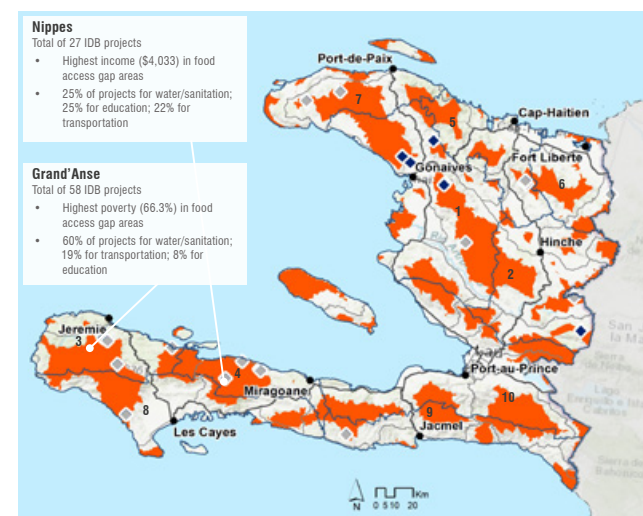
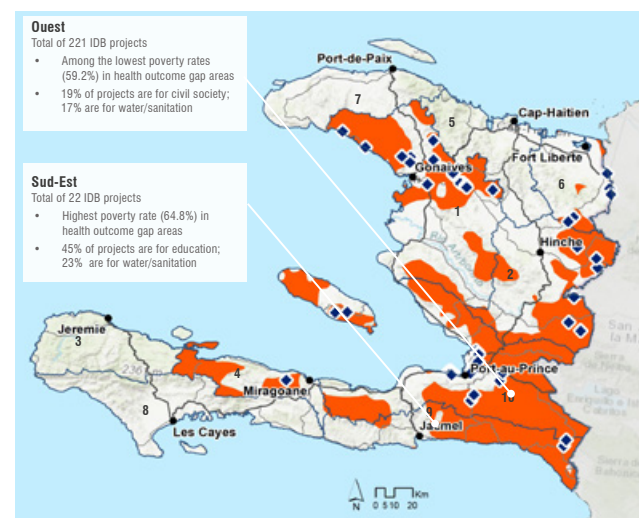
Haiti is vulnerable to public health crises due to poverty, food insecurity, lack of clean water and sanitation, limited healthcare resources, low educational attainment, political conflict, and densely populated slums.

- 36.8 percent of the area of the country and 1.9 million people (16.7 percent of the population) are affected by the gap.
- The departments of Grand Nord-Ouest, Artibonite, and Centre have the largest gaps.

k. Low outcomes in health

Challenges remain relating both to inadequate healthcare access and poor health outcomes. For example, the maternal mortality ratio was 520.8 per 100,000 live births in 2015, while the Latin America and Caribbean average was 73.6 (Wang 2015).

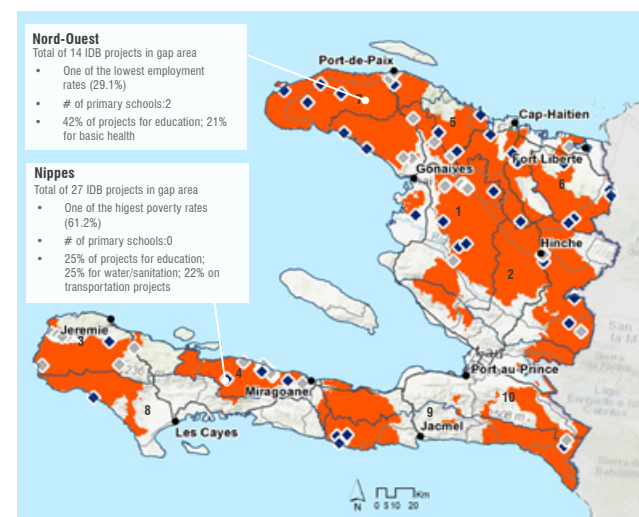
- 33.8 percent of the area of the country and 2.4 million people (21.1 percent of the population) are affected by the gap.
- The departments of Ouest, Sud-Est, and Nippes have the largest gaps.



l. Limited access to markets in food crisis areas

Haiti has one of the highest levels of food insecurity in the world. High levels of poverty and inequality limit access to nutritious food, especially for the most vulnerable populations. Physical accessibility and transportation costs remain key factors affecting food availability, particularly in remote areas. Transport costs to food markets make up a significant portion of transaction costs along agricultural value chains. Furthermore, inaccessibility to food markets limits the reach of both producers and consumers, increasing economic inequality and food insecurity.

- 35.2 percent of the area of the country and 1.7 million people (14.9 percent of the population) are affected by the gap.
- The departments of Nippes, Grand'Anse, and Artibonite have the largest gaps.



m. Limited access to early childhood education

A large number of Haitians lack access to education. Some of the key challenges relate to low school enrollment, poor literacy rates, high tuition fees, limited government oversight, and a shortage of qualified teachers. Furthermore, gender inequality persists in education. For examples, schools are reported to be the second most common place for sexual abuse among girls ages 13 to 17 (USAID 2020)

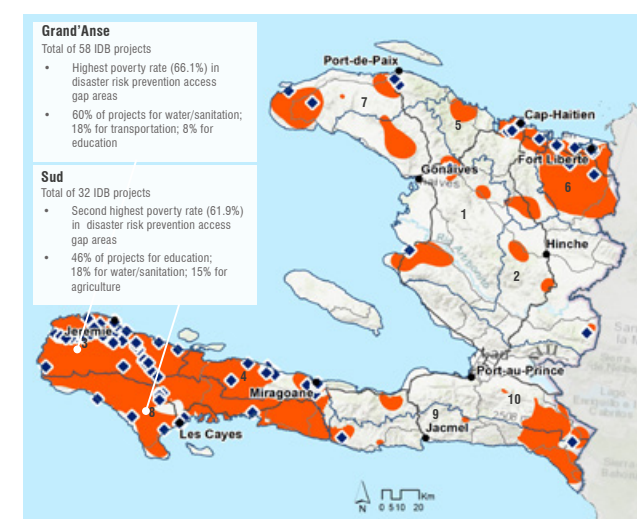
- 53.9 percent of the area of the country and 3.9 million people (34.2 percent of the population) are affected by the gap.
- The departments of Nord-Ouest, Nippes, and Centre have the largest gaps.

Resilience

n. Limited access to disaster assistance services

Haiti's high risk to natural disasters is due to its geographical location and to internal and institutional factors (World Bank 2014). Common natural hazards include hurricanes, floods, landslides, tropical storms, flash floods, earthquakes, and droughts.

- 33.8 percent of the area of the country and 2.7 million people (23.7 percent of the population) are affected by the gap.
- The departments of Grand'Anse, Sud, and Nord-Est have the largest gaps.



Governance

o. Limited access to financial services

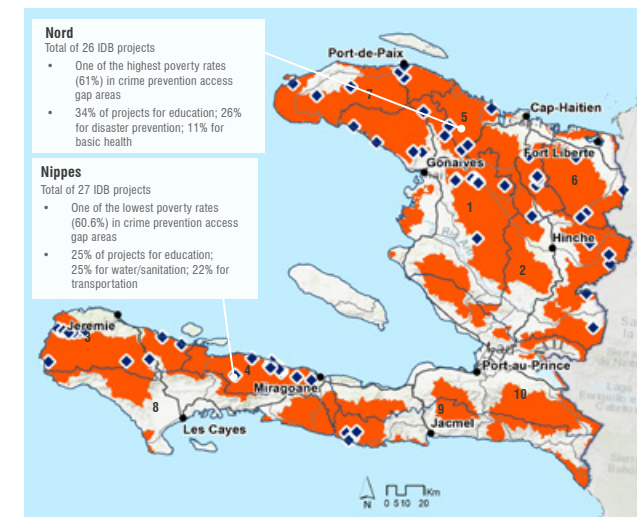
Formal bank account penetration levels were about 8.6 percent in 2014, lower than in low-income countries globally (World Bank 2014). Only 27 percent of Haitian adults have a bank account in a formal financial institution. Reasons behind this include the lack of a national identity card, physical access to financial institutions, and financial resources to rely on these services. Additionally, financial services are scarce for small and medium-sized enterprises, productive sectors, and the general population.

- 44 percent of the area of the country and 2.6 million people (22.8 percent of the population) are affected by the gap.
- The departments of Grand'Anse, Nord, and Centre have the largest gaps.

p. Limited access to security provision in unsafe areas

As crime and violence continue to be a pervasive and costly problem in Haiti, political instability inhibits the country's ability to meet basic needs, including public safety (Human Rights Watch 2020). As discussed in previous sections, the problem of insecurity has worsened in recent years.

- 55 percent of the area of the country and 3.4 million people (29.8 percent of the population) are affected by the gap.
- The departments of Nippes, Nord, and Nord-Ouest have the largest gaps.



Multiple Gap Analysis

In reality, sectoral gaps are not siloed, they are often linked to other challenges of other sectors. Although sectoral gaps provide a nationwide picture of the severity of the challenges related to the 16 development indicators, these challenges are multifaceted and linked across different sectors. It is certainly useful to evaluate sectoral gaps independently, nevertheless the sectoral approach can overlook many of these intertwined complexities. Therefore, the goal of the multiple gap analysis is to widen the analytical lens and look into possible correlations across gaps in different sectors.

As detailed in Section 2, a multigap index was created in order to evaluate multisectoral gaps. This index captures the concentration (measured in terms of spatial overlap) of sectoral gaps across the country and presents a classification of concentration to facilitate interpretation that is based in three categories: high (9–13 overlapping gaps), medium (5–8 overlapping gaps), and low (1–4 overlapping gaps). The resulting multisectoral gap index is then evaluated across all departments in Haiti to provide an understanding of the level of concentration within each region.

Approximately a quarter of the Haitian territory and 9.9 percent of the population are located in areas with a high multigap index score. The results indicate that 24 percent (6,808 square kilometers) of the country has a high multigap index result (nine or more physical access gaps in the same geographical location). When looking at the multigap index taking into account population density, 5.2 percent of the country, and 4.3 percent of Haitians who live in highly dense areas, are affected by the overlap of nine or more gaps, particularly in the Nord, Nord-Ouest, and Nippes departments. Targeted interventions in areas of high concentration of various gaps and with high population density could thus benefit up to 1.1 million people in Haiti, which constitutes nearly 9.9 percent of the total population. The departments of Nippes and Nord-Ouest show the highest levels of gap concentration, affecting 30.3 percent and 26.6 percent of the population, respectively. Figure 5 illustrates the results of the multisector gap analysis by department, while Table 2 presents the demographics by department within high multisectoral gap areas. As shown in the table, Nord-Ouest and Artibonite are identified as the departments of greatest concern. From a multisectoral perspective, interrelationships between sectors can be strengthened where there is a high number of potential beneficiaries and overlapping gaps. Such a perspective opens up possibilities to create efficiencies in implementation and increase returns on investment by capitalizing on spillover effects across gap interventions.

Figure 5. Characterization of the Concentration of Access Gaps across Haitian Departments

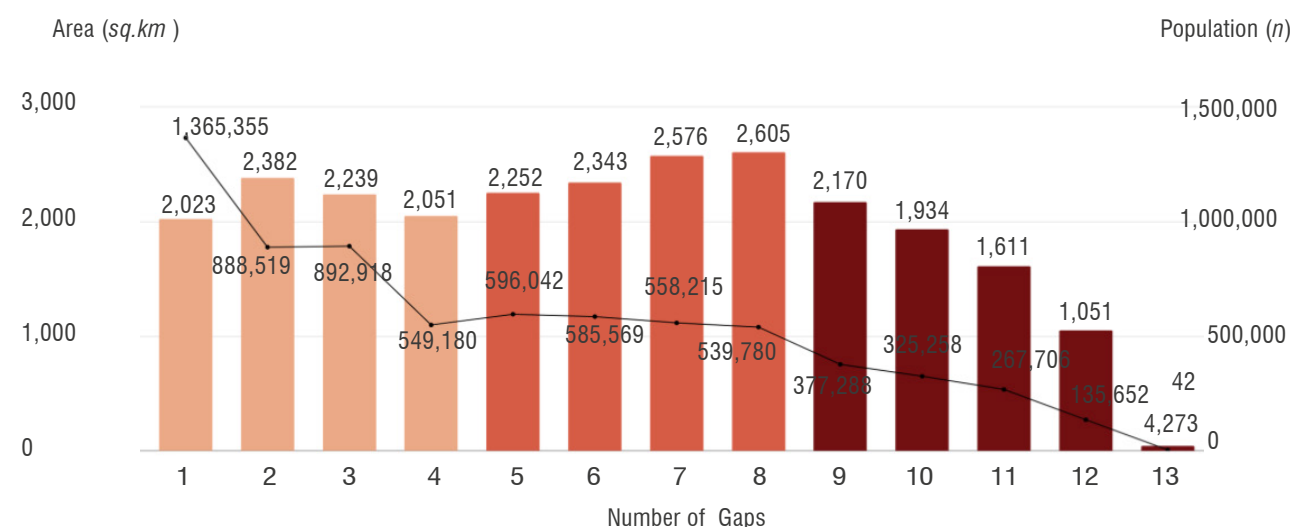
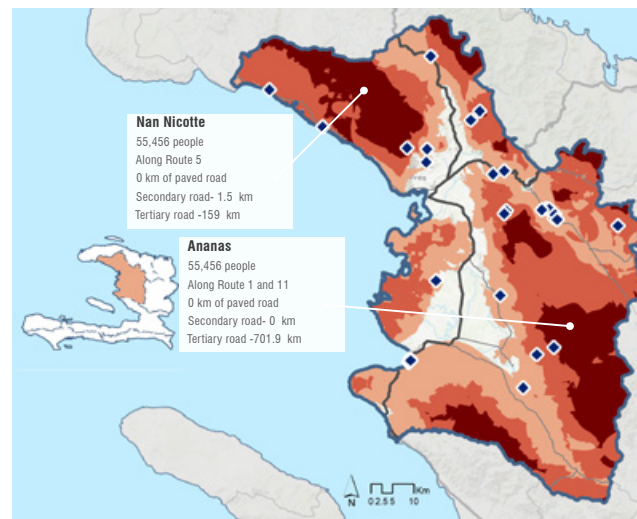


Table 2. Demographics by Department in High Multisectoral Access Gap Areas

	Department	Area (km ²)	Population	Working Population	Employment Rate	Poverty Rate	Average Household Income (U.S. dollars)
1	Artibonite	1,051.6 (3.8%)	183,604 (1.6%)	149,975	31.20%	50.00%	\$3,068
2	Centre	809.3 (2.9%)	116,339 (1.0%)	91,222	39.90%	50.30%	\$3,034
3	Grand'Anse	788.8 (2.8%)	115,543 (1.0%)	92,507	37.10%	67.00%	\$3,471
4	Nippes	472.2 (1.7%)	106,109 (0.9%)	83,942	27.50%	65.80%	\$3,508
5	Nord	483.9 (1.7%)	107,173 (1.0%)	83,487	37.80%	66.40%	\$3,728
6	Nord-Est	526.3 (1.9%)	75,830 (0.7%)	58,171	41.90%	51.80%	\$3,056
7	Nord-Ouest	821.9 (3.0%)	203,120 (1.8%)	160,761	29.70%	50.70%	\$3,029
8	Sud	586.9 (2.1%)	67,067 (0.6%)	52,913	35.00%	69.20%	\$3,259
9	Sud-Est	343.9 (1.2%)	54,484 (0.5%)	41,532	37.80%	65.90%	\$3,550
10	Ouest	923.0 (3.3%)	80,908 (0.7%)	67,276	52.20%	64.00%	\$3,666
	Total	6,807.90	1,110,176	881,785	37.01% (average)	60.10% (average)	\$3,369 (average)

Figure 6. Multisectoral Access Gaps in Haiti

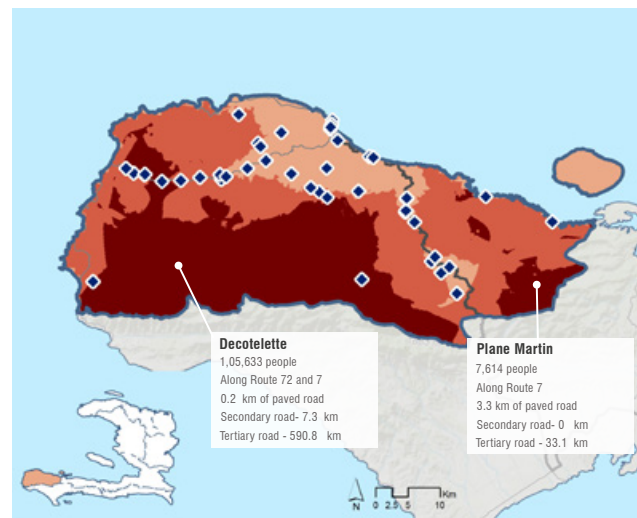
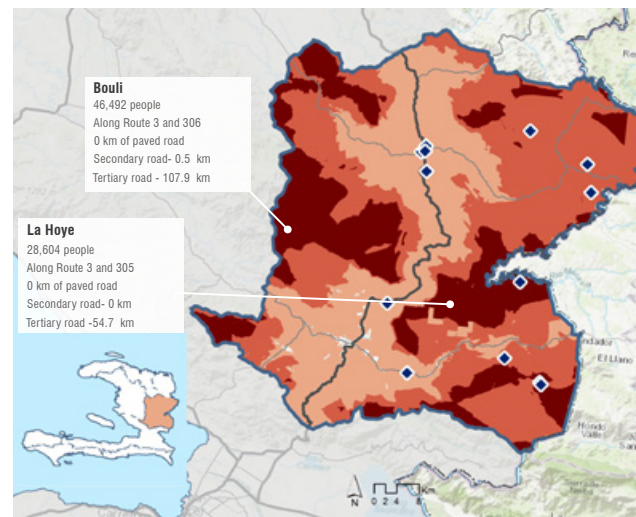


a. Artibonite

- 10.4 percent of the population lives in areas with a high concentration of gaps.
- Early childhood education, crime and insecurity, access to paved road networks, and electrification are the main overlapping gaps.
- Proposed coordinated interventions:
 - Coordinate improvement in roads and irrigation systems in rice-producing areas, where gaps are largest.
 - Combine early childhood education and employment programs in insecure areas, where gaps tend to overlap.
 - Prioritize adequate electricity and water infrastructure in the construction of new schools, particularly in Ennery, La Chapelle, Marmelade, Petite Rivière de l'Artibonite, and Saint Michel de l'Attalaye.

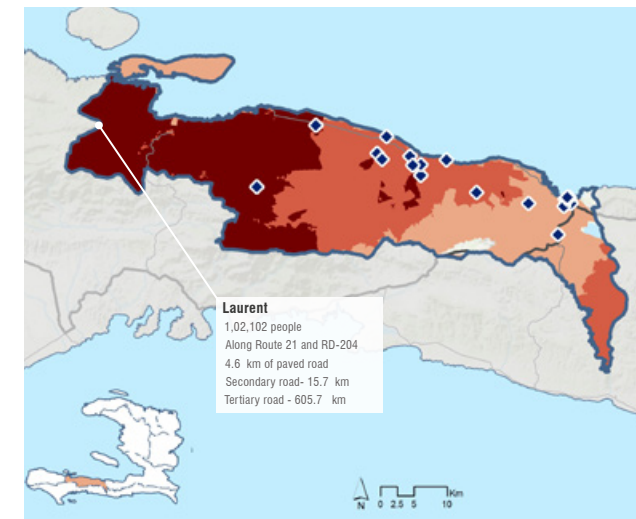
b. Centre

- 16.1 percent of the population lives in areas with a high concentration of gaps.
- Access to paved road networks, early childhood education, financial services, and crime and insecurity are the main overlapping gaps.
- Proposed coordinated interventions:
 - Increase access to credit services for farmers, particularly in Belladère, Boucan Carré, Cerca La Source, and Maissad.
 - Prioritize road access projects that link educational facilities, particularly in Belladère, Boucan Carré, Maissad, and Savanette.



c. Grand'Anse

- 24 percent of the population lives in areas with a high concentration of gaps.
- Disaster risk prevention, access to paved roads, access to economic potential, and access to potable water are the main overlapping gaps.
- Proposed coordinated interventions:
 - Promote disaster risk mitigation among farmers and when planning for infrastructure.
 - Increase access to financial services for farmers, particularly in Abricots, Anse d'Hainault, and Chambellan.

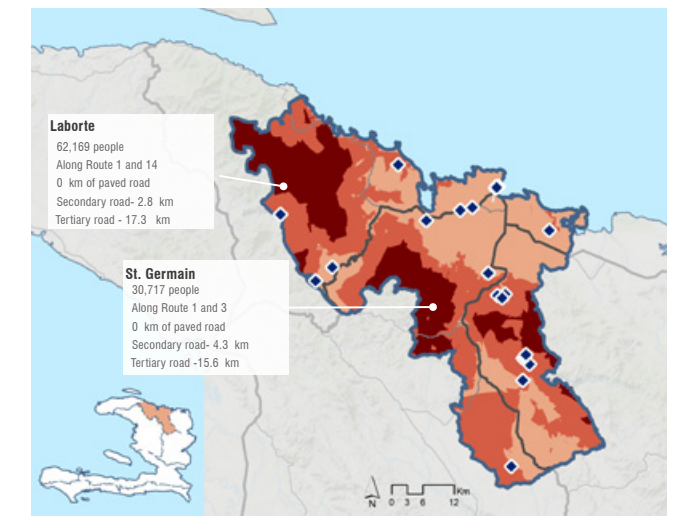


e. Nord

- 10.2 percent of the population lives in areas with a high concentration of gaps.
- Access to paved roads, crime and insecurity, early childhood education, and potable water access are the main overlapping gaps.
- Proposed coordinated interventions:
 - Targeted investments within an urbanization strategy in informal settlements in Bahun, Borgne, and Pilate to overcome gaps in water/sanitation, energy, and insecurity.
 - Increase police presence combined with education and labor programs in insecure areas, particularly in Pilate and Plaisance.
 - Promote sanitation and health education campaigns in schools located within health access gaps, such as Borgne, Dondon, and Saint-Raphael.

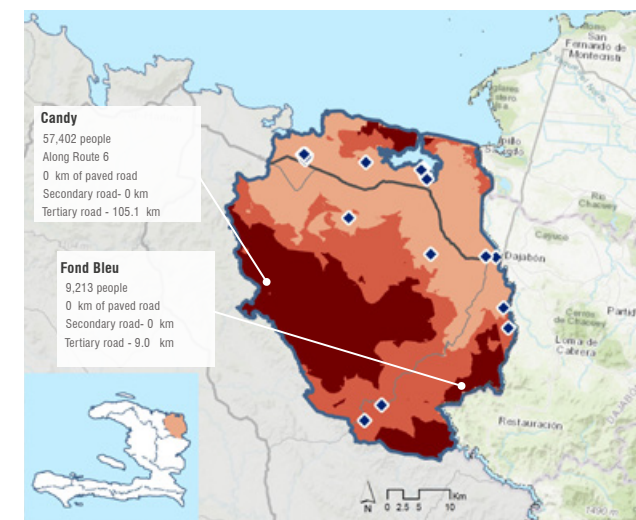
d. Nippes

- 30.3 percent of the population lives in areas with a high concentration of gaps.
- Crime and insecurity, disaster risk prevention, early childhood education, and access to paved roads are the main overlapping gaps.
- Proposed coordinated interventions:
 - Promote education and employment projects in areas of high insecurity.
 - Provide financial mechanisms in the agricultural sector that respond to the risk to natural disasters.
 - Invest in transport infrastructure, particularly to connect portuary infrastructure in Baradères, Petit Trou de Nippes, and Plaisance su Sud.



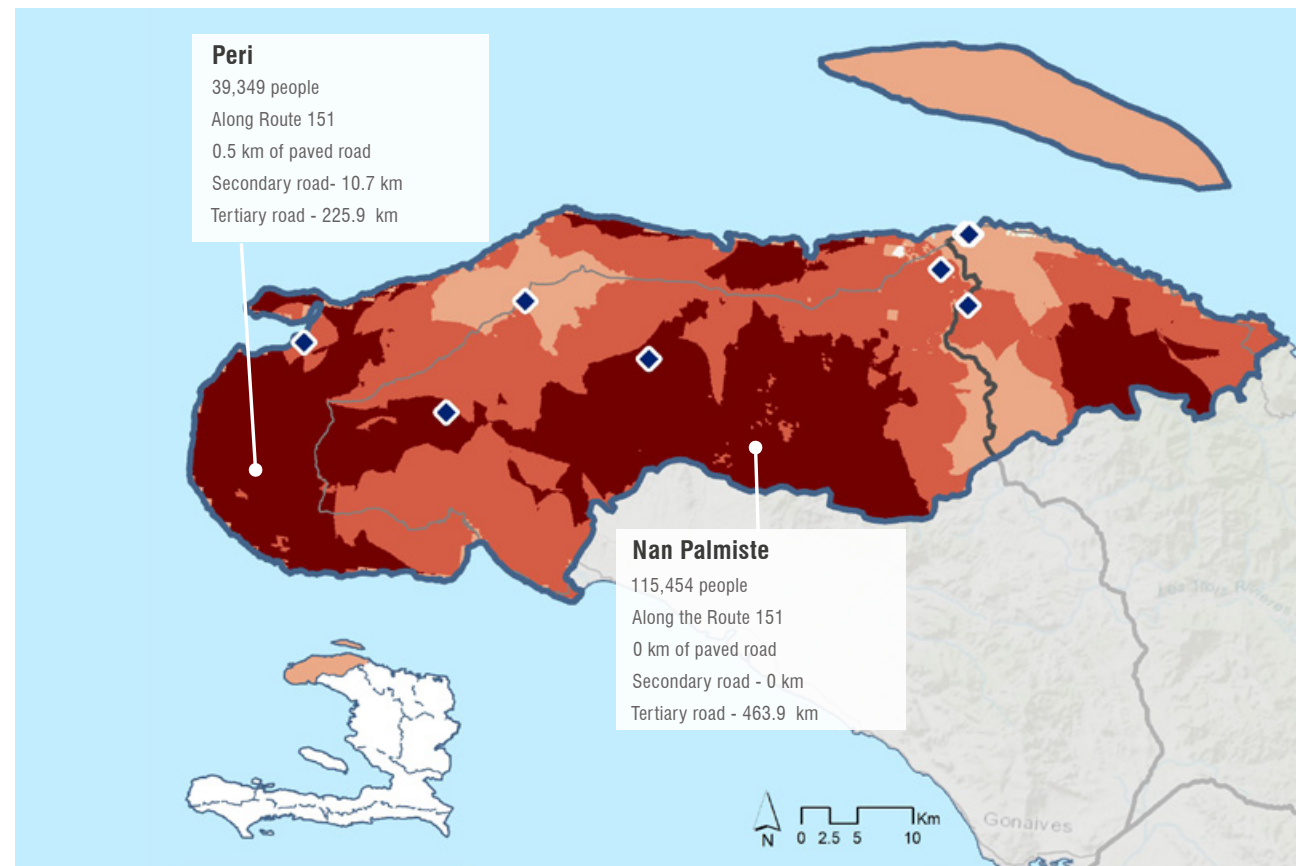
f. Nord-Est

- 21.9 percent of the population lives in areas with a high concentration of gaps.
- Access to paved roads, disaster risk prevention, access to economic potential, and crime and insecurity are the main overlapping gaps.
- Proposed coordinated interventions:
 - Promote sanitation and health education campaigns in schools located within health access gaps such as Perches and Vallières.
 - Coordinate education and employment programs in insecure areas, particularly within Mombin Crochu, Sainte Suzanne, and Vallières.
 - Promote resilient infrastructure, particularly for key roads that link agricultural areas with a high exposure to natural hazards.



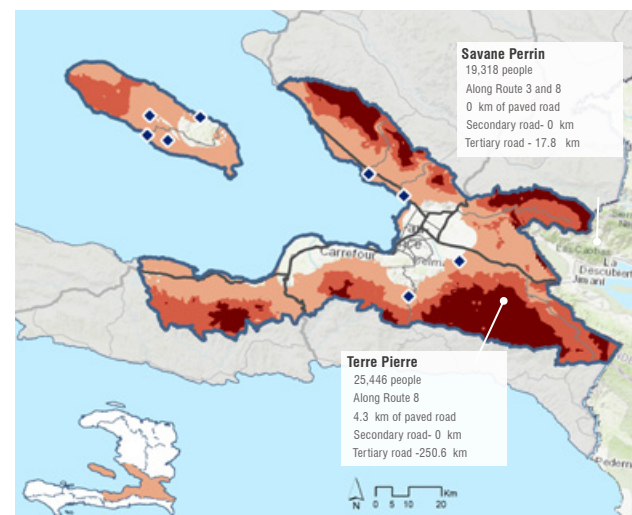
g. Nord-Ouest

- 26.6 percent of the population lives in areas with a high concentration of gaps.
- Access to paved roads, early childhood education, crime and insecurity, and primary healthcare access are the main overlapping gaps.
- Proposed coordinated interventions:
 - Coordinate both education and employment programs in insecure areas where gaps overlap.
 - Invest in water and sanitation infrastructure, particularly since only 13 percent and 7 percent of the population have access to improved water and sanitation facilities, respectively.



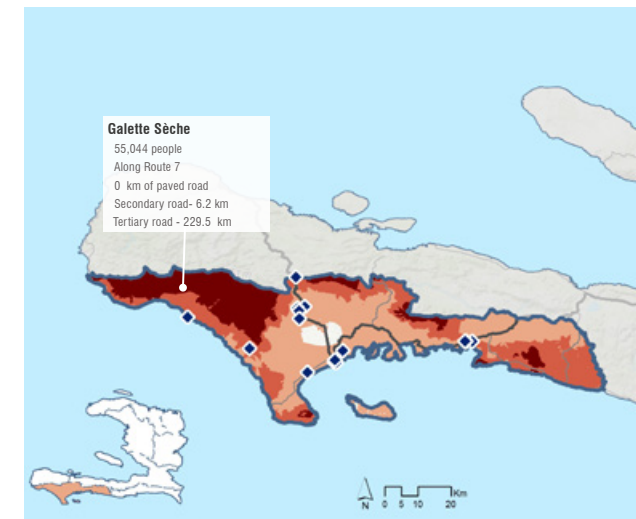
h. Ouest

- 1.8 percent of the population lives in areas with a high concentration of gaps.
- Electrification, sanitation, access to paved roads, and economic diversification are the main overlapping gaps.
- Proposed coordinated interventions:
 - Further invest in smallholder farmer training/ tools to increase crop yields and strengthen food chains to improve supply, particularly in Carrefour, Croix-Des-Bouquets, and Léogâne.



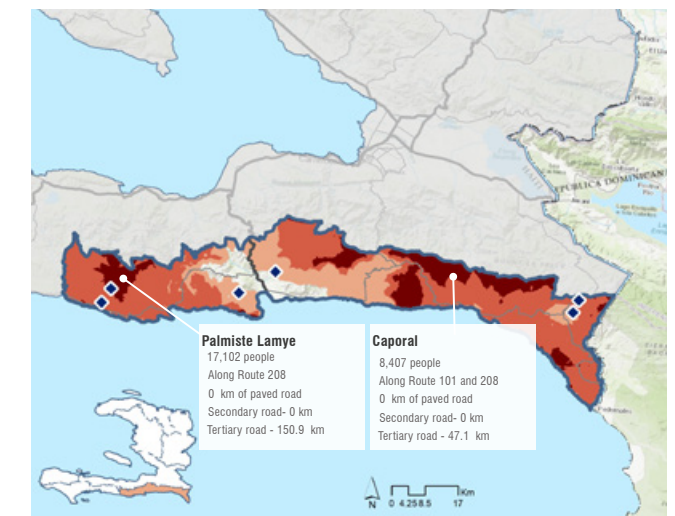
i. Sud

- 9.9 percent of the population lives in areas with a high concentration of gaps.
- Disaster risk prevention, access to paved roads, early childhood education access, and economic potential access are the main overlapping gaps.
- Proposed coordinated interventions:
 - Invest in resilient infrastructure for roads, educational and health facilities, highlighting the Chantal and Les Anglais communes.
 - Increase access to financial services for farmers, particularly in Chantal, Côteaux, Port-Salut, Roche à Bateau, and Saint Jean du Sud.



j. Sud-Est

- 9.5 percent of the population lives in areas with a high concentration of gaps.
- Access to paved roads, economic potential access, agriculture access, and access to early childhood education are the main overlapping gaps.
- Proposed coordinated interventions:
 - Increase access to financial services and insurance mechanisms for farmers, particularly in communes such as Cayes-Jacmel and Marigot..
 - Coordinate investments in roads and irrigation systems for bean-producing areas to improve yields.





CONCLUSIONS AND POLICY RECOMMENDATIONS

Image by: Heather Suggitt

This paper has presented the results of a development gap analysis using a geospatial approach. By means of a range of qualitative and quantitative techniques, including macroeconomic and microeconomic evaluations using geospatial data, the analysis has sought to identify gaps that hinder Haiti's development and growth. The paper first presented 16 sectoral gaps and discussed how they affect different areas of Haiti using both the total geographic area and the population affected by the gap. This analysis was then expanded to include a multisectoral approach by overlapping different sectoral gaps across the country and identifying those areas with a relative higher gap accumulation. The results should be considered with care, as they reflect the most complete analysis possible given data availability. Table 1 presents more detailed information on the indicators used for each gap. The analysis has also provided recommendations on the possible combination and coordination of prioritized sectors. Note, however, that the analysis neither prescribes nor reflects future operations of the Haitian government or any international agency.

The results suggest that transportation, early childhood education, and crime and insecurity are the most widespread sectoral gaps in Haiti. Access to paved roads, early childhood education, and security provision in unsafe areas are the gaps that affect the largest area and the greatest number of people, accounting for gaps that respectively cover 68.2 percent, 53.9 percent, and 55 percent of the country's area, and affect 4.8 million, 3.9 million, and 3.4 million people.

More broadly, the sectoral gap analysis delved into four analytical dimensions to assess gaps across 16 sectors. Under the productivity dimension, limited access to the paved road network, electricity, and agriculture infrastructure present severe gaps. Access gaps to paved roads are the most prevalent, particularly in the Nord-Ouest, Sud-Est, and Nord-Est departments. These gaps can contribute to limited access to agricultural infrastructure and health and education services, with resulting negative effects on the country's productivity caused by higher logistic costs and reduced resilience of trade and supply networks. Gaps in access to current and planned electricity also are widespread, affecting 43.7 percent of the country and 2.7 million people, particularly in the Ouest, Nord-Ouest, and Nord departments. This gap has profound effects on both households and businesses, as it also negatively affects productivity, trade, and social service delivery. Finally, limited access to agriculture support and infrastructure affects 44.3 percent of the country, or 2.4 million people, impacting the departments of Sud-Est, Nord-Est, and Centre in particular. This hinders national productivity and livelihoods, as agriculture is the main economic sector in the country and a key source of income and food for many families.

In terms of the human capital dimension, Haitians continue to suffer from limited access to basic education, health and social services. Based on the gap analysis, 53.9 percent of the population (3.9 million people) face gaps in access to early childhood education facilities, and 36.8 percent (1.9 million people) face gaps in access to community-level healthcare services. The departments of Nord-Ouest, Nord, Centre, Sud-Est, and Nippes face the highest access gaps in these two sectors. In Grand'Anse, Sud-Est, Centre, Nord-Ouest, and Nord, on the other hand, limited access to water and sanitation services are one of the primary barriers to human capital development. Limited access to markets in food crisis areas also affects 35.2 percent of the country, or 1.7 million people, primarily in Nippes, Grand'Anse, and Artibonite. Looking at gender inclusion, the largest gaps in female secondary education achievement are in the Centre, Artibonite, and Grand'Anse departments. Prevailing gaps in the human capital dimension ultimately hinder living standards and workforce productivity in Haiti.

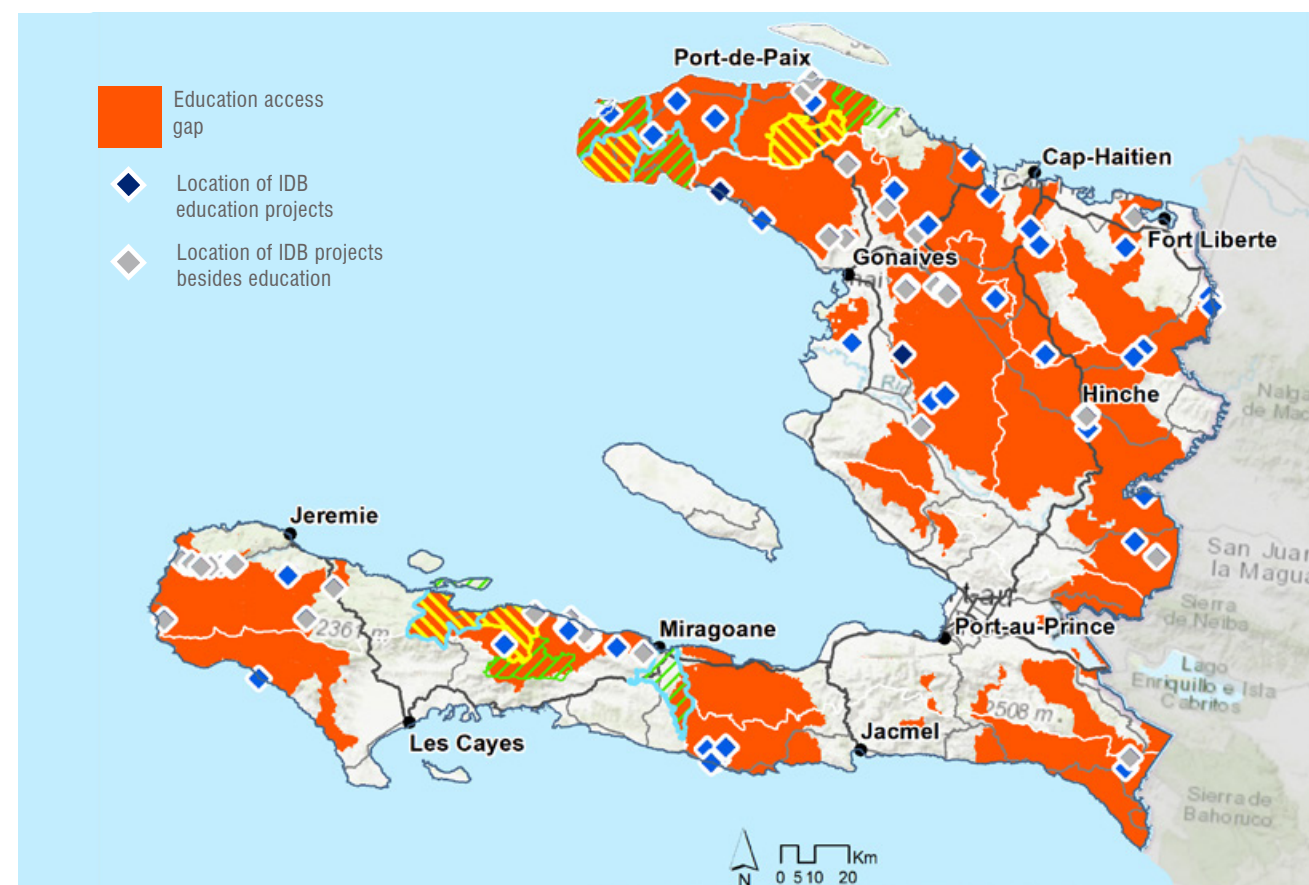
In the resilience dimension, Haiti's vulnerability to natural disasters is exacerbated by gaps in access to shelters, particularly in the south of the country. In addition to the country's high vulnerability to natural disasters, 33.8 percent of the territory (2.7 million people) is exposed to gaps in access to disaster assistance services, particularly in the Grand'Anse, Sud, and Nord Est departments. Gaps in climate change adaptation and mitigation measures can have long-term effects on growth and development, reduce the resilience of the country's operating infrastructure and services, hinder productivity, and increase inequality.

Finally, in the governance dimension, gaps in access to credit and security provision are significant and can have spillover effects on all other social and productivity dimensions in the country. Limited access to financial services affects 44 percent of the area of the country (approximately 2.6 million people), most notably in Grand'Anse, Nord, and Centre. Improving credit access could help expand the scale of production, diversify the economy, and help scale up operations of small and medium-sized enterprises across multiple sectors. Limited access to security provision in unsafe areas is also an important constraint for development, given that addressing conflict and violence is a strategic priority to promote resilience. This affects 55 percent of the area of the country, or 3.4 million people, particularly in the Nippes, Nord, and Nord-Ouest departments. Security-related gaps can have negative spillover effects on other factors such as educational attainment, production, commercialization, the private sector climate, and the attraction of foreign direct investment.

Based on these results of the analysis, targeted policy recommendations include the following:

- **In the transport sector, prioritize the restoration of some of the main highways and primary roads, particularly the RN5 section from Gonaïves to Port-de-Paix.** Expanding the connectivity of secondary and tertiary roads and linking them to main highways and thoroughfares is also recommended. This will help achieve two important objectives: better connect productive areas to markets, and provide easy access between rural areas and social service and labor markets centers.
- **In the education sector, continue strengthening early childhood education facilities.** Some of the targeted communes with a high concentration of education gaps include Saint-Louis du Nord and Mole Saint Nicolas in the Nord-Ouest department; and Miragoane and L'Asile in the Nippes department. Transit solutions such as school buses could also help close the gaps in access to early childhood education, particularly in areas more than 45 minutes away from a primary school. Finally, prioritizing the provision or improvement of basic services (such as electricity, water, and sanitation) for existing or planned primary schools would help reduce the education gap. These two last measures would be particularly beneficial in communes such as Bombardopolis and Bassin Bleu in the Nord Ouest department, and in Petit Trou de Nippes and Baraderes in Nippes (Figure 7).
- **To reduce the insecurity and crime gap, promote safety audits in areas with frequent conflicts in order to better understand issues and to draft strategies.** This could be particularly beneficial in the communes of Arnaud and Fonds des Nègres in the Nippes department, or in Acul du Nord and Bas Limbé in the Nord department. Integrating crime prevention into social and economic policies focused on integration of at-risk communities could also yield positive results to overcome this gap. This would be particularly useful in the communes of Anse-à-Veau and Baradères in Nippes; in Anse-a-Foleur and Port-Margot in the Nord; and in Bassin Bleu or Baie de Henne in the Nord-Ouest. Finally, establishing more law enforcement and promoting human rights programs in educational facilities could be transformative in communes such as Baradères and Fonds des Nègres in Nippes; in Cap-Haitien and Limbé in the Nord; and in Port-de-Paix and Baie de Henne in the Nord-Ouest.

Figure 7. Early Childhood Education focalized recommendations



Recommendations: 1. Strengthen education facilities | 2. Consider transit solutions and/or distance education | 3. Provision/improvement of basic services (electricity, water, and sanitation) for schools

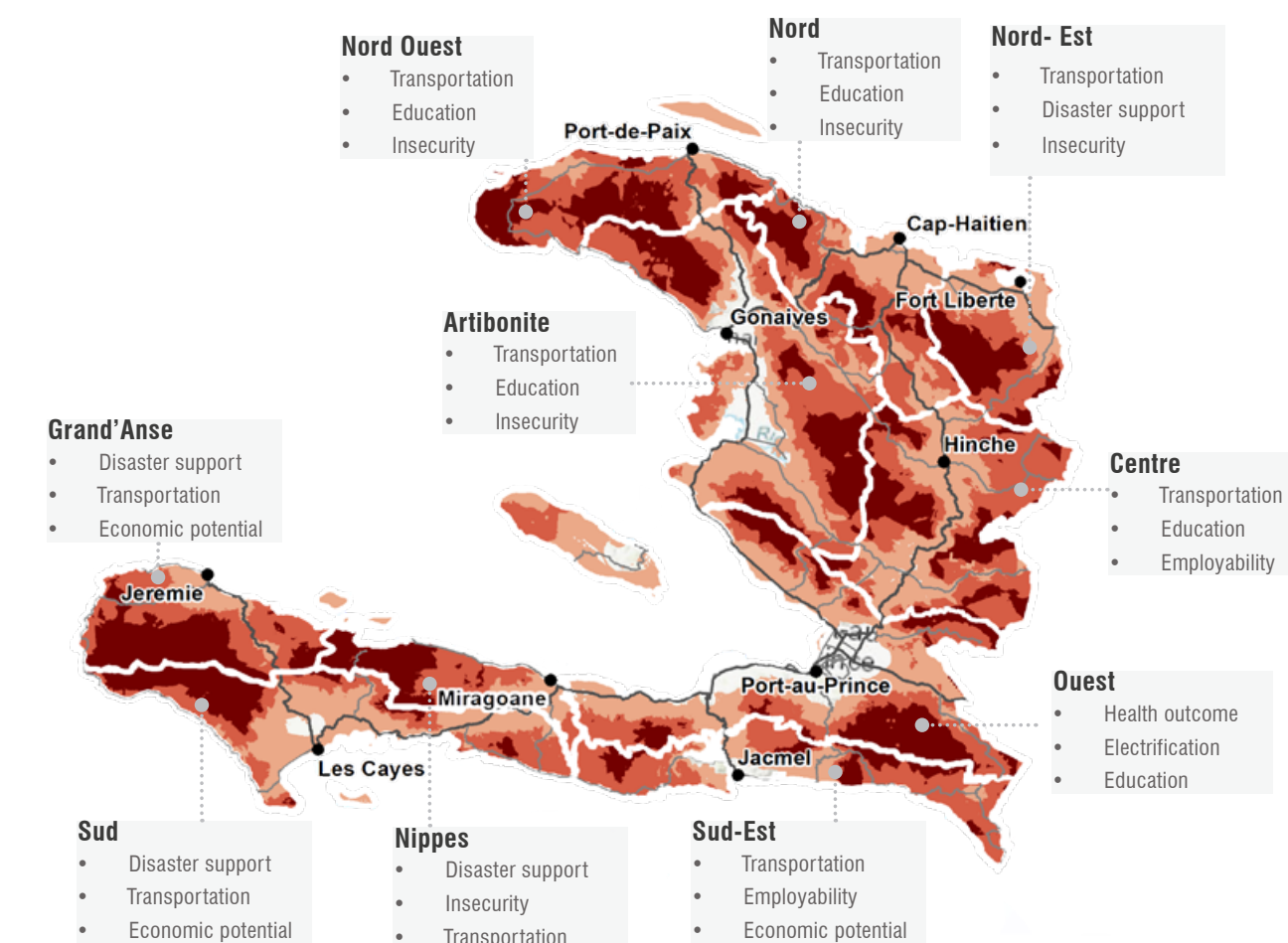
The multiple gap analysis provides insights into possible combinations of coordinated interventions that could yield greater benefits stemming from spillover effects. The multiple gap analysis highlighted that Nord-Ouest, Nord, and Artibonite are the departments that show the highest concentration of overlapping gaps. For example, in the Nord-Ouest, 26.5 percent of the population lives in areas that have more than nine sectoral gaps. The analysis also allowed for identifying combinations of gaps that tend to be present in the same location (Figure 8).

Although Figure 6 outlined the main gaps and measured proposed interventions by department, there are prevailing sectoral overlaps that, in general, could have spillover effects if targeted by an intervention.

First, areas that have insecurity gaps tend to overlap with areas that have limited access to early childhood education and employment opportunities. Second, many areas with economic diversification or opportunity gaps are agricultural areas with low penetration of financial services or transport networks. Third, areas with infrastructure gaps also sometimes have high risks to natural disasters. Finally, areas with gaps to accessing health tend to also have gaps in water and sanitation services. These sectoral overlaps can provide insightful perspectives on specific conditions and characteristics (gap size, location, and magnitude) that together lead to systemic problems and challenges, as well as provide a rationale on causality and inform the design of action and development policy frameworks.

There are several possible combinations of interventions that could help alleviate these multisectoral challenges. First, security interventions could be combined with education and labor market initiatives. Second, agriculture sector interventions could include access to finance components (including access to credit and insurance mechanisms). Third, health interventions could include water and sanitation provision as part of educational campaigns. Fourth, investing in resilient infrastructure, particularly in critical transport and logistics, productive, and social infrastructure, could reduce the risk of large-scale damage from natural disasters. Coordinated interventions would be well advised to consider these linkages in order to recognize possible spillover effects and aim to attain positive spillover effects from sectoral interventions.

Figure 8. Multisectoral gap areas across Haiti with indication of the three most pressing gaps by department



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