ENVIRONMENT AND ENERGY LANDSCAPE IN LATIN AMERICA AND THE CARIBBEAN: AN ANALYSIS OF TRENDS 2020–2030

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CONTRACT INFORMATION
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TABLE OF CONTENTS

EXECUTIVE SUMMARY

The U.S. Agency for International Development (USAID) partnered with Environmental Incentives and Dalberg Advisors to conduct an analysis of key environmental and energy trends that will affect Latin America and the Caribbean (LAC) from 2020 to 2030 in order to improve environmental and energy programming in LAC.

The process began with exploring the most relevant environmental and energy trends in the region along multiple dimensions. The analysis included trends that were both challenges (e.g., greater scarcity of water) and solutions (e.g., the rise of sustainable production). Similarly, the analysis included trends that were both pan-regional and local, existing and emerging or expected, and trends with either a large or a very small number of players participating.

Five key trends were prioritized based on their potential impact and relevance for USAID and the United States Government (USG) 1) increased exploitation of natural resources, 2) increased planetary health issues, 3) increased adoption of climate adaptation, 4) increased access to and use of modern energy sources, and 5) expanded use of market-based mechanisms for environmental management and conservation.

1) Increased exploitation of natural resources

The pace of natural resource exploitation in LAC is alarming, unsustainable, and worsened by increased illegality in sectors such as forestry, mining, wildlife trafficking, and fishing. LAC countries play a crucial role in global natural resource markets. The region is one of the United States' most important trading partners. Given the United States' reliance on the region for agricultural and mineral imports, adequately managing LAC resources is critical for the U.S. economy. Yet in recent years, legal and particularly illegal exploitation have reached unsustainable levels. For example, 2.7 million hectares of forest land were lost per year between 2010 and 2020.[1] This trend is mainly driven by a) demand for natural resources, b) economic incentives, and c) poor governance. Exploitation is only projected to increase as population growth continues, transnational criminal organizations strengthen, and new technologies increase resource demand (e.g., lithium demand will continue to grow as electric vehicles become more mainstream).

1. (FAOSTAT n.d.)

2) Increased planetary health issues

The LAC region has also experienced a surge in planetary health issues[2] in recent years. This trend is projected to get worse because of humanity's persistently destructive relationship with the environment. Growing evidence suggests that environmental degradation resulting from human activity is causing a wide range of serious health challenges. Among the most acute planetary health challenges in the region are illnesses stemming from changes in vector ecology of mosquito-borne diseases (e.g., dengue, malaria, chikungunya, Zika) and air pollution (e.g., cardiovascular and respiratory issues). Deforestation, agriculture, mining, and road construction, among other activities, are altering natural ecosystems in LAC and reducing the geographic distance between vectors and human settlements. As a result, the prevalence and incidence of vector-borne diseases (VBDs) have increased across the region. Vector-borne diseases are reducing quality of life and longevity for millions of people in LAC each year, particularly more vulnerable population, such as women, children, and indigenous groups. Meanwhile, persistent high levels of emissions from motor vehicles, power generation, and industry have produced more air pollution, which has led to cardiovascular and respiratory diseases. To date, air pollution remains among the top three causes of death in LAC. [3]

3) Increased adoption of climate adaptation

LAC countries are increasingly feeling the urgency to take measures to adapt to, and not just mitigate, climate change. The region has begun to embrace climate adaptation through: a) policies by implementing national adaptation plans and through their nationally determined contributions, b) technologies such as climate-smart agriculture and smart energy grids, and c) increasing dedicated financing. Additionally, a trend toward integrating climate adaptation into national development policies is beginning to emerge throughout the region. There is a clear case for investing in climate adaptation given its human, economic, and environmental benefits. Estimates suggest that climate change will cost LAC between 1.5 percent and 5 percent of the region's GDP by 2050, while climate adaptation will cost less than 0.5 percent of regional GDP.[4] Moreover, climate adaptation closely aligns with larger USAID priorities, including climate-resilient development, the Journey to Self-Reliance, and decreasing migration from Central and South America.

4) Increased access to and use of modern energy sources

Although LAC countries continue to rely heavily on non-renewable energies, renewables have grown in the region and represent a significant share of the total energy supply. More than half of electricity generation comes from renewable sources, mainly hydropower, which is more than twice the global average. Despite large gains in renewable energy, energy poverty still undermines livelihoods in many areas. As a result, innovative solutions have emerged in the region, creating a more sustainable and inclusive energy landscape, including: a) distributed generation technologies such as solar panels; b) modern energy sources, including renewable fuels for electricity and transportation and modern fuels for cooking and heating; and c) energy efficiency practices throughout the energy value chain. These solutions have gained traction and are expected to grow as consumer preferences shift and as countries adopt new regulations and increasingly prioritize international commitments, such as zero-emissions in public transportation systems and the Sustainable Development Goals (SDG) commitments.

2. Note: "Planetary Health is an emerging field focused on understanding the human health implications of the anthropogenic disruption and transformation of our planet's natural systems"; Source: (Planetary Health Alliance n.d.)
3. (EPA 2019)
4. (ECLAC 2015)

5) Expanded use of market-based mechanisms for environmental management and conservation

Market-based mechanisms for environmental management and conservation are also on the rise in LAC, with payments for ecosystem services (PES), tradable permits and quotas (P&Q), environmental taxes, and green bonds gaining momentum. Today, the LAC region is spearheading the global adoption of water funds[5] (a type of PES) and has 15 reported tradable P&Qs.[6] Moreover, revenues from environmental taxes have slowly increased in the region, reaching 1.1 percent of GDP on average in 2018. Similarly, the green bond issuance volume in LAC grew 18-fold from 2014-2019.[7] Market-based mechanisms are projected to gain further traction as more countries have expressed interest in adopting them. Their emerging use in LAC presents a unique opportunity to include non-traditional actors and build a more diverse ecosystem to address the region's environmental challenges.

A holistic, cross-sectoral approach is needed to properly mitigate the challenges and build on the solutions of these emerging trends. The underlying drivers of each trend are often systemic issues that cut across local economic, social, and cultural realities that are profoundly difficult to address. Making progress on these challenges often requires multi-pronged approaches that draw on resources and capabilities from local communities themselves along with support from government, the private sector, civil society, academia, and donors. The high-level ideas outlined in this report are often interdependent – they need to be implemented in tandem in order to be effective. They also require a keen understanding of the local context to determine whether and how they might apply, given the region's size and diversity.

USAID is well-positioned to provide various capabilities and support other actors to either expand the adoption of the solutions or to adequately tackle the challenges presented above. In particular, USAID can play a crucial role in: 1) supporting government expansion of technical capacity (e.g., for climate adaptation, USAID can build local capacity on climate adaptation, including implementation and monitoring of adaptation policies); 2) facilitating the exchange of knowledge between countries (e.g., for increased access to and use of modern energy sources, USAID can disseminate knowledge and best practices on setting up distributed energy projects across the region); 3) supporting private sector engagement (e.g., for market-based mechanisms, USAID can help private sector companies to showcase business opportunities in the green economy); and 4) supporting the development of financing mechanisms (e.g., for natural resource exploitation, USAID can provide catalytic capital for sustainable practices such as agroforestry). Additional USAID opportunities and potential roles are outlined in each chapter.

5. (Alianza Latinoamericana de Fondos de Agua, 2020)
6. (OECD, 2017)
7. (Initiative Climate Bonds, 2019)

INTRODUCTION

In the coming decade, LAC will face unprecedented environmental and energy challenges that will play a crucial role in its long-term sustainable growth and the population's well-being. The year 2030 stands as a key milestone, or deadline, for rerouting our global development path to a more sustainable alternative. As such, ensuring the region is on the right track in sustainable environmental and energy management is crucial for the long-term development and well-being of both its population and the globe at large.

In today's interconnected economy, conserving LAC's environment would benefit other regions and countries, including the United States. Furthermore, prioritizing inclusive sustainable development and adequate energy and environmental management would help advance additional USAID objectives in the region. As proven by the COVID-19 pandemic, our relationship with the environment is more precarious than ever, with large-scale impacts that can have unprecedented consequences on our population. Therefore, investing in a more sustainable development path is critical, going forward.

This report gives USAID, its Missions, and partners a more thorough understanding of key environmental and energy trends affecting the region through 2030.
The data and insights gathered in this report are meant to support Missions as they consider programming in their countries. Moreover, the calls to action included in each section are meant to serve as a starting point to guide USAID and different stakeholders (public sector, private sector, academia, and civil society) in the actions they can take, both to combat pressing environmental challenges and to embrace emerging solutions.

The report summarizes five key trends that are affecting energy and the environment in LAC. To identify these five trends, the analysis began by exploring a diverse set of trends affecting the region along multiple dimensions. The analysis included trends that were both challenges and solutions, pan-regional and local, existing and emerging or expected, and trends with varying degrees of attention and resources being allocated to them. Then, the scope was narrowed down to five key trends based on their potential impact and relevance for USAID and USG. The trend assessment included a mix of desk research, and consultations with USAID experts and Missions and with expert advisors.

Five trends were collectively identified as having the greatest impact potential and relevance for USAID and USG through 2030: 1) increased exploitation of natural resources, 2) increased planetary health issues, 3) increased adoption of climate adaptation, 4) increased access and use of modern energy sources, and 5) expanded use of market-based mechanisms for environmental management and conservation.

The chapters presented in this document are overviews of each of the five priority trends (see Figure 1) and how they manifest in the region.
Each chapter includes an introduction to the trend, followed by deep-dives on specific sub-trends, relevant case studies, and calls to action for USAID as well as other stakeholders in the public sector, private sector, civil society, and academia.

Figure 1: Overview of Selected Trends

A detailed description of the methodology and list of interviews conducted can be found in the annex.

INCREASED EXPLOITATION OF NATURAL RESOURCES

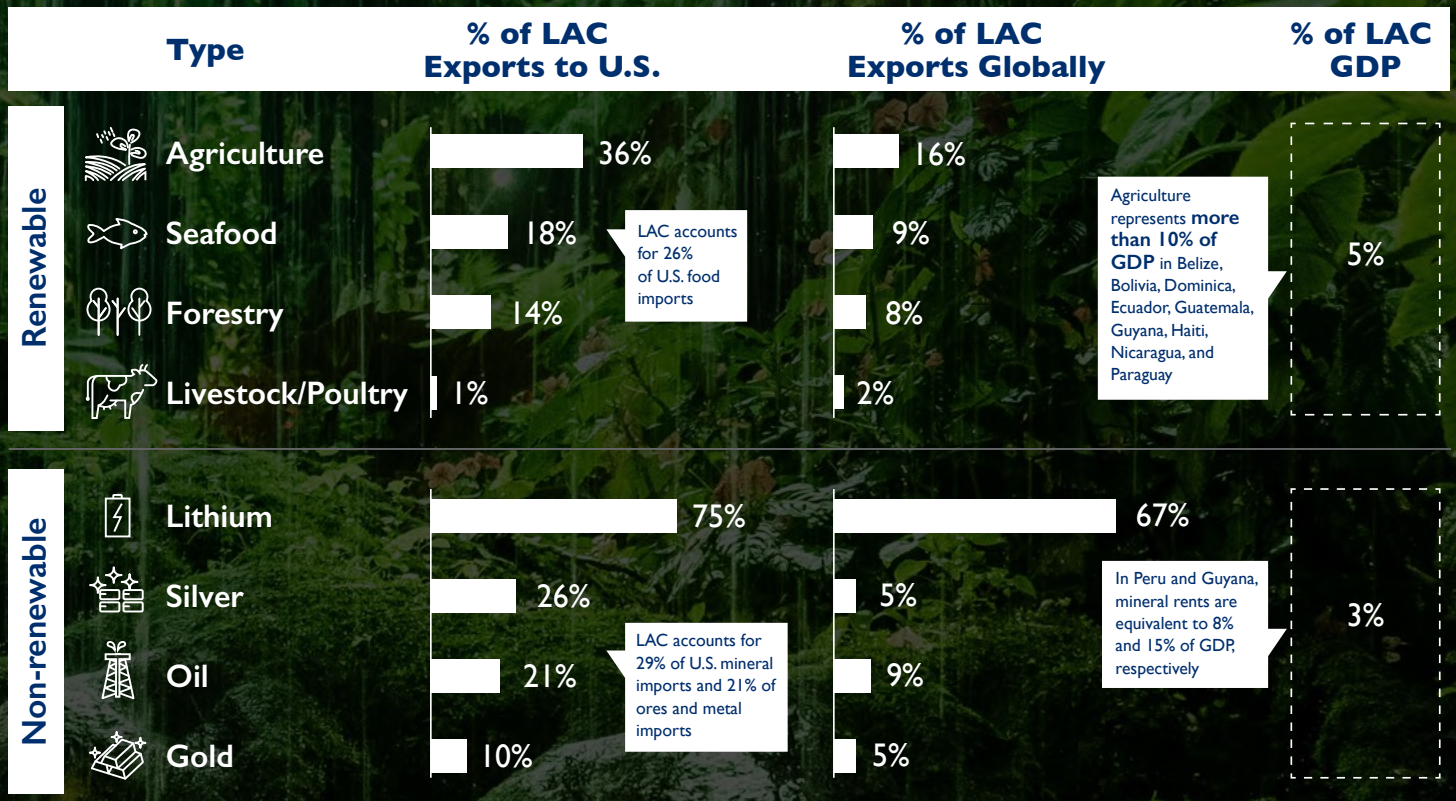
INTRODUCTION

Latin America and the Caribbean (LAC) is one of the world's richest regions in natural resources. It is home to 33 percent of the world's water resources, 30 percent of plant and animal species, and 25 percent of forests and arable land.[8, 9, 10] Similarly, the LAC region is endowed with some of the world's largest non-renewable reserves, including 61 percent of lithium reserves, 39 percent of copper reserves, 32 percent of silver reserves, 25 percent of oil reserves, and 11 percent of gold reserves.[11, 12]

LAC's resources are critical for U.S. and global value chains and play a crucial role in local economies (see Figure 2). The LAC region accounts for 26 percent of U.S. food imports, 29 percent of U.S. mineral imports, and 21 percent of ore and metal imports.[13, 14, 15] Moreover, economies in the region rely heavily on natural resources. Agriculture represents more than 10 percent of GDP in Belize, Bolivia, the Dominican Republic, Ecuador, Guatemala, Guyana, Haiti, Nicaragua, and Paraguay.[16] Similarly, countries like Peru and Guyana have a high dependency on mineral rents, equivalent to 8 percent and 15 percent of GDP, respectively.[17]

8. (FAO, 2019)
9. (The Nature Conservancy, 2019)
10. (World Bank, 2016)
11. (ECLAC, 2018)
12. (IOGP, 2018)
13. (World Integrated Trade Solution World Bank, 2020)
14. (World Integrated Trade Solution World Bank, 2020)
15. (World Integrated Trade Solution World Bank, 2020)
16. (OECD-FAO, 2019)
17. (World Bank, 2018)

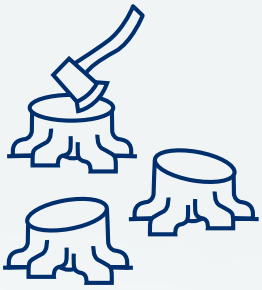
Figure 2: LAC Natural Resource Exports and GDP Contribution[18]



A host of factors[19] **are driving the unsustainable exploitation of natural resources in the region, including: 1) demand for natural resources,** which has increased due to population growth of 10 percent in the last decade,[20] rapid expansion of the middle-class, and a surge in global demand (e.g., for lithium, wildlife); **2) economic incentives** as natural resource trading is increasingly lucrative (e.g., gold price increased 80 percent from 2015-2020),[21] driving a lot of employment, and creating opportunities for criminal organizations to diversify their revenue sources; and **3) poor governance** given weak or poorly enforced policies and regulations as well as rampant corruption.

Unsustainable deforestation, mining, wildlife trafficking, and fishing have been particularly problematic in recent years, driven in part by a surge in illegal activity. Given the scale of the challenges, the acceleration of illegal activity, and the nature of USAID's priorities, this chapter focuses primarily on illegal deforestation, mining, and wildlife trafficking.

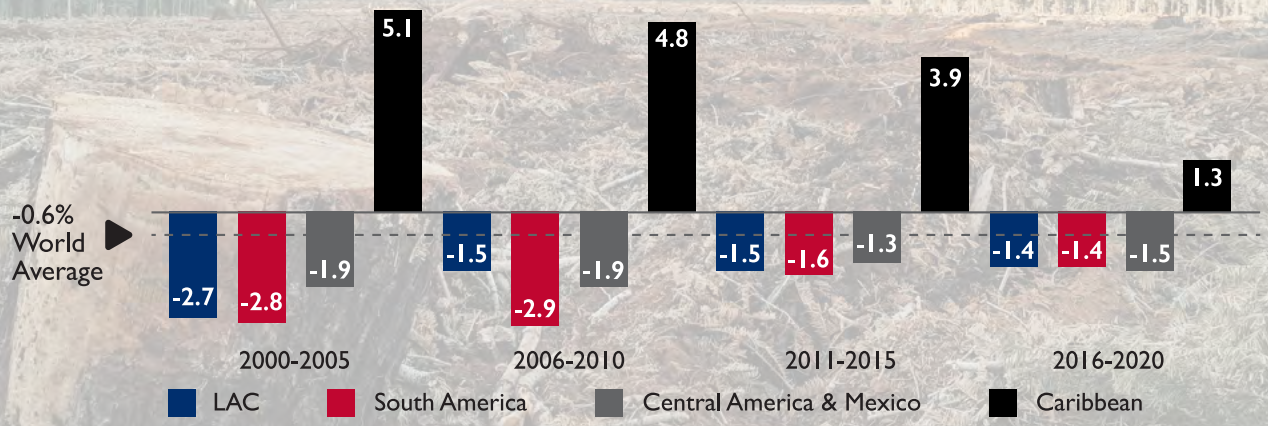
18. (FAOSTATS, 2017); (Statista, 2019); (WITS, 2018); (World Bank Data, 2017); (WITS, 2019); (WITS, 2019); (WITS, 2019); (World Bank Data, 2017); (WITS, 2019); (FAOSTATS, 2018); (U.S. Energy Information Administration, 2019); (WITS, 2019); (World Integrated Trade Solution World Bank, 2020); (OECD-FAO, 2019); (World Integrated Trade Solution World Bank, 2020); (World Integrated Trade Solution World Bank, 2020); (World Bank, 2018)
19. Note: COVID-19 is likely to impact the trajectory of some drivers as, for example, the middle class may recede, and environmental enforcement may decrease as countries prioritize alleviating economic crises.
20. (World Bank Data, 2019), 21. (Goldprice, n.d.)



DEFORESTATION

Despite some progress in decreasing the rate of deforestation during the last decade, it continues to be a major problem in LAC. The greatest progress has been achieved in the Caribbean, where forest land increased 0.5 percent per year from 2011-2020.[22] This suggests mitigating deforestation is achievable despite all obstacles. However, during the same time period, LAC lost 2.7 million hectares of forest per year, an area approximately the size of the state of West Virginia, meaning that LAC forests decreased at a rate of 1.5-1.6 percent per five-year period (see Figure 3).[23] Between 2015-2020, LAC losses represented 55 percent of global forest area losses.[24] Most recently, in 2019 alone, deforestation in the Amazon increased by 85 percent, reaching its highest level in 10 years.[25] Projections suggest that 27 percent of the Amazon will have no trees by 2030.[26] Most concerning, the Amazon is projected to reach a tipping point (where forests will be unable to regenerate) in the next 15-20 years.[27]

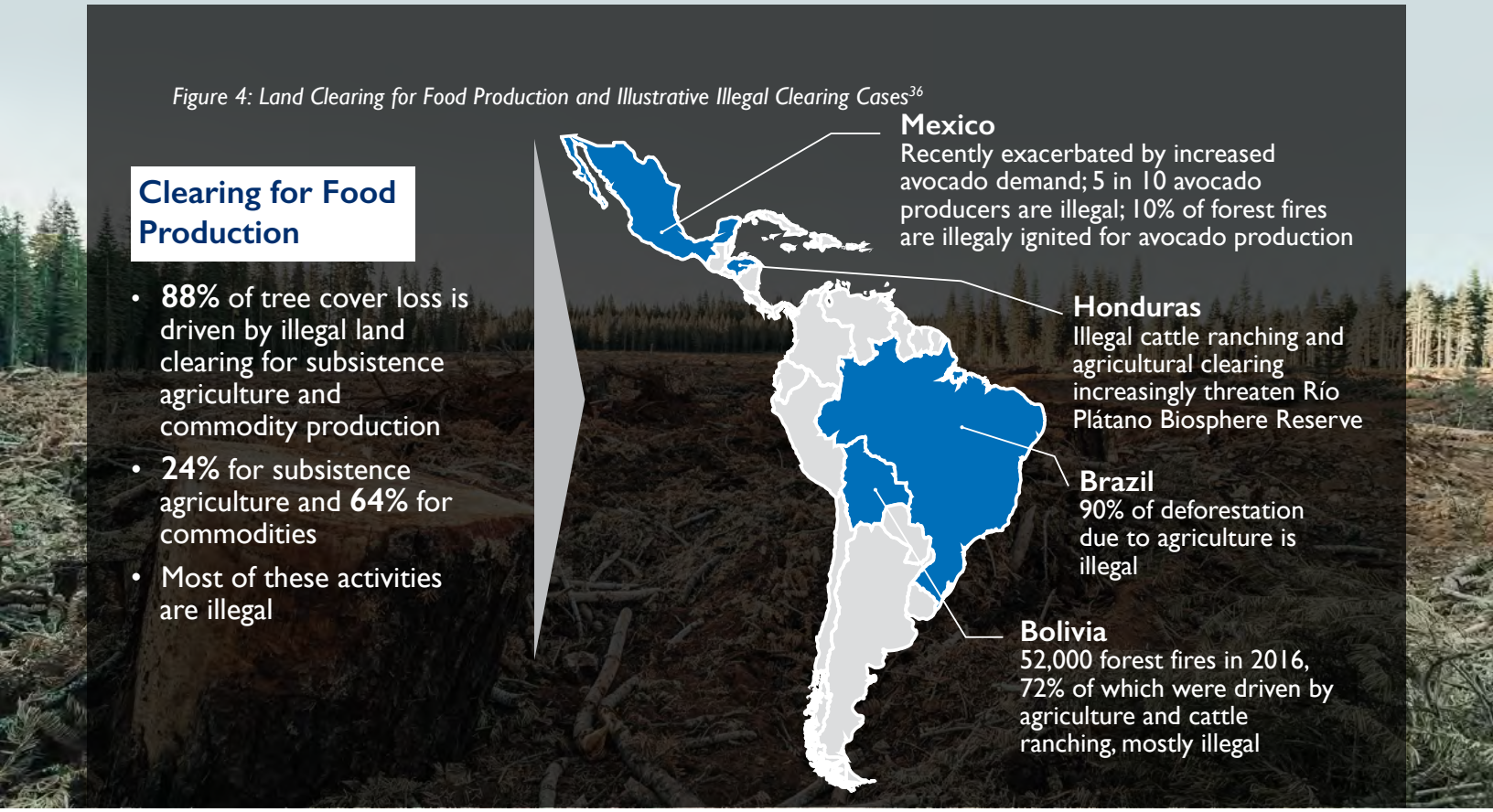
Figure 3: Percentage of Forest Loss or Gain Per Five-Year Period[28]



Deforestation in LAC is driven primarily by land clearing for food production and the expansion of timber trading, much of which is illegal. Most tree cover loss (64 percent) is caused by land clearing for commodity production, while subsistence agriculture is responsible for an additional 24 percent.[29] A significant part of this land clearing is illegal (see examples in Figure 4). The expansion of timber trade accounts for 12 percent of the region's deforestation.[30, 31] Three quarters of the region's timber exports are illegal,[32, 33] and its main destinations are the United States (23 percent), the Netherlands (10 percent), Italy (8 percent), Korea (5 percent), and Mexico (5 percent).[34, 35]

22. (FAOSTAT, n.d.)
23. (ibid.)
24. (ibid.)
25. (Reuters, 2020)
26. (WWF, n.d.)
27. (Nature, 2020)
28. (FAOSTAT, n.d.)
29. (Mongabay, 2018)
30. (Mongabay, 2018)
31. (World Resources Institute, 2018)
32. (LaPress, 2018)
33. Note: Although it is widely known that deforestation has been characterized by illegality, it is difficult to clearly distinguish between illegal and legal activities given lack of data, high corruption, and the incorporation of goods into legal supply chains.
34. Note: Includes forest products, fibreboard, wood pulp, paper, and paperboard.
35. (FAOSTATS, 2017)

Figure 4: Land Clearing for Food Production and Illustrative Illegal Clearing Cases[36]



Forest loss in LAC has enormous environmental, economic, health, and social implications. Environmental consequences include decreased biodiversity, increased soil erosion, lower rainfall, and reduced carbon stock (e.g., carbon stock in South America decreased from 162 Gt in 1990 to 145 Gt in 2020).[37] Forest loss also has large-scale **economic** implications. Forest-related economic activities generate $62 billion per year. Continued deforestation in the Amazon could result in losses of $3.5 trillion over 30 years.[38, 39] Additionally, it can create and exacerbate **health** challenges, such as decreased food security and nutrition and increased emergence and spread of infectious diseases. The **social** implications can be profound as well given the loss of livelihoods for indigenous and rural communities, particularly women. This is compounded by land grabs, displacement of communities, and violence against environmental activists associated with deforestation in LAC.

Various approaches in forest management are reducing illegality and contributing to sustainable commercial activity, for example: 1) agroforestry practices (e.g., the Pur Project in Colombia for organic coffee production, which benefited ~1,000 farmers and planted more than 2 million trees, diminishing soil erosion); [40] **2) technological solutions** (e.g., tracking technologies such as radio-frequency identification, Internet of Things (IoT), and blockchain technology that monitor supply chains in real-time from tree to the final user); and **3) innovative governance models** (e.g., community concessions[41] in the Maya Biosphere Reserve in Guatemala that have contributed to more sustainable timber production, increased incomes up to 2.8 times the poverty line, and reduced emigration).[42]

One example of combatting illegal logging in Mexico has shown encouraging results as shown in Figure 5.

36. (Earthsight, 2019); (Earthsight, 2017); (The Guardian, 2014); (Univeristy of Maryland, n.d.); (Mongabay, 2020)
37. (FAO, 2020)
38. (Al Jazeera, 2019)
39. (UNEP, 2016)
40. (Pur Project, n.d.)
41. Note: A community concession is a "contract between a forest owner [usually government] and another party [local community] permitting the harvesting (forest utilization contracts) and/or managing (forest management services contracts) of specified resources from a given forest area"; Source: (FAO, n.d.)
42. (FAO and UNEP, 2020)

Figure 5: Case Study: Indigenous Management of Forests to Combat Illegal Logging in Mexico[43]

"Drug traffickers who are involved in illegal logging have also been associated with land grabs. These activities often result in the forced displacement and migration of vulnerable, mostly indigenous people, who are at a high risk of becoming victims of [human] trafficking in the forestry and agricultural sectors [for labor exploitation]."

– Global Initiative Against Organized Crime

Challenge:

- Since 2015, illegal logging has skyrocketed in the state of Chihuahua, driven by drug cartels
- Drug cartels have either taken control of logging by stealing indigenous lands or forced sawmills to pay a tax to operate
- Increasingly, forests are used to harvest marijuana and timber for money laundering
- Forced labor, human trafficking, and violence have risen (e.g., murder of indigenous leaders)

Approach to Address the Challenge

- Emergence of community leadership in Chihuahua to resist organized crime
- Cooperation between community leaders to provide security, given state absence
- Development of forestry activities that provide employment and benefit communities and the environment, including forest and soil management, and reforestation

Outcomes:

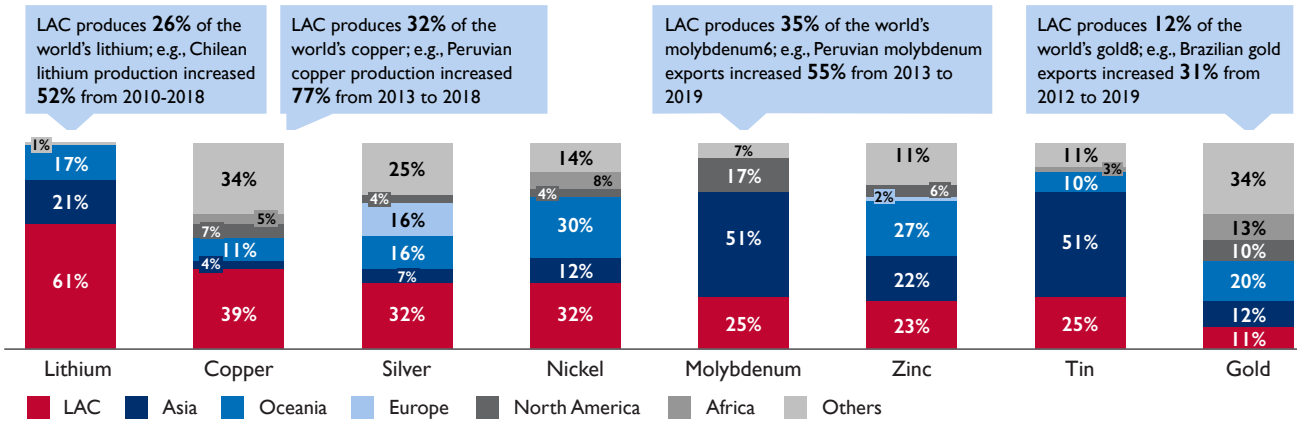
By taking control back from cartels, community leaders have:

- Increased conservation of forests (e.g., obtaining certifications for sustainable management, promoting sustainable jobs)
- Reduced illegal logging by establishing control over land and by providing alternative means of employment (e.g., over 300 jobs in sustainable forestry activities)

MINING

The LAC region has immense mineral wealth and is a leader in the global production of essential minerals. As Figure 6 illustrates, LAC countries have some of the world's largest reserves of highly sought-after minerals and has become a leader in the global production of several of these.

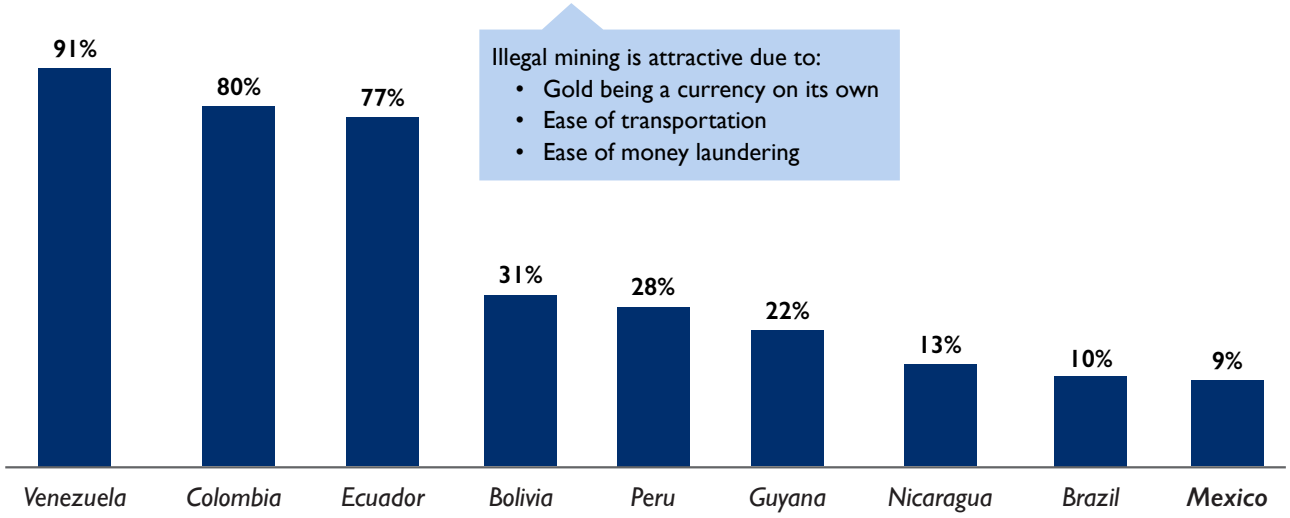
Figure 6: Global Mineral Reserves 2017[44]



43. (Global Initiative Against Transnational Organized Crime, 2020); (InSight Crime, 2019)
44. (CEPAL, 2018); (Reuters, 2019); (U.S. Geological Survey, 2020); (A.T. Minerals, 2019); (U.S. Geological Survey, 2019); (U.S. Geological Survey, 2015); (U.S. Geological Survey, 2020); (U.S. Geological Survey, 2014)

This section focuses primarily on small-scale mining, although large-scale mining is also degrading the environment across LAC. Small-scale illicit mining includes both informal[45] and criminal activities,[46] which at times are difficult to distinguish. Illegal gold mining is particularly problematic as levels of illegality reach 80 percent and 90 percent of all gold production in Colombia and Venezuela, respectively (see Figure 7).

Figure 7: Illegal Gold Mining by Country (% of Total Mining) [47, 48, 49]



Illegal small-scale and artisanal mining has been primarily driven by increased demand due to growing populations and middle-class expansion and is expected to continue rising as demand for products with mineral inputs grows (e.g., jewelry, consumer electronics, electric vehicles). There are also **economic incentives** for people to pursue illegal mining to make a living, as the price of minerals such as gold has increased significantly. These higher prices, along with the ease with which minerals can be transported and laundered, have made it increasingly attractive to organized criminal groups, which are eager to diversify their revenue streams.[50]

Local governments have generally been unable or unwilling to tackle illegal mining due to corruption, lack of resources, and limited government presence in the remote areas where mines are typically located. The burdensome legalization procedures that governments typically impose (e.g., formalization requires 22 steps in Peru)[51] also create incentives to bypass the state and its regulations.

Illegal small-scale and artisanal mining in LAC has resulted in an array of environmental, economic, health, and social issues. Among the **environmental** impacts are increased deforestation as well as greater water, air, and soil pollution (e.g., 1.3 kilograms of mercury are released for each kilogram of gold produced[52]). From an **economic** perspective, communities lose millions of dollars in potential tax revenues due to informality (e.g., illegal mining in Colombia is valued at $7 billion per year[53]). There are pernicious **health** consequences associated with illegal mining, particularly when mercury is used for gold mining (e.g., mercury levels in the Amazon are 34 times the safe level for women,[54] while 66 indigenous communities in

45. Note: Informal mining refers to traditional, artisanal miners, or small-scale miners who operate without licenses or who have not formalized their operations, but are in the process of doing so and operate in permitted areas.
46. Note: Criminal mining tends to be linked to organized crime, operates in prohibited areas, and/or fails to meet environmental, tax, and labor laws.
47. Note: For Peru, Honduras, Brazil, and Guatemala, the estimate included is an average of the range of estimates (average of upper and lower bounds), while for Bolivia, Ecuador, Mexico, and Colombia, the estimate included is a concrete data point.
48. (The Global Initiative Against Transnational Organized Crime, 2016)
49. Note: Definitions of what constitutes informality and illegality vary from country to country and local authorities have been unable to successfully identify them, or track them, on the ground.
50. (FBI, 2019)
51. (ELLA, n.d.)
52. (Global Americans, 2018)
53. (Al Jazeera, 2017)
54. (The Global Initiative Against Transnational Organized Crime, 2016)

Colombia have issues with mercury poisoning[55]). Where illegal mining is prevalent, a host of **social** challenges often arise, including human and sex trafficking, forced labor, extortion, conflict, murder, and increased displacement (e.g., in Colombia 87 percent of displaced people come from areas with illegal mines[56]).

Emerging solutions to tackle illegality and to improve mining practices are creating new opportunities for responsible commerce. Some examples include 1) gold tracing and certification (e.g., The Better Gold Initiative in Colombia, Peru, and Bolivia employs gold tracing and accreditation to improve social and environmental conditions in small-scale mines and builds demand for responsible gold);[57] **2) transparency regulations** that legally require companies to disclose their sourcing information (e.g., the emerging EU Conflict Minerals Legislation); and **3) progressive formalization,** which enables artisanal and small-scale miners to gradually comply with requirements rather than taking a one-step approach (e.g., through Colombia's 2014 National Formalization Policy, 19,000 miners had been trained, 3,388 mines had been evaluated, and 860 mines had begun the formalization process by July 2015).[58]

One multifaceted approach that can inform efforts to combat illegal mining is USAID's "Oro Legal" Program in Colombia. The program helps build gold mining governance capacity by strengthening legislation enforcement capacity, increasing the participation of artisanal mining associations and indigenous communities in formalization programs, and providing technical assistance and training for miners (see Figure 8).

Colombia Through USAID's "Oro Legal" Program[59]

Challenges:

- Poor governance of the small-scale mining sector, limited presence of mining and environmental authorities in rural settings, and gaps in the regulatory framework to effectively enforce small-scale gold mining
- Long history of environmental impact (mercury contamination and deforestation) caused by illegal or informal gold mining (e.g., 170 tons of mercury released per year)
- It would take an estimated $10.8 billion and 25-40 years to restore the environmental damages caused by mining
- Illegal mining is sustained by strong transnational criminal organizations colluding with illegal armed groups who obtain significant funding from illegal gold mining exploitation (e.g., FARC obtains 20 percent of its funding from illegal gold mining)
- Steadily increasing market gold prices to entice illegal actors and incentivize deeper encroachment into tropical forests

Approach to Address the Challenge

- Strategy anchored on two pillars: i) improve governance capacity for gold mining activities, and ii) increase capacity to address environmental degradation
- Reduce the use of mercury for gold mining through formalization and legalization of miners, mercury-free gold processing pilot projects, and the recuperation of degraded areas through the rehabilitation of degraded mining lands and the provision of alternative livelihoods

Outcomes:

- Legalize or formalize 135 small mines and produce $155 million worth of legal gold
- Rehabilitate 17,000 hectares of degraded mining lands
- Remove 55 tons of mercury from the production chain
- Train 3,500 miners on responsible mining methods

55. (InSight Crime, 2019)
56. (The Global Initiative Against Transnational Organized Crime, 2016)
57. (Better Gold Initiative, n.d.); (SECO, n.d.)
58. (Impact, 2018)
59. (USAID, n.d.); (The Global Initiative Against Transnational Organized Crime, 2016); (USAID Mission Review)

WILDLIFE TRAFFICKING

Wildlife trafficking is on the rise in LAC, threatening the region's biodiversity. The United States and Europe continue to be important export destinations for wildlife, although trafficking to the United States appears to have declined in recent years. Trafficking to China, on the other hand, has skyrocketed. As an example, seizures of jaguar parts in LAC increased 200-fold from 2012-2018, with more than a third of cases destined for China.[60] Domestic trafficking also continues to pose a threat to the region's biodiversity. For example, in Mexico, confiscations of illegally trafficked animals, including both domestic and imported animals, increased by 43 percent from 2013-2016.[61] Figure 9 depicts the types of animals commonly trafficked to key locations.

Figure 9: Trafficking by Species and Export Location[62]

Wildlife trafficking is driven by increased demand from both domestic and international markets. Domestically, demand is highest for birds as pets, reptiles as pets and accessories, and wild meat for consumption. While Europe and North America have a long history of trade in wildlife from LAC, growing commercial ties between LAC and China have been accompanied by an explosion of transpacific criminal activity, including wildlife trafficking. **Economic** incentives also continue to drive wildlife trafficking in the region and worldwide, given that this is the world's most lucrative organized crime trade after drugs and human trafficking (e.g., indigenous communities in Colombia have resorted to conducting wildlife trafficking activities for criminal groups to make a living).[63]

Ineffective policies and weak enforcement have also exacerbated the problem in LAC. Laws to combat wildlife trafficking are typically vague or non-existent, and countries rarely plan together or coordinate their efforts. Moreover, resources allocated to enforcement are insufficient, tracking data is limited, and law enforcement and judges do not receive adequate training on prosecuting these crimes.

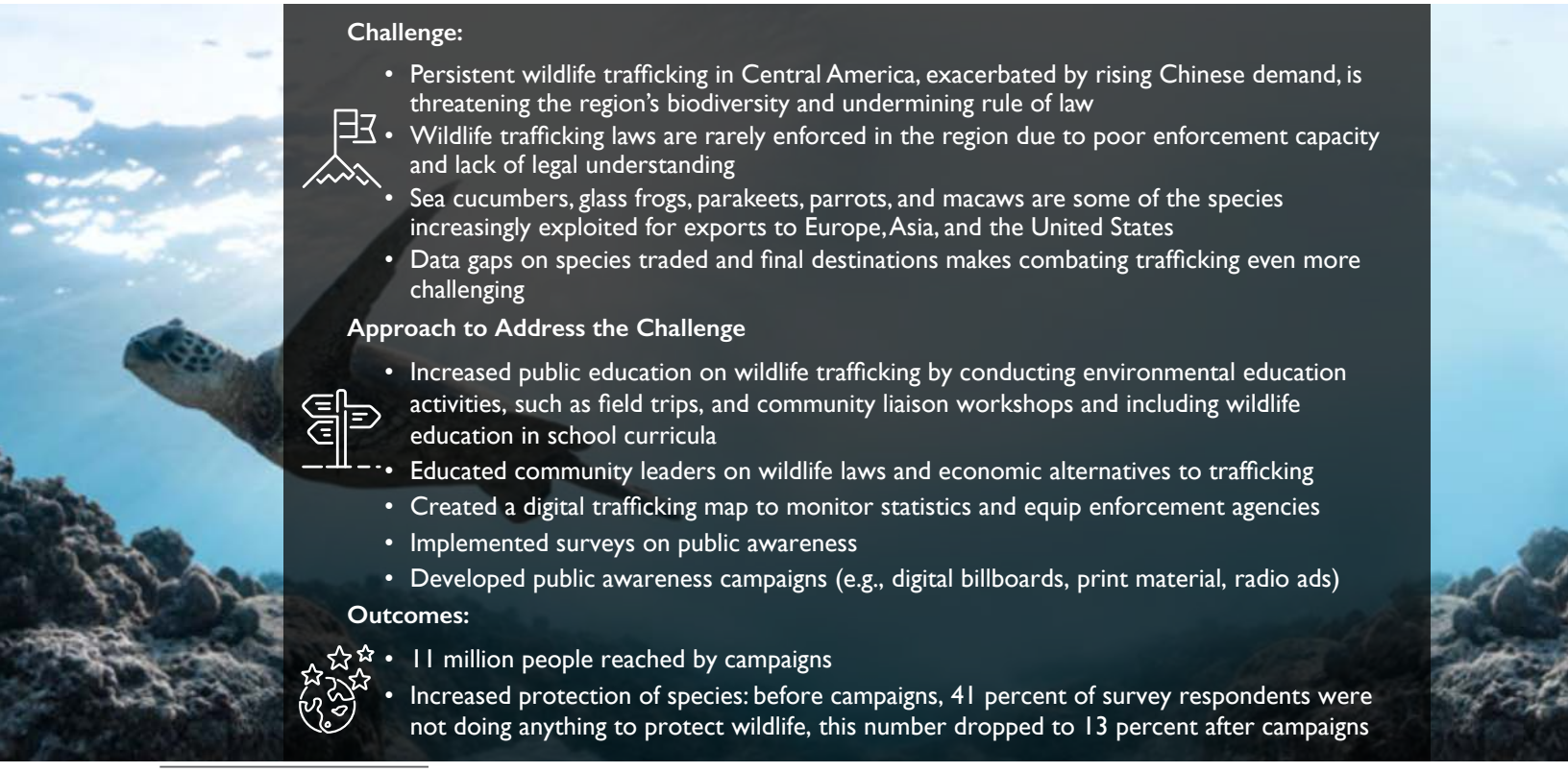
60. (Mongabay, 2020)
61. (Excelsior, 2018)
62. (Wildlife Conservation Society, 2018); (Mongabay, 2015); (Geographical, 2020); (European Commission, 2016); (Biological Conservation, 2016); (Defenders of Wildlife, n.d.); (Mongabay, 2010); (American University, 2018); (El Universal, 2015); (Excelsior, 2018); (Defenders of Wildlife, 2019)
63. (Latin America Reports, 2019)

Wildlife trafficking in LAC has huge biodiversity, economic, health, and social implications. **Biodiversity** in LAC has suffered as populations of these species dwindle (e.g., the jaguar population has decreased by 25 percent in two decades, mainly due to poaching)[64] and ecosystems are disrupted (e.g., shark poaching has significantly increased populations of some small fish, which in turn have depleted shellfish). From an **economic** perspective, communities dependent on wildlife (e.g., through ecotourism) may lose a key source of income. The **health** implications can be severe given the emergence of new diseases from increased human-wildlife contact (e.g., illegal bushmeat trade in other regions has been associated with increases in Ebola and retroviruses transmission). Wildlife trafficking also creates deep **social** challenges as it strengthens transnational criminal groups and leads to violence in affected communities, particularly against environmental activists.

Innovative approaches have emerged to mitigate illicit activity and improve wildlife management, such as **1) technologies to monitor** species and track illegal activity (e.g., a mobile application with geolocation technology in Colombia that identifies the location of crimes against sea turtles and helps improve investigations);[65] **2) government-civil society partnerships** to prosecute wildlife crimes and strengthen law enforcement (e.g., the Mesa Técnica partnership in Guatemala uses social media to identify crimes); and **3) forensic technologies** in wildlife trafficking investigations (e.g., using stable isotopes analysis to distinguish captive and wild animals, and to identify the origin of confiscated animal parts).[66]

One notable, multi-country effort is the Public Participation in Compliance with Wildlife Laws in CAFTA-DR[67] Countries Program, implemented by the Humane Society International (HSI). The program has managed to raise awareness among citizens and, consequently, increase wildlife protection in the region (see Figure 10).

Figure 10: Case Study: Combating Wildlife Trafficking by Increasing Public Awareness in CAFTA-DR Countries[68]



64. (UNEP, 2018)
65. (WWF, 2017)
66. (USAID and TRAFFIC, 2020)
67. Note: CAFTA-DR: Central America-Dominican Republic-United States Free Trade Agreement
68. (OAS, 2017)

ILLEGAL, UNREPORTED, AND UNREGULATED FISHING

Illegal, unreported, and unregulated (IUU) fishing continues to present a major challenge in LAC, threatening livelihoods and food security in the region. Globally, IUU fishing accounts for an estimated 20 percent of fish caught, resulting in an annual cost of $23 billion.[69] Although it is difficult to quantify the extent of IUU fishing given the scarcity of data, unsustainable fishing continues to be a major problem in the region, with 30 percent of fish in LAC being caught above permitted levels.[70]

IUU fishing has been driven by high demand for fish and weak enforcement. Approximately 900 illegal fishing boats arrive in LAC each year, primarily from China, Taiwan, South Korea, Spain, and Portugal.[71] With high demand levels, the fishing trade has become increasingly profitable (e.g., salmon profits rose 45-60 percent since 2012[72]), creating more incentives for IUU fishing. Unsustainable fishing is exacerbated by poor fishing techniques that result in large amounts of incidental catch.

Fishing activities remain poorly monitored and regulated across much of LAC. Many countries in the region have larger marine than terrestrial areas, making it difficult to monitor the high seas. Ultimately the lack of meaningful laws and enforcement creates few disincentives for IUU fishing.

IUU fishing has negatively affected the region's biodiversity, economy, and society. IUU fishing decreases biodiversity and endangers marine species, while threatening food security for local communities. It diminishes sources of livelihoods for 2.4 million people legally employed in fishing and aquaculture, with small fishers left most vulnerable.[73] Finally, it increases transnational crime, including human and arms trafficking.

Given the rise of IUU fishing and its direct impact on LAC livelihoods, USAID should continue to closely monitor IUU fishing in the coming years.

69. (FAO, 2018)
70. (France24, 2018)
71. (SciDevNet, 2019)
72. (Berkeley Political Review, 2018)
73. (FAO, 2018)

CALL TO ACTION

A holistic, cross-sectoral approach is needed to tackle the underlying drivers of unsustainable natural resource exploitation. Making progress usually requires cross-cutting approaches that draw on resources and capabilities from local communities and support from the government, private sector, civil society, academia, and donors. The high-level ideas outlined in this section often need to be implemented in tandem to be effective (e.g., support for alternative livelihoods alongside legal enforcement).

Reducing unsustainable natural resource exploitation in LAC requires action and collaboration across sectors.

Table 1: Calls to Action by Stakeholder

Public Sector

Support alternative economic activities and livelihoods, particularly in rural and indigenous communities, to reduce the need for unsustainable natural resource exploitation

Strengthen regulatory frameworks, their application and enforcement

- Develop and enforce legislation to regulate the exploitation of natural resources (e.g., use quotas)
- Provide land rights such as collective land titles (e.g., for indigenous populations) and guarantee rights are respected
- Improve standards of environmental impact assessment for infrastructure projects
- Fulfill commitments under the LAC P10 agreement to protect environmental activists, improve access to environmental information, and broaden public participation in environmental decision-making[74]

Break the chain of illegal trade

- Improve monitoring, tracking, and surveillance
- Improve prosecution of illegal activity at any stage
- Develop mandatory reporting systems where organizations must disclose the country of origin of the wood, gold, and other natural resources they purchase as a mechanism of public pressure for companies that trade in countries with high illegal exploitation of natural resources

Increase international cooperation to address both demand and supply, which is particularly effective in tackling trafficking

Civil Society

Engage in activism and advocacy

- Build alliances across civil society and the private sector to collectively increase pressure on policymakers and business leaders to adopt sustainable production policies and practices

Influence consumer demand

- Support and execute behavior change initiatives to shape consumption toward more sustainable products

Increase participation in planning and monitoring

- Participate in public consultation processes (e.g., consultations about mining projects)

Private Sector

Change sourcing policies

- Define strict procurement policies (e.g., "Zero deforestation" policies) and support suppliers in transitioning to sustainable practices
- Support small producers along the supply chain to improve processes

Invest in traceability mechanisms

- Develop tools and frameworks to improve traceability of products in key supply chains (e.g., mobile apps that help buyers trace products end-to-end)

74. Note: Ten countries (Costa Rica, Chile, the Dominican Republic, Ecuador, Jamaica, Panama, Paraguay, Peru, Mexico, and Uruguay) signed the 2012 Declaration on the application of Principle 10 of the Rio Declaration on Environment and Development in Latin America and the Caribbean ("the LAC Declaration on Principle 10") at the United Nations Conference on Sustainable Development (Rio+20) in June 2012. Signatories to the Declaration agreed to support the development of a regional instrument that will strengthen access to information, encourage public participation, and strengthen access to justice in sustainable development decision-making.

Private Sector

Influence policymakers

- Partner with civil society actors and contribute resources to influence policymakers into enacting and implementing sustainability-focused policies and regulations

Academia and Research Institutions

Innovate

- Develop technology and techniques for sustainable exploitation of natural resources and tracking and monitoring

Research

- Develop deep-dives by country to build knowledge and to implement a more data-driven approach to these topics (e.g., state of wildlife trafficking in Peru)

Train conservation professionals

- Improve and expand training in conservation-related disciplines for professionals across public, private, and civil society sectors

USAID can bring various capabilities to reduce unsustainable natural resource exploitation across the region:

SUPPORT GOVERNMENTS WHEN EXPANDING TECHNICAL CAPACITY AND IMPROVING THE RULE OF LAW ON TOPICS SUCH AS:

- Resource management
- Conservation programs
- Organized crime

PROVIDE CATALYTIC CAPITAL TO TRANSITION TO SUSTAINABLE PRACTICES

- Provide catalytic capital for sustainable practices such as agroforestry
- Bring in more sustainability-focused private sector off-takers

FACILITATE EXCHANGE OF KNOWLEDGE ACROSS COUNTRIES

- Create platforms and fora for cross-Mission learnings (e.g., Guatemala has knowledge related to environmental conservation crimes)

SUPPORT PRIVATE SECTOR COMPANIES

- Support companies transitioning to business models that use natural resources sustainably
- Work with local governments to encourage and support the formalization of small-scale, artisanal, and informal mining and logging (e.g., create incentives, ease bureaucratic hurdles)

SUPPORT AND PROTECT ENVIRONMENTAL ACTIVISTS, ESPECIALLY IN INDIGENOUS COMMUNITIES

- Support and pressure, where needed, LAC governments to fulfill commitments to protect environmental activists under the LAC P10 agreement

BUILD PUBLIC-PRIVATE-CIVIL SOCIETY COALITIONS

- Create data sharing coalitions so as to obtain real-time data on conservation crimes across different organizations

INCREASED PLANETARY HEALTH ISSUES

INTRODUCTION

There is growing evidence that environmental degradation from human activities is causing a wide range of serious health challenges. This has spurred the rise of Planetary Health – an emerging field focused on understanding the health implications of human-driven disruption and transformation of the planet's natural systems.[75]

Environment-related problems affect human health in multiple ways (see Figure 11). For example, air pollution from burning fossil fuels can cause cardiovascular and respiratory diseases; deforestation due to livestock activities, agriculture, and extractive industries, alongside climate change, contribute to an increase in the frequency and severity of vector-borne disease outbreaks; and water scarcity due to agricultural and industrial uses as well as climate change are leading to community displacement. Collectively, these environment-related challenges are driving increasing anxiety levels in communities whose sustainability is consistently at risk.

75. (Planetary Health Alliance n.d.)

Figure 11: Relation Between Specific Environment-Related Problems and Health-Related Challenges[76]

Environment-Related Problems	Non-Communicable Diseases	Infectious Diseases	Nutrition	Displacement	Mental Health
Deforestation	✓	✓		✓	✓
Climate Change	✓	✓	✓	✓	✓
Air Pollution	✓				✓
Biodiversity Shifts		✓	✓		
Water Scarcity		✓	✓	✓	✓
Changing Food Systems	✓		✓	✓	
Natural Disasters			✓	✓	✓
Examples	Cardiovascular diseases, respiratory diseases	Dengue, Zika, malaria, COVID-19, SARS	Malnutrition, obesity, food Insecurity	Forced migration, civil strife	Anxiety

The LAC region faces a host of planetary health challenges. For example, natural disasters affected 297 million people from 1980 to 2016[77] and ~50 percent of Central America's annual harvests have been lost due to water scarcity and higher temperatures, leaving millions of people food insecure.[78]

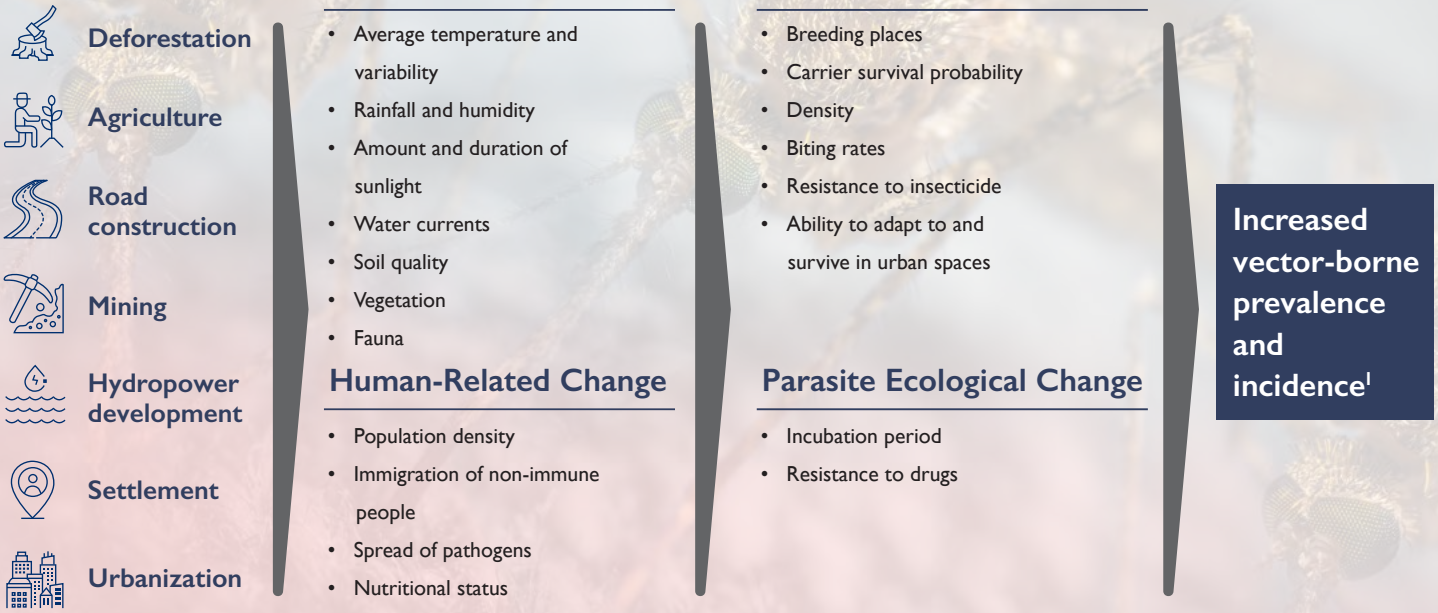
Among the most acute planetary health challenges in the region are diseases stemming from changes in vector ecology (e.g., dengue, malaria, chikungunya, Zika) and air pollution (e.g., cardiovascular and respiratory issues). These challenges will be the focus of this chapter given their threat to human health, interdependence with other environmental trends, and alignment with USAID experience.

DISEASES FROM CHANGES IN VECTOR ECOLOGY

A host of human-driven ecological changes are contributing to the increased frequency and severity of VBD outbreaks in LAC. Deforestation, agriculture, mining, and road construction, among other activities, are altering natural ecosystems in LAC and reducing the geographic distance between vectors and human settlements. This, in turn, is increasing the prevalence and incidence of VBDs across the region. The pathway from human activity to spread of VBD (as outlined in Figure 12) has been observed in regions like the Amazon, where a 10 percent increase in deforestation was shown to contribute to a 3.3 percent increase in malaria incidence between 2003-2015.

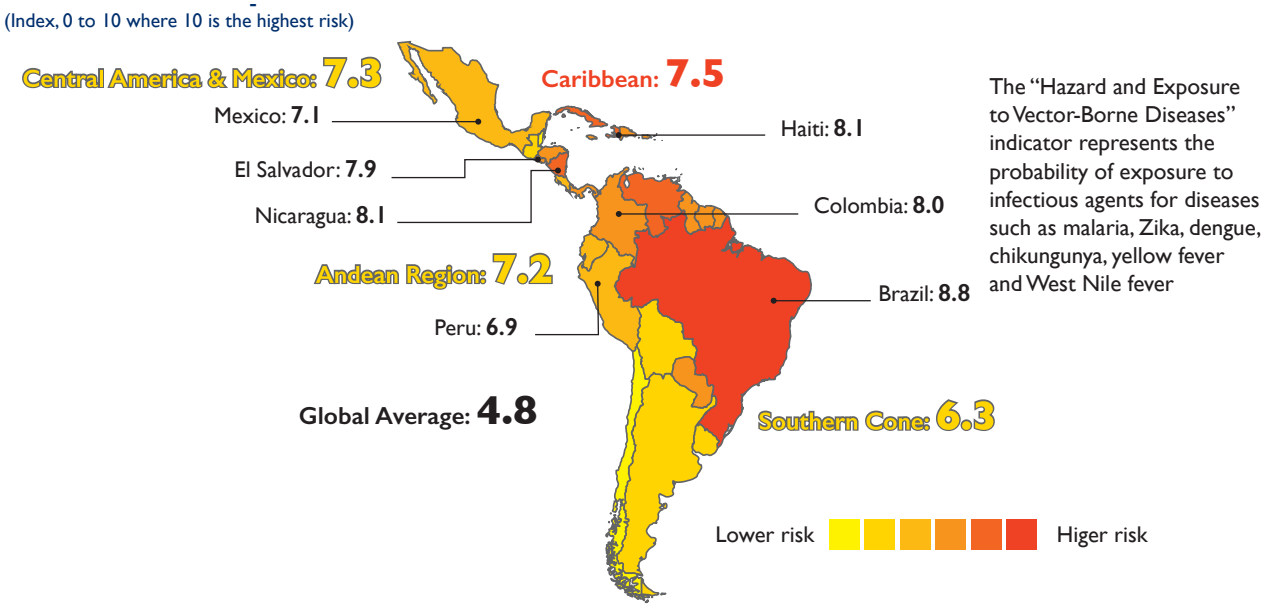
76. (Planetary Health Alliance n.d.)
77. (IDB 2018)
78. (FAO 2016)

Figure 12: Impact of Human Activities on Ecological Change and VBD Prevalence and Incidence[79]



LAC countries face a high risk of infection from VBDs, particularly those in the Caribbean, Central America, and countries like Brazil and Colombia. According to the INFORM index 2020 "Hazard and exposure to VBDs,"[80] the region has a risk score of 7.2 (out of 10), well above the global average of 4.8. This risk level is a result of the narrow gap between vectors' tropical ecosystems and human settlements in several subregions, particularly in high-risk countries with high levels of land-use change within and bordering the Amazon such as Brazil and Colombia, as well as Haiti, Nicaragua, and El Salvador.

Figure 13: Regional and National Hazard and Exposure to VBD[81]



79. (People, Health, and Forests 2008)
80. (European Commission Disaster Risk Management Knowledge Centre 2020); "Hazard and exposure to VBDs" represents the probability of exposure to infectious agents for diseases such as malaria, Zika, dengue, chikungunya, yellow fever, and West Nile fever.
81. (European Commission Disaster Risk Management Knowledge Centre 2020)

Figure 14: Main VBDs' Impact on Health Across Latin America and the Caribbean[82]

	Key Locations	Total Cases in the Last 5 Years (million)	DALYs per 100,000 People	Recent Evolution in LAC
Dengue	**Brazil, Mexico, Colombia,** Nicaragua, and Honduras	10.6	21.9	**Reported cases increased 165%** between 2014 and 2019, with fluctuations in 2017-18
Malaria	**Venezuela, Brazil, Colombia,** Peru, and Haiti	3.0	79.4	**Reported cases increased 96%** between 2014 and 2018 with a clear linear, upward trend
Chikungunya	**Brazil, Panama, Bolivia,** Colombia, and El Salvador	2.9	25.4	**Record of 1 million cases in 2014,** but downward trend ever since: ~177,000 cases in 2019
Zika	**Brazil, Colombia, Venezuela,** Honduras, and Martinique	0.9	5.1	**Cases increased 7 times between 2015-2016** and then decreased to 50% of 2015 levels in 2019
Leishmaniasis	**Brazil, Colombia, Peru,** Nicaragua, and Bolivia	0.3	273.1	**Cases are stable at an average of ~50,000** per year

Disability-adjusted life years (DALYs) is a measure of overall disease burden, expressed as the number of years lost due to ill-health, disability, or early death. As a reference, DALYs per 100,000 people for appendicitis in LAC is 24 and diabetes mellitus is 839.

VBDs affect the health of millions of people in LAC, especially at the peaks of outbreaks. The main diseases affecting the region measured by total cases are dengue, malaria, chikungunya, Zika, and leishmaniasis. For example, dengue affected more than 10 million people between 2014–2019, a 165 percent increase in annual cases over that time period. Other diseases such as leishmaniasis affected fewer people (295,000) between 2014–2019, but with a much higher burden of disease among the population infected. Figure 14 presents key facts of the impacts on health for the main VBDs in LAC.

VBDs have had enormous economic consequences in LAC. For example, dengue and malaria cost the region more than $3 billion and $2 billion per year, respectively, given strains on health systems, reduced employment, decreased worker's productivity, etc.[83,84] Similarly, Zika is estimated to have caused an economic loss of $7 to $18 billion from 2015 to 2017 across LAC,[85] primarily due to its effects on tourism as travelers shied away from the region.

Vulnerable populations often bear the heaviest brunt of VBDs. Women and children in rural areas are typically more affected due to assigned roles within households, such as collecting water.[86] Structural gender inequality in healthcare access and nutrition, in addition to factors like menstruation and pregnancy, make women less immune than men to VBDs such as dengue.[87] These infections can have acute consequences in pregnant women and their babies, as is the case of the microcephaly syndrome associated with Zika.[88] Furthermore, indigenous populations are also more vulnerable, as they are frequently marginalized through lower access to essential household services and healthcare.[89]

Various approaches are showing promising results toward addressing the consequences and environment-related causes of VBDs. Some examples include: 1) **water supply management** (e.g., a partnership with local communities from Veracruz, Mexico, promoted the adoption of safe water-collection systems and led to a decrease in dengue incidence in the region[90]); 2) **mosquitoes' habitat management** (e.g., wetland draining and mosquito-ditching to remove standing water have been effective in the Peruvian Amazon to reduce malaria transmission, although

82. (PAHO n.d.); (The Lancet 2017); (International Journal of Infectious Diseases 2015)
83. (Pan American Journal of Public Health 2018)
84. (WHO 2019)
85. (UNDP 2017)
86. (WHO 2019)
87. (The Independent 2018)
88. (WHO 2017)
89. (Tropical Medicine & International Health 2018)
90. (WHO 2018)

risks of affecting ecosystems and causing the loss of other species through these practices must be assessed[91]); and 3) **insecticide-treated nets (ITN)** (e.g., regions of Colombia, Ecuador, Peru, Venezuela, and Nicaragua have successfully implemented ITN, reducing child mortality by 83 percent and severe malaria episodes by 56 percent[92]).

One particularly promising approach is the introduction of natural bacteria to decrease the transmission rate of VBDs. For example, in Brazil and Colombia, *Wolbachia*-infected mosquitoes have been released into areas with high incidence of mosquito-borne diseases to reduce the spread of dengue, as discussed in Figure 15.

Figure 15: Case Study: Wolbachia Bacteria to Decrease Transmission of VBDs[93]

"By breeding mosquitoes that carry safe and natural Wolbachia bacteria, we can effectively prevent diseases from spreading in whole cities and even regions. Our evidence shows that in areas where Wolbachia is self-sustaining at a high level, there have been no dengue outbreaks." – World Mosquito Program

Challenge:

- In recent years, population growth, the movement of people from rural areas to cities, more international travel and climate change have all increased the spread of *Aedes aegypti* mosquitoes, which carry viruses like dengue, Zika, chikungunya, and yellow fever

Approach to Adress the Challenge

- When *Aedes aegypti* mosquitoes carry the natural bacteria *Wolbachia*, the bacteria compete with the viruses. This makes it harder for viruses to reproduces inside mosquitoes and makes them much less likely to spread diseases
- "The World Mosquito Program breeds *Wolbachia*-carrying mosquitoes and, in partnership with local communities, releases them into areas affected by mosquito-borne diseases"
- Independent risk analyses indicate that the release of *Wolbachia*-infected mosquitoes poses negligible risk to humans and the environment. The program has received regulatory approval in all countries where *Wolbachia*-carrying mosquitoes have been released

Outcomes:

- Brazil: "dengue incidence ↓ 42–74 percent and chikungunya incidence ↓ 21–74 percent"
- Colombia: "No dengue outbreaks in *Wolbachia*-treated areas of city-wide deployments"

HEALTH ISSUES FROM OUTDOOR AND INDOOR AIR POLLUTION

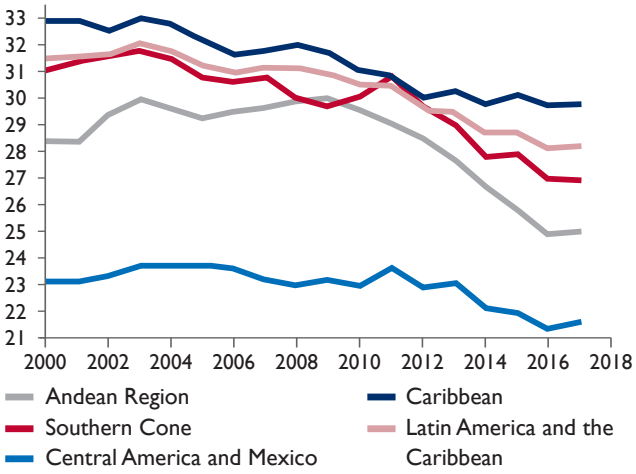
A host of factors drive outdoor and indoor air pollution in LAC. Outdoor air pollution comes primarily from emissions by combustion processes from motor vehicles, power generation, and industry.[94] In the case of indoor air pollution, biomass burning for cooking and heating generates most of the emissions within households.[95]

Exposure to air pollution can lead to serious health issues and even death. Indeed, air pollution has been consistently among the top three causes of death in LAC.[96] The most common health issues associated with air pollution include cardiovascular diseases (e.g., coronary heart disease, stroke, diabetes), respiratory diseases (e.g., chronic obstructive pulmonary disease, acute lower respiratory infections), and lung cancer.[97] A person's vulnerability to air pollution can also depend on their stage of life. For example, pregnant women face additional risks as air pollution is associated with premature birth, low birth weight, and even stillbirth. Among children, air pollution is linked to asthma, lung function impairment, and the possible start of atherosclerosis.[98]

91. (Case Studies in the Environment 2019)
92. (WHO 2019)
93. (The World Mosquito Program 2019)
94. (OLADE n.d.)
95. (EPA 2019)
96. (EPA 2019)
97. (WHO 2018)
98. (Public Health England 2018)

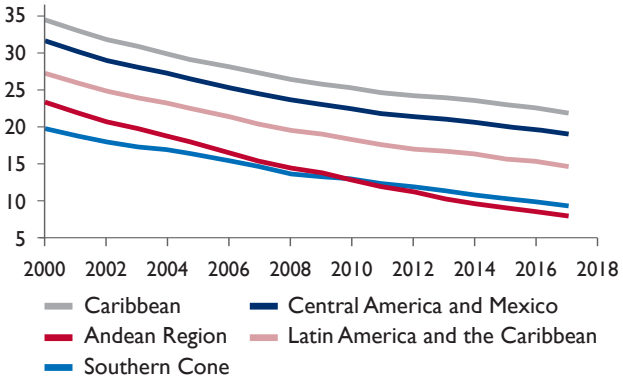
In LAC, mortality rates from outdoor air pollution have declined in recent years, but remain high, and progress has been uneven. Currently, 26 per 100,000 people die from outdoor air pollution in the region (see Figure 16), which is less than the world average of 44, but remains well above the level for high-income countries (17).[99] Despite the overall downward trend in LAC, mortality rates from outdoor air pollution are increasing in some countries, such as Jamaica, El Salvador, and the Dominican Republic.

Figure 16: National and Region Outdoor Air Pollution Death Rates per 100,000 People[100]



Mortality rates from indoor air pollution have also declined in LAC, yet a few countries continue to face relatively high rates. Death rates from indoor air pollution have declined from 28 to 15 per 100,000 between 2000-2017; in high-income countries, there are just 0.2 deaths per 100,000 people.[101] In countries like Haiti, Guatemala, Honduras, Paraguay, Nicaragua, and Bolivia, where cooking with traditional cookstoves and solid fuels is still widespread, mortality rates are approximately between two to four times the region's average.

Figure 17: National and Regional Indoor Air Pollution Death Rates per 100,000 People[102]



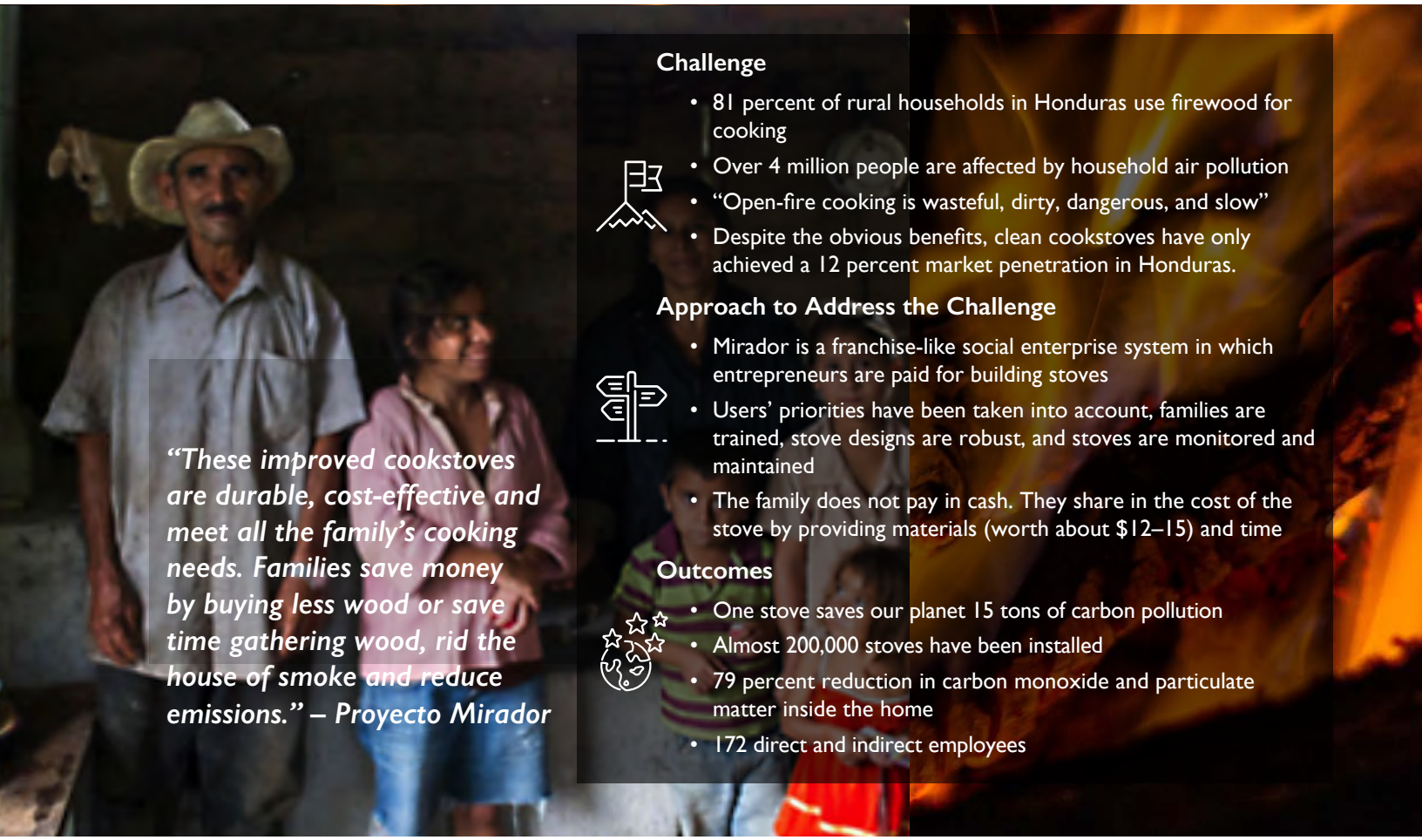
The health impacts of air pollution in LAC also have economic and social implications. For example, LAC countries currently spend $80 billion in welfare costs[103] as a result of premature deaths from air pollution and are projected to spend up to $470 billion by 2060.[104] Also, vulnerable populations, including women, indigenous people, and poorer communities, often suffer most from the health and economic consequences of air pollution.[105] This is due to cultural norms[106] (e.g., cooking habits in rural areas, division of household responsibilities), inadequate access to health care services, and higher likelihood of having preexisting conditions.

There are promising approaches to address the consequences and environment-related causes of air pollution. For example, 1) upgrading industrial technology (e.g., Argentina and Brazil have both begun installing supermarket refrigeration systems utilizing mainly CO_2 and ethylene glycol instead of hydrofluorocarbons[107]); 2) efficient transport systems (e.g., through a fiscal incentive applicable to replacing freight units more than ten years old and for vehicles less than six years old, Mexico has eliminated more than 25,000 older units[108]); and 3) behavior change campaigns (e.g., EcoMal, Doña Dora, and Chispas stoves, who leverage multichannel communication campaigns to drive behavioral change in Guatemala). The favorable impact includes a reduction in exposure to pollutants and a reduction in deforestation.[109]

99. (Global Burden of Disease Collaborative Network 2017)
100. (Global Burden of Disease Collaborative Network 2017)
101. Note: High-income countries categorization according to the World Bank, refers to countries (83) with Gross National Income per capita above $12,055, e.g. United States, New Zealand, Malta, Hungary, Malta. etc.
102. (Global Burden of Disease Collaborative Network 2017)
103. Note: Welfare cost associated to non-market impacts such as premature deaths from air pollution refers to the individual willingness-to-pay to reduce the risks of premature deaths
104. (OECD 2016)
105. (Global Burden of Disease Collaborative Network 2017)
106. (OECD 2016)
107. (Greenpeace 2016)
108. (Alternative Fuels Data Center 2014)
109. (Clean Cooking Alliance 2013)

Clean cookstoves are one example of cleaner technologies employed to avoid indoor air pollution. In Honduras, for example, a social enterprise called el Mirador has designed a model where entrepreneurs get paid for building improved biomass stoves that take into account customers' preferences.

Figure 18: Case Study: Social Enterprise for Clean Cookstoves[110]



CALL TO ACTION

A holistic, cross-sectoral approach is needed to tackle the underlying drivers of unsustainable natural resource exploitation. Making progress usually requires cross-cutting approaches that draw on resources and capabilities from local communities and support from the government, private sector, civil society, academia, and donors. The high-level ideas outlined in this section are often interdependent; they need to be implemented in tandem to be effective (e.g., support for alternative livelihoods alongside legal enforcement).

110. (Gold Standards 2019)

Table 2: Calls to Action by Stakeholder

Public Sector

Support sustainable livelihoods

- Support economic opportunities for communities whose economic insecurity forces them to engage in activities related to environmental health risks (e.g., deforestation, hunting wildlife, driving highly polluting cars)

Strengthen monitoring and tracking

- Implement monitoring stations to have real-time data of air pollution levels
- Implement early detection systems in areas with high proximity to vectors (e.g., zoonotic disease surveillance)

Strengthen regulatory frameworks and their application and enforcement

- Legislation to regulate fuel (avoid low-quality fuels) and old vehicles (restrict the circulation of old vehicles)
- Phase-out unsustainable agricultural practices
- Develop and implement more robust biosecurity measures (e.g., biosecurity policies across the food chain)
- Develop national clean cooking plans

Expand utilities and services coverage and quality of services

- Improve health governance with a planetary health approach by engaging environmental stakeholders
- Improve access to clean water and sanitation (i.e., decrease breeding sites for the vectors)
- Increase access to other energy sources for cooking (i.e., provide options for a transition to cleaner fuels)
- Develop clean public transportation public systems

Promote environmental education to increases society's awareness of the relationship between the environment and human health

- Build awareness of potential risks of consuming wildlife and wildlife products
- Build awareness of potential risks of air pollution, e.g., cooking with open fires

Promote the participation of communities

- Champion the integration of local communities into policymaking and implementation during early stages and beyond

Civil Society

Promote the participation of communities

- Champion the integration of local communities into project planning and implementation during early stages and beyond

Drive behavioral change

- Address economic drivers to modify cooking patterns and transition to cleaner energy sources or cleaner technologies (biomass improved cookstoves)
- Create incentives and offer access to new technologies to change water storage behavior
- Avoid breeding sites for vector diseases
- Catalyze at-scale production of vaccines, treatments, and tests

Private Sector

Develop voluntary guidelines and standards (e.g., SDG Impact Practice Standards for PE Funds)

- Implement energy-efficient policies to reduce emissions and environmental degradation
- Track progress toward standards with independent or third-party evaluations

Develop product innovation and business models

- Develop and offer improved cookstoves that are both high quality and affordable
- Develop more sustainable energy appliances that are more energy-efficient (and cost-saving for the company)
- Support research and development of vaccines for crucial VBDs

Academia and Research Institutions

Innovate

- Develop vector control techniques (e.g., genetic modifications, bacteria, and/or use of organic compounds) that can decrease the vector transmission rate
- Partner with government and private sector to develop at-scale diagnostic tools, vaccines, and medicine to diagnose and treat emerging diseases

Research

- Expand scientific inquiry into the environmental dimensions of zoonotic diseases
- Develop research to better quantify the impact on human health of environmental degradation
- Create cross-disciplinary departments in research groups on planetary health challenges
- Incorporate planetary health approaches and coursework that promote multisectoral collaboration across a myriad programs (i.e. schools of public administration, medicine, public health, business, among others).

USAID can bring various capabilities and can play a crucial role in supporting other actors to further expand the capacity to address environment-related health issues across the region:

SUPPORT GOVERNMENTS TO EXPAND MONITORING SYSTEMS

- Increase surveillance of areas, both for vector diseases and air pollution (e.g., use of insecticides, monitoring air quality, stricter regulations, improved management and enforcement)
- Provide tools, training, and best practices for local authorities, including monitoring program implementation

BUILD AWARENESS AND RESEARCH

- Build the awareness of critical stakeholders from the public, private, and philanthropic sector about the relationship between environmental degradation and human health
- Fund research activity that addresses knowledge and capacity related to planetary health (e.g., similar to IDEAL in the food and nutrition security space)

PROMOTE PRIVATE SECTOR ENGAGEMENT AND PARTNERSHIPS

- Support governments developing incentives or taxes that encourage market-based approaches, i.e., the transition to biomass improved cookstoves in rural areas currently cooking with open fires
- Deploy blended-finance mechanisms to mobilized private funding toward cross-sectoral investment in conservation, education, health, sustainable tourism, sustainable agriculture, etc. (e.g., USAID HEARTH)

FACILITATE THE EXCHANGE OF KNOWLEDGE ACROSS COUNTRIES (CROSS-MISSION LEARNING)

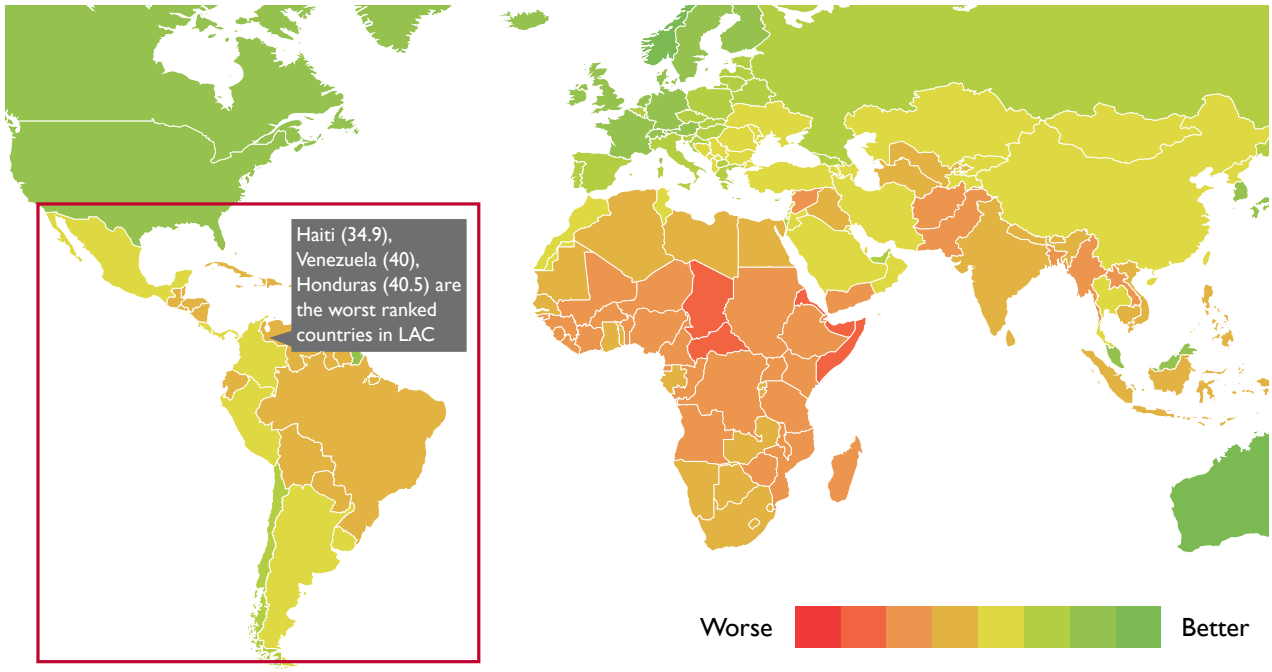
- Disseminate learning from other Missions worldwide that have supported prevention and recovery from vector diseases and zoonotic diseases to bring best practices to help countries prepare for future outbreaks
- Disseminate knowledge and best practices in terms of programs aimed at addressing ongoing and emerging environmental challenges, such as air pollution, e.g., USAID Clean Air Green Cities project in Vietnam

INCREASED ADOPTION OF CLIMATE ADAPTATION

INTRODUCTION

The LAC region is among the most vulnerable regions to the consequences of climate change. Central America and the Caribbean rank second and third, respectively, in the Climate Change Vulnerability Index, only after Africa[111] (see Figure 19).

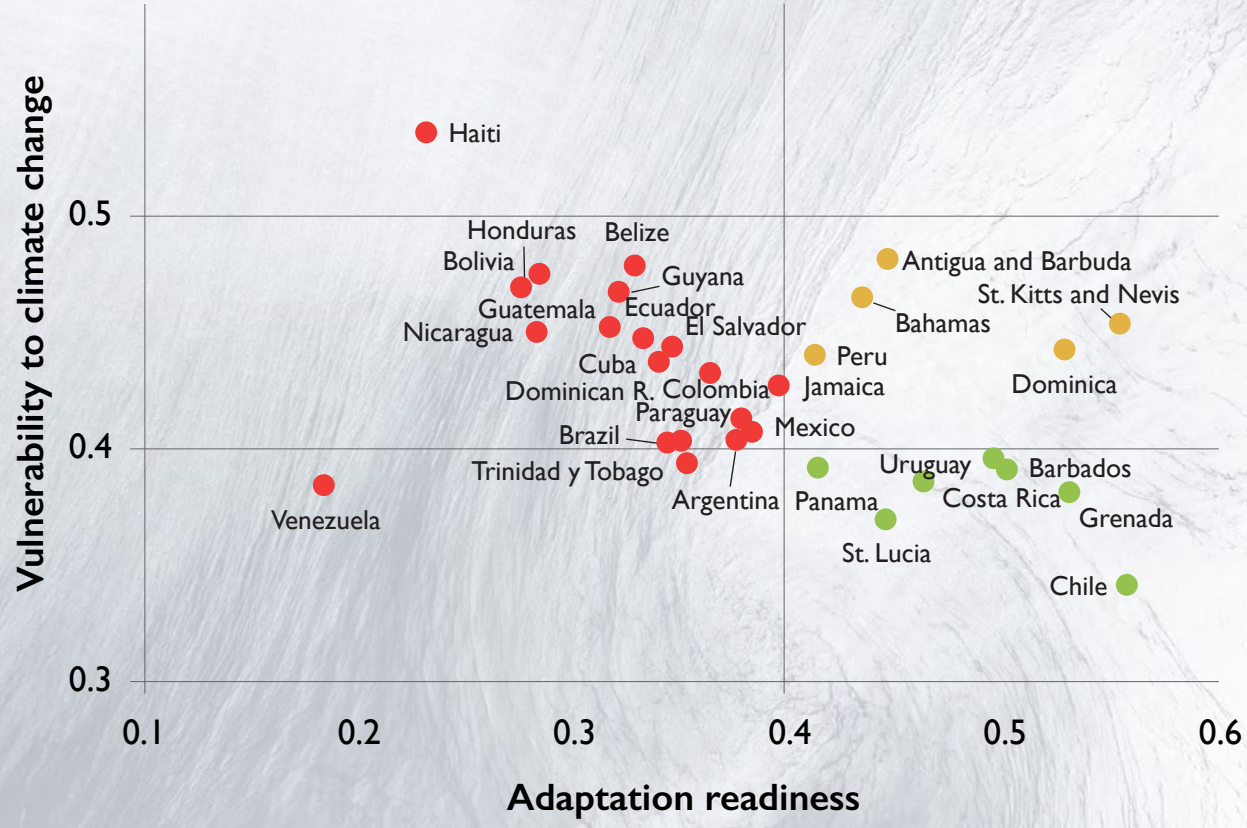
Figure 19: Climate Change Vulnerability Index 2020[112]



111. (Verisk Maplecroft, 2016)

112. Note: The ND-GAIN Country Index ranks a country's vulnerability to climate change and other challenges along with its readiness to adapt to the effects of climate change. Countries are ranked from a scale of 0-100, with 100 being the best ranked and 0 being the worst ranked; Source: (ND-GAIN 2020)

Figure 20: Vulnerability to Climate Change and Adaptation Readiness by LAC Country 2018[113]



Moreover, 61 percent of LAC countries rank poorly in their level of adaptation readiness toward climate change (i.e., have a level of adaptation readiness below 0.4), meaning that they have inadequate economic, governmental, and social conditions to leverage investments for climate adaptation. The worst ranked countries in adaptation readiness are Venezuela, Haiti, and Honduras (see Figure 20).[114] Therefore, improving adaptation capabilities in the region is of the utmost urgency.

The effects of climate change are already felt in LAC and are only expected to worsen in the coming decades. Climate change has resulted in increased temperatures and sea levels, greater water scarcity, and a higher frequency and severity of natural disasters (see Figure 21). Temperature in the region has become more volatile and extreme, sea levels have risen at a faster rate than the global average, glaciers have shrunk, most of the largest cities are under water-related stress, and there has been an intensification of natural disasters such as floods, droughts, heat waves, and hurricanes.

113. Note: Vulnerability refers to a country's exposure, sensitivity, and ability to adapt to climate change and is measured by evaluating six sectors – food, water, health, ecosystem service, human habitat, and infrastructure. Readiness refers to a country's ability to use investments for adaptation and is measured by evaluating economic, government, and social factors. Vulnerability and readiness are ranked on a scale of 0-0.8, with 0 being extremely low vulnerability / low readiness and 0.8 being extremely high vulnerability / high readiness; Source: (ND-GAIN 2020)

114. (ND-GAIN 2020)

Figure 21: Impacts of Climate Change in LAC[115]

Climate change current and projected effects

Increased temperature

- Temperature in Central and South America increased 0.7°-1.0°C since the mid-1970s
- It is estimated that by 2100, temperature will increase 1.6°C-4.0°C in Central America and 1.7°C-6.7°C in South America

Increased sea levels

- In the 20th century, sea levels in the Caribbean rose ~1.8mm/yr, a faster pace than the global average (1.4 mm/yr)
- From 2006-15, the rate of global sea level rise doubled to 3.6 mm/yr
- Under current conditions, sea levels in the Caribbean are expected to rise 1.5 m by 2100
- The Caribbean has the highest percentage in the world of its population living at elevations below 5 meters (12%)

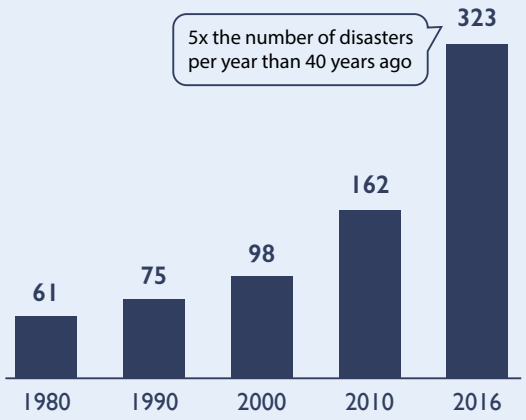
Greater water scarcity

- Since 2000, Andean glaciers have shrunk three feet per year, affecting South American cities that heavily rely on glacier water
- There have been more severe droughts in Central America's Dry Corridor
- Sixteen of LAC's 20 largest cities are under water-related stress, and three are expected to run out of water in the next decades

Increased number of natural disasters

The frequency of natural disasters has rapidly escalated

Number of natural disasters per year in LAC (1980-2016)



From 1980 to 2016, more than 4,000 natural disasters:

- Affected 297 million people and more than 290,000 deaths
- Estimated $282 billion in economic losses
- Annually, the cost of natural disasters in LAC is equivalent to six times Belize's GDP

These conditions are ultimately leading to: 1) loss of livelihoods and reduced incomes, particularly among vulnerable communities (e.g., temperature and precipitation changes could cause a 20 percent reduction in rural incomes in Bolivia[116]); **2) food and nutrition insecurity** (e.g., 1.6 million people are severely food insecure in Central America's Dry Corridor; this is expected to worsen with falling agricultural productivity[117]); **3) health risks** (e.g., there is a rise in the number of people at risk of dengue due to changes in geographic transmission zones and disease distributions[118]); **4) migration and displacement** (e.g., research from Mexico shows for instance, that a 10 percent increase in the frequency of natural disasters results in a 5–13 percent increase in migration[119]); and **5) supply chain interruptions** (e.g., excess rains in Colombia have caused road collapses that make it difficult to transport inputs and raw materials to main cities[120]).

There is a clear case for investing in climate adaptation – the process of adjusting to actual or expected climate and its effects–given its human, economic, and environmental benefits.[121] Climate adaptation protects lives and health, and reduces climate-related migration. Moreover, it has an excellent return on investment. Estimates suggest that climate change will cost LAC between 1.5 percent and 5 percent of the region's GDP by 2050, while climate adaptation will cost less than 0.5 percent of regional GDP.[122] Climate adaptation also supports a sustainable development path that is more resilient to climate change and that coexists with the environment by including climate and environmental considerations in strategies (e.g., nature-based solutions).

115. (ECLAC 2015); (Quarterly 2019); (IDB 2018); (ECLAC 2020); (World Bank 2010); (ECLAC and EUROCLIMA, 2018); (NOAA 2020); (IDB and Climate Central 2018)
116. (ECLAC, 2016)
117. (World Food Programme, 2020)
118. (ECLAC and IDB, 2013)
119. (Laczko, 2014)
120. (Portafolio, 2019)
121. (IPCC, 2018)
122. (ECLAC, 2015)

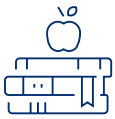
Climate adaptation is also aligned with USAID's priorities and its climate-resilient development objective. Climate adaptation contributes to overarching USAID priorities such as the Journey to Self-Reliance, improving environmental and natural resource management, and decreasing migration from Central America. Thus, USAID aims to help countries 1) mainstream adaptation measures into governance, planning, and budgeting and 2) mobilize financing for adaptation.

In order to accelerate climate adaptation measures, action, coordination, and investment are needed across four areas:

Financing: Actions from public, private, or non-profit actors to increase funding for developing and deploying adaptation technologies and innovation, and for designing and implementing policies (e.g., funds, subsidies, grants).

Policies: Public policies to enable and further expand the adoption of climate adaptation interventions (e.g., nationally determined contributions, national adaptation plans).

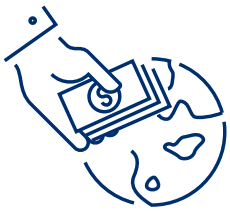
Technology: Tools and practices that reduce vulnerability and build resilience to climate change. Technologies can be hard (e.g., infrastructure, equipment) or soft (e.g., institutional arrangements), and urban (e.g., smart energy grids) or rural (e.g., precision agriculture). Technology also includes innovations in natural infrastructure (e.g., urban gardens).



Education: Investment in school curricula, training, and public awareness on climate adaptation for the purpose of increasing people's understanding of how to counteract the effects of climate change.

Considering USAID's main capabilities and the traction of climate adaptation solutions in LAC, this chapter focuses on financing, policies, and technology.

ADAPTATION FINANCING



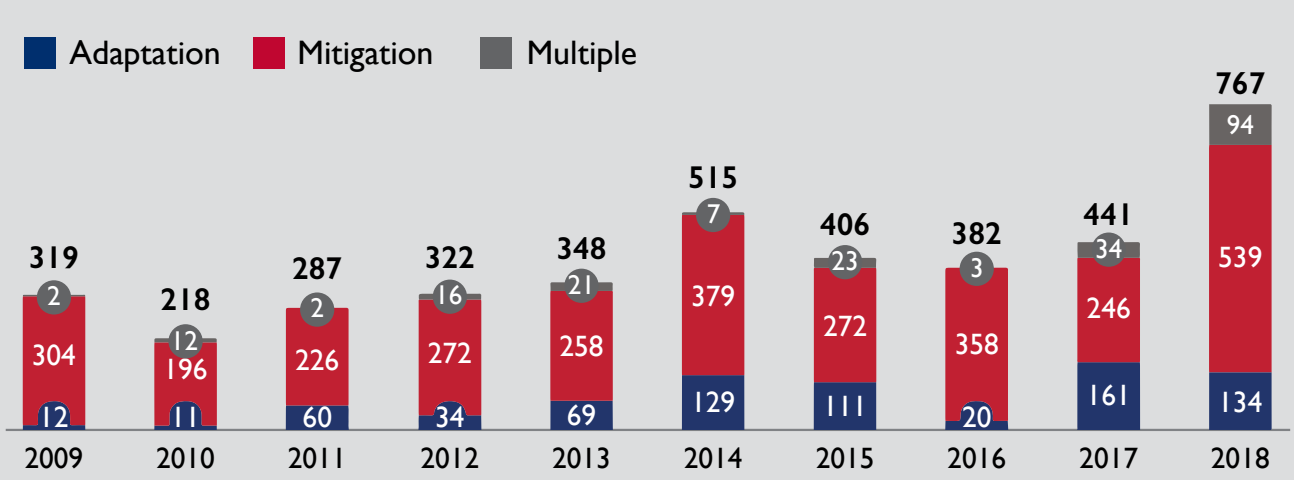
Multilateral institutions, development banks, and donors have been at the forefront of climate financing. In recent years, multilateral climate funds have been developed to provide loans, grants, and equity for climate adaptation. Other stakeholders within the public and private sector have also begun allocating funds for climate adaptation (e.g., public sector budgets, corporate social responsibility, and building climate adaptation into business models).[123]

LAC received 16 percent of the total adaptation funding from 2003-2018. Additionally, funding for combined mitigation and adaptation purposes increased during the last two years.[124] The main sectors receiving funding from climate adaptation funds in the region are water supply and sanitation (32 percent), general environmental protection (17 percent), and agriculture (14 percent); the countries receiving the most funding have been Bolivia (15 percent), Argentina (9 percent), and Granada, Colombia, and Jamaica (each with 7 percent).[125]

While financing for climate adaptation has gained some momentum in LAC, it still remains low when compared to financing for mitigation (see Figure 22).

123. Despite this promising data, a large gap still remains in the availability and standardization of publicly available climate adaptation data, particularly from governments and the private sector, making it difficult to quantify aggregate adaptation financing in LAC.
124. (Climate Funds Update 2019),
125. (Climate Funds Update 2019)

Figure 22: Financing from Multilaterals and Donors in LAC[126]



Several challenges have hindered adaptation financing, including 1) lack of awareness as policymakers are often unaware of the importance of climate adaptation, while the private sector does not have information on proven business models; **2) limited demand** as existing financial instruments do not meet the needs of the companies, research institutions, and NGOs that would use them (e.g., projects may require longer loan repayment periods than existing instruments offer[127]); **3) limited supply** as lenders and investors face difficulty identifying projects that generate satisfactory financial returns and increase adaptation improvement;[128] and **4) limited government capacity** to combine available financial resources, which would enable access to a wider variety of financing resources and improve financial management and fund allocation (e.g., combining different instruments in a single project, using an instrument to restructure the terms of another instrument).[129]

Despite these challenges, there have been successful efforts to increase adaptation financing in the region, including the creation of adaptation funds that finance critical adaptation projects. The Colombia Climate Adaptation Fund is one of the most recognized examples in the region. Due to this dedicated fund, Colombia is one of the only countries in LAC with publicly available climate adaptation financing data (see details in Figure 23).

126. (Climate Funds Update 2019)
127. (UNDP, 2011)
128. (UNDP 2012)
129. (UNDP 2012)

Figure 23: Colombia Climate Adaptation Fund Case Study[130]

Context

- The adaptation fund was created to reconstruct regions affected by La Niña phenomenon in 2010–2011, which affected 3 million people and resulted in economic losses of $6.1 billion
- As of 2015, Colombia's Adaptation Fund executes risk management and climate adaptation projects in different sectors and regions

Operations

- Receives financing from the national budget and international actors
- Yearly budget ranges around $350-500 million
- The fund has five macro-projects and operates in seven sectors: housing, education, health, water, environment, agriculture, and transportation

Outcomes

- By December 2019, the fund had financed the reconstruction of 107 aqueducts (out of a goal of 130) and 32,000 homes (out of a goal of 44,000) and the installation of 457 hydrometeorological stations
- Colombia reports the fund's budget in its national budget, making it one of the only countries in LAC with publicly available adaptation financing data
- The fund is a good starting point, but the country is still facing challenges in terms of climate adaptation, e.g., there have been significant catastrophes, including the disappearance of an entire town due to mudslides

ADAPTATION POLICIES

Adaptation policies establish countries' goals, priority projects, and implementation approaches. They usually take the form of national adaptation plans (NAPs), are incorporated into national or sector development and economic plans, and/or are included in nationally determined contributions (NDCs). NDCs are targets and measures governments have pledged to undertake to curb emissions and tackle climate change in line with the Paris Agreement. In some cases, NDCs have an adaptation focus. NAPs also enable countries to meet these international commitments, help countries clearly define their adaptation needs, build their adaptive capacity, and provide guidelines for developing and implementing strategies.[131]

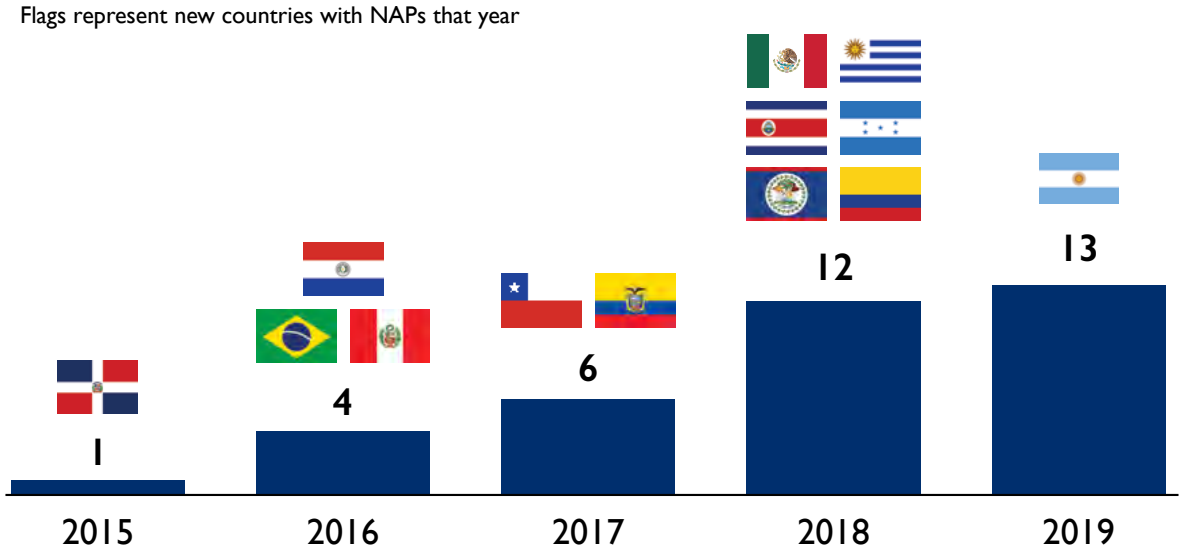
Following the Paris Agreement, LAC countries have made ambitious adaptation commitments in their NDCs. Thirty of the 32 LAC countries analyzed include adaptation in their NDCs with adaptation commitments focused primarily on water resources, agriculture and cattle ranching, and health[132, 133] (see Figure 24).

Figure 24: Most Commonly Prioritized Sectors for Adaptation Commitments (# of Countries) [134]

130. (Fondo Adaptación Colombia n.d.); (Fondo Adaptación n.d.); (Latino Adapta 2019); (Trinomics 2017)
131. (United Nations Climate Change n.d.)
132. (Eco Ltd Group 2019)
133. (Líbelula, BID, PNUD 2019), Dalberg analysis
134. (Líbelula, BID, PNUD 2019), Dalberg analysis

To achieve their NDCs, LAC nations have also begun developing NAPs. The number of NAPs in LAC has increased rapidly, from one in 2015 to 13 in 2019, as shown in Figure 25.[135] Today, more countries are in the process of developing NAPs or plan to do so in the near future (e.g., Panama will do so by 2023). NAPs are also beginning to incorporate adaptation into the strategies of ministries and institutions focused on women and vulnerable populations.

Figure 25: Total Number of National Adaptation Plans in LAC by Year (2015-19)[136]



Most countries in the region that do not have NAPs have outlined adaptation plans in other key policy documents. Bolivia and El Salvador, for example, have included adaptation strategies in their national development plans, while Cuba includes adaptation in its national climate change plan. Other countries, such as Guatemala and Jamaica, have gone a step further by including climate adaptation in both national development plans and national climate change plans. City and regional level climate adaptation plans have also emerged in countries such as Argentina, Chile, Colombia, Mexico, and Peru. Venezuela is the only country in the region that does not include climate adaptation in any major policy document.

Despite progress, several challenges are undermining policy action across the region, including 1) inadequate government coordination as agencies and ministries work in silos, rather than taking an interinstitutional approach that includes all agencies and ministries in adaptation policy development; **2) poor mainstreaming of adaptation policies** across agencies and government levels as adaptation measures are not fully integrated into development plans and specific sector initiatives; **3) low government capacity for decision-making, implementation, monitoring, and evaluation** as most governments lack knowledge-sharing platforms, evidence on what works, sufficient training on climate-resilient development, and scientific information, and have ineffective enforcement mechanisms and regulations; and **4) insufficient funding** for climate adaptation given poor linkages between suppliers and demanders of finance and mechanisms (e.g., guarantees) to facilitate access to international financing (e.g., via multilaterals, bilaterals) and low private sector investment in adaptation given poor enabling conditions and incentives (i.e., fiscal incentives).

Some countries have managed to overcome these obstacles and develop cohesive and rigorous national adaptation strategies. As Figure 26 outlines, Jamaica's adaptation strategy is an example of an integrated, cross-sector plan that also has a robust monitoring and evaluation framework.

135. (Libélula, BID, PNUD 2019), Dalberg analysis
136. (Libélula, BID, PNUD 2019), Dalberg analysis.

Figure 26: Case Study: Jamaica's Nationwide Climate Adaptation Strategy, Anchored in Sector Integration[137]

Context

- Jamaica's 2009 "National Development Plan, Vision 2030" determined climate adaptation as a national priority
- The plan calls for vulnerable sectors to develop their own adaptation planning

Key milestones

2013: Established **Climate Change Division** to coordinate activities across different sectors
2014: Created the **Climate Change Focal Point Network,** with participation from all ministries, departments, and agencies
2015: Developed the **Climate Change Policy Framework,** which prioritizes the most vulnerable sectors (12 total), including forestry, agriculture, energy, and water
2017: 1) Drafted Forestry Sector Strategy and Action Plan; 2) Trained staff across ministries and departments on budgeting; 3) Provided specific training on adaptation for the Climate Change Focal Point Network

Key strengths

- Strong monitoring and evaluation framework, applied by the Climate Change Division
- Sector integration approach, achieved via two mechanisms
  - Incorporating climate adaptation into Jamaica's development plan, which enables interaction between sectors
  - Working through the Climate Change Focal Point Network when creating sector strategies and action plans, which provides representation from all sectors

ADAPTATION TECHNOLOGY

Adaptation technologies can help reduce vulnerability and build resilience to climate change. Technologies can be hard (e.g., infrastructure, equipment) or soft (e.g., institutional arrangements, management practices) and can be applied in both urban (e.g., smart energy grids, disaster-resilient infrastructure, early warning systems) and rural (e.g., precision agriculture, efficient irrigation systems) settings. Adaptation technologies can also be used for innovations in natural infrastructure (e.g., constructed wetlands, riparian buffers, urban forests and woodlots, meadows and pastures, and community gardens). As shown in Table 3, climate adaptation technologies have helped improve climate resilience in multiple sectors.

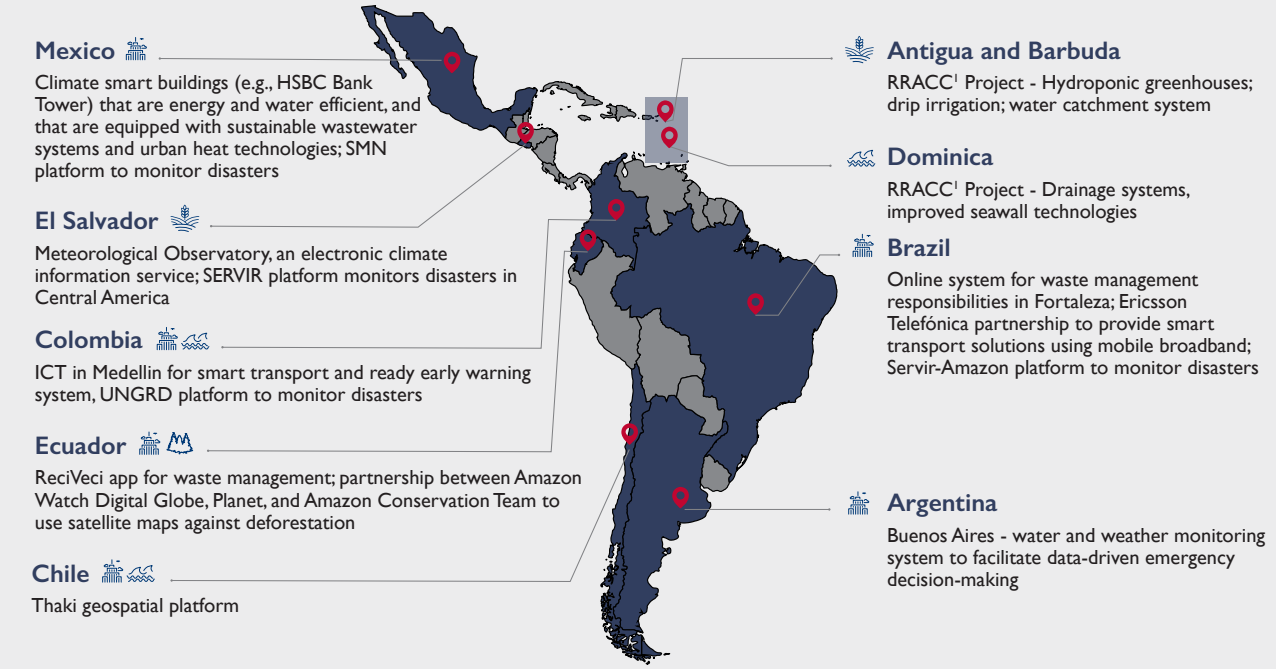
137. (NAP Global Network 2017)

Table 3: Key Technology Types

SECTOR	EXAMPLES
Agriculture	• Drip irrigation and irrigation efficiencies • Water catchment systems • Adapted crops (i.e., drought-tolerant) • Precision farming • Technology for livestock (i.e., ventilation systems) • Agroforestry
Natural Resources	• Material reuse and recycling • Constructed wetlands
Coastal Zones	• Dikes, tidal barriers, and seawalls • Early warning and evacuation systems • Hazard insurance • Disaster-resistant building technologies • Drainage technologies • Desalination systems
Urban Infrastructure	• Energy and water efficiency • Urban heat moderation technologies • Flood prevention technologies • Disaster-resistant building technologies • Leakage management • Non-water-based sanitation • Extensive green roofs and green covering shelters
Public Health	• Cool or green roofs to reduce heat effects • Air conditioning

Successful technologies and innovations have emerged throughout the region to improve adaptation capacity and, therefore, resiliency, as shown in Figure 27.

Figure 27: Selected Technology and Innovation Examples in LAC [138]



138. (Dialogo Chino 2019); (Global Opportunity Explorer 2018); (IDB and GSMA 2018); (World Bank, CIAT, and CATIE 2014); (SPORE 2018); (Think Nature 2020)

Several key challenges impede greater usage of climate adaptation technologies, including 1) suboptimal environment for innovation due to insufficient public and private funding for research and development (i.e., grants, subsidies), few policies and regulations that encourage innovation (i.e., intellectual property rights, patents) and the transition to adaptation technologies (i.e., tax incentives), and low investment in building innovation capacity (i.e., prototype design, engineering educational programs); **2) insufficient collaboration across sectors** as the region has not frequently leveraged multi-stakeholder partnerships for technology development and deployment; and **3) slow consumer adoption of adaptation technologies** as low awareness (i.e., misunderstanding of benefits such as cost and well-being), unaffordability (i.e., limited access to and availability of financing such as microcredits and loans), and inaccessibility (i.e., low technology literacy) have hindered behavioral changes (e.g., increased use of clean energy).

Despite these challenges, new adaptation technologies continue to be developed and deployed throughout the region. For example, the MasAgro Program in Mexico employs precision and conservation agriculture techniques as well as improved seed varieties, which have allowed enhanced smallholder farmers to adapt to the effects of climate change (see Figure 28).

Figure 28: Case Study: MasAgro Program in Mexico[139]

Challenge

- In the next 10 years, climate change could decrease Mexican agricultural production by 25 percent due to soil erosion and water scarcity
- Mexican smallholder farmers traditionally utilize suboptimal agricultural practices and inadequate fertilizers, which must be adapted to the increasing effects of climate change

Approach to address the challenge

- Joint initiative between CIMMYT and SAGARPA to support smallholder farmers that have limited access to technology and market information
- Development of innovative agricultural practices including precision agriculture and conservation agriculture
- Development and increased use of improved, high-performance seed varieties

2015 results

- 48 seed producing SMEs participated in MasAgro programs; seed sales for these companies increased 44 percent
- Average income for MasAgro participating maize producers was 23 percent higher than the regional average
- 46 technicians certified in sustainable agriculture and 55 trained – cumulatively, MasAgro has certified 294 technicians

Expected benefits

- Increase in national production of maize – from 5 to 9 million tons in ten years
- Contribute five times more to the economy, in added value, aside from the extra grains snallholder farmers will be able to produce
- Job creation and decreased migration
- Poverty decreases and more decentralized development

CALL TO ACTION

A holistic, cross-sectoral approach is needed to promote the increased adoption of climate adaptation solutions. Making progress usually requires cross-cutting approaches that draw on resources and capabilities from local communities and support from the government, private sector, civil society, academia, and donors. The high-level ideas outlined in this section are often interdependent; they need to be implemented in tandem to be effective (e.g., support for alternative livelihoods alongside legal enforcement).

Increasing the adoption of climate adaptation requires action and collaboration across the public sector, civil society, private sector, and academia (see Table 4).

139. (CIMMYT and SAGARPA, n.d.); (CIMMYT and SAGARPA, n.d.); (MasAgro, n.d.)

Table 4: Calls to Action by Stakeholder

Public Sector

Strengthen monitoring and tracking

- Develop a Monitoring, Reporting and Verification (MRV) system for climate financing that allows countries to calculate the funding they receive and to channel it to combat climate change

Strengthen regulatory framework and its application and enforcement

- Develop national adaptations plans (NAPs) with clear programs, implementation plans, ownership, and funding
- Incorporate adaptation measures into national plans (e.g., country development plans) and sector-specific plans (e.g., transportation plans, energy plans)
- Develop policies to encourage investors to invest in climate adaptation projects

Develop financing mechanisms to encourage private sector engagement in climate adaptation

- Provide direct loans, grants, equity, or guarantees to private sector projects on climate adaptation
- Develop bonds for climate adaptation (e.g., catastrophe bonds

Civil Society

Increase participation in planning and monitoring

- Participate in public consultation processes on policies and technologies to adopt

Engage in activism and advocacy

- Increase pressure on public and private sector players to adopt climate adaptation technologies and policies
- Hold government accountable for their climate adaptation commitments
- Give voice to the sectors and populations most vulnerable to climate change and that therefore need climate adaptation the most

Private Sector

Develop business model innovation

- Develop and implement business models that include adaptation measures and increase resilience and profitability (e.g., increase agricultural yields)
- Formulate viable financial and technical climate adaptation projects

Increase financing and investing

- Increase engagement of private sector companies as investors for adaptation projects
- Develop new financial products (i.e., climate index insurance)

Establish collective action

- Establish industry associations that encourage voluntary reporting of climate adaptation financing flows to allow for better monitoring

Academia and Research Institutions

Research and knowledge dissemination

- Quantify the impact of climate change and its impact on different sectors in LAC-specific contexts
- Research best practices in climate adaptation and success stories, and disseminate their impact

Innovation

- Develop new climate adaptation technologies (e.g., heat resistant seeds)

Update curricula

- Update curricula across a diverse range of disciplines to adequately address climate adaptation

Engage the community

- Serve as "hubs" in their communities on adaptation issues
- Advocate for specific adaptation policies at the local, state, and national levels

USAID can provide various capabilities and can play a crucial role in supporting other actors to further expand the adoption of climate adaptation across the region.

SUPPORT GOVERNMENT EXPANSION OF TECHNICAL CAPACITY

- Build local capacity on climate adaptation, including technical capacity, and implementation and monitoring of NAPs and other adaptation policies
- Support governments' mainstream adaptation policies to convert them into national plans and sector specific plans
- Provide tools and develop strategies to build resilience to climate variability and risks (e.g., USAID's Climate-Resilient Development Framework, 2014)

PROVIDE ACCESS TO CLIMATE SERVICES

- Provide access to climate service information on longer-term weather conditions (e.g., historical weather patterns and expected future climate conditions)
- Train meteorologists and others to develop tools to help planners
- Develop economic estimations of the value of climate services to farmers and other users of climate data
- Evaluate climate services programs

FACILITATE KNOWLEDGE TRANSFER ACROSS COUNTRIES (CROSS-MISSION LEARNING)

- Cross learning from other Missions – USAID reaches nearly 30 countries in Africa, Asia, and Latin America with science, knowledge, tools and actions to adapt to change

SUPPORT PRIVATE SECTOR ENGAGEMENT FOR CLIMATE ADAPTATION

- Increase the engagement of private sector companies to incorporate adaptation practices (as a prerequisite for some sectors and geographies to work with USAID)
- Support the development of public-private partnerships for climate adaptation

SUPPORT THE DEVELOPMENT OF FINANCING MECHANISMS FOR CLIMATE ADAPTATION

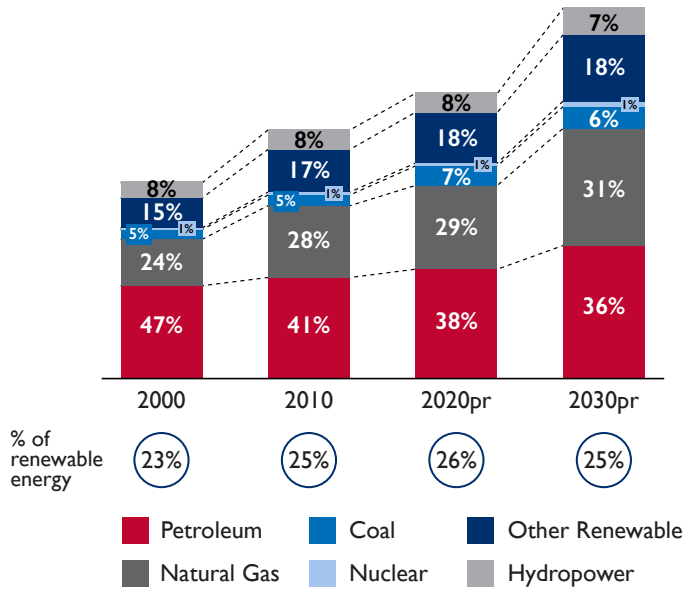
- Increase lending to private sector companies to promote climate financing (e.g., grants)
- Provide risk-sharing mechanisms (e.g., guarantees)
- Invest in innovative financing structures to fund projects to demonstrate viability or overcome hesitance

INCREASED ACCESS AND USE OF MODERN ENERGY SOURCES

INTRODUCTION

The LAC region continues to rely heavily on non-renewable energy sources. However, renewables have grown and represent a significant share of the total energy supply. Currently, petroleum, natural gas, coal, and nuclear jointly account for 74 percent of the energy supply (see Figure 29). The transportation sector accounts for 38 percent of the total energy use, primarily petroleum and natural gas, followed by the industrial (30 percent) and residential sector (16 percent).[140]

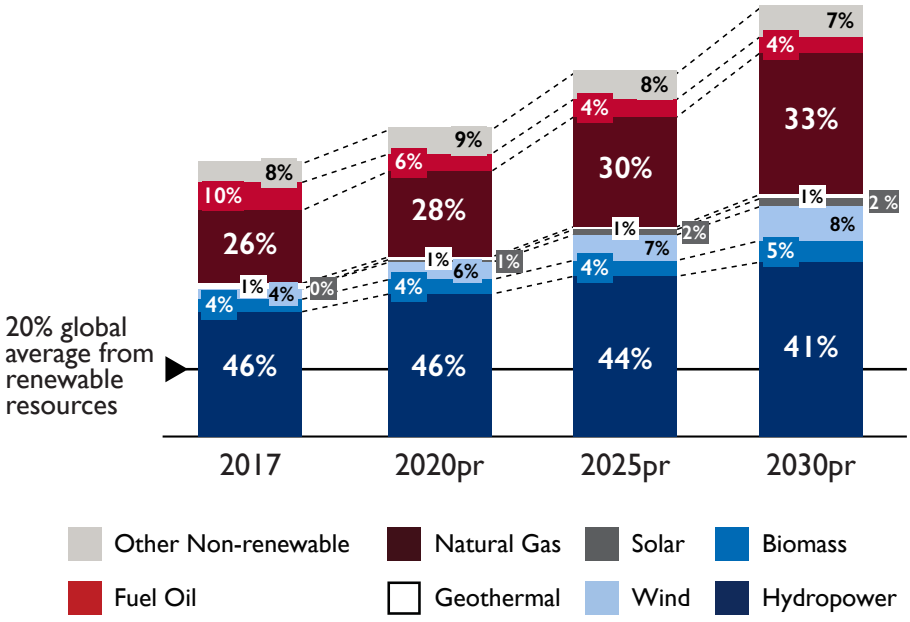
Figure 29: Energy Supply by Source in LAC[141]



However, over 50 percent of electricity generation comes from renewable sources, more than double the global average of 20 percent.[142] Hydropower is the primary source for electricity production (46 percent), followed by natural gas (28 percent). Paraguay, Colombia, Costa Rica, Ecuador, and Brazil have the highest dependency on hydropower for electricity in the region.[143] While hydropower is a renewable source, it is important to note that big hydropower dams are associated with adverse social and environmental effects. For example, in 2017, in South America, 5.7 million people downstream of dams were affected by changes in water flow.[144]

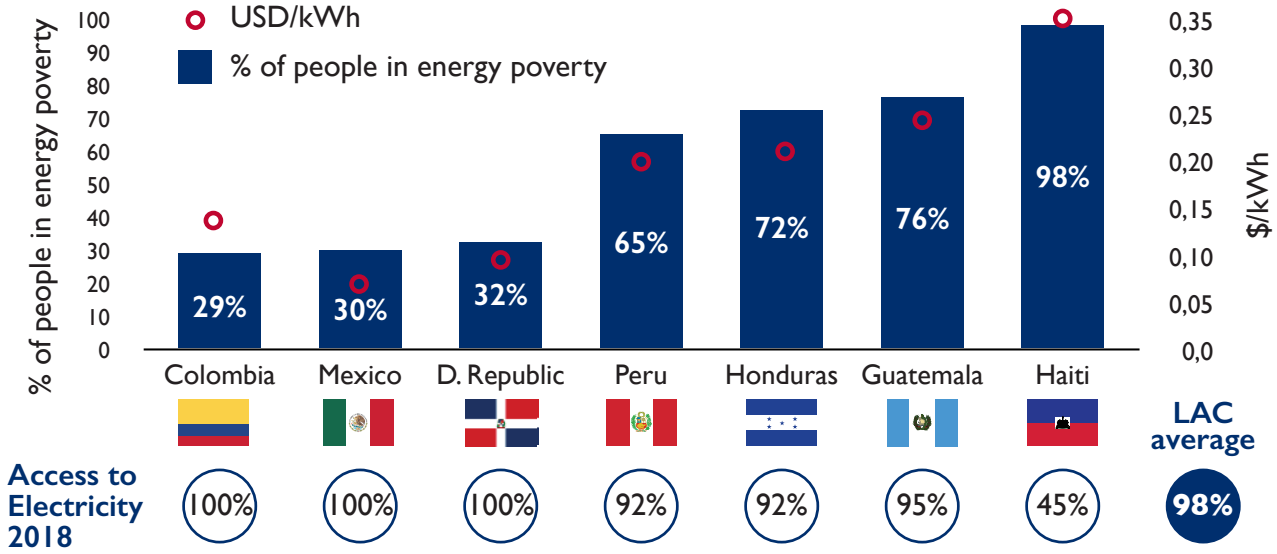
140. (OLADE n.d.)
141. (OLADE n.d.); (OLADE 2019)
142. (Reuters 2019)
143. (OLADE 2019)
144. (Grassroots 2017)

Figure 30: Current and Projected Electricity Generation Matrix in LAC [145]



Although more than 90 percent of LAC's population has access to electricity, energy poverty[146] still undermines livelihoods in many areas. Energy poverty is caused by the low quality of energy infrastructure, poor housing quality, and high energy prices relative to income levels[147] (e.g., the electricity price in Haiti (~$0.35/kWh) is around three times higher than the price in countries like Colombia or Mexico (~$0.10/kWh)[148]). More than 70 percent of the population is energy poor in countries like Haiti, Guatemala, and Honduras[149] (Figure 31). This translates into poor living conditions and limited development potential (e.g., constrained income generation opportunities, fewer hours for education and learning) for this population.[150]

Figure 31: Energy Poverty and Electricity Prices in LAC 2020 [151]



145. (OLADE n.d.); (OLADE 2019)
146. Note: Energy poverty is the absence of sufficient choice in accessing adequate, affordable, reliable, high-quality, safe, and environmentally benign energy services to support economic and human development; Source: (Santillán et al.2020)
147. (OLADE 2019)
148. Electricity prices from Globalpetrolprices.com
149. (Santillán et al. 2020), 150. (Santillán et al.2020)
151. (Santillán et al. 2020)

Emerging solutions in LAC are driving a more sustainable and inclusive energy landscape. These solutions include distributed generation (DG), modern energy sources, and energy efficiency (EE) practices:

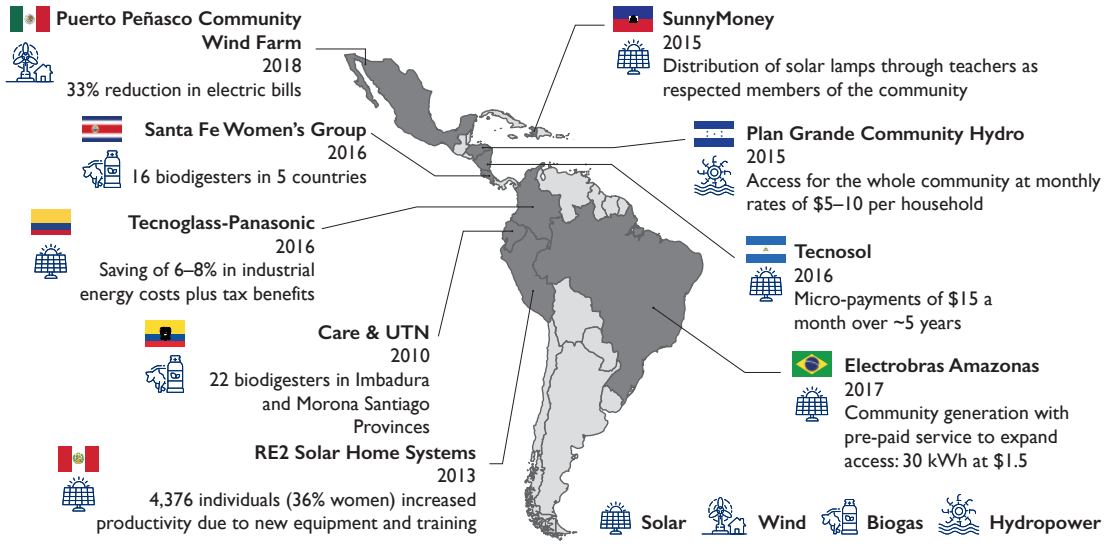
- **DG is a variety of small-scale (on and off-grid) technologies that generate electricity at or near where it will be used,** such as solar panels or small hydro.[152] These solutions have gained traction, mainly through solar photovoltaic systems, and are expected to grow as several countries are adopting new regulations and mechanisms to expand them (e.g., Brazil produced 1.2GW in 2019 and is expected to increase ten times that by 2027[153]).
- **Use of modern energy sources is increasing in LAC, including renewable fuels for electricity and transportation, and less-polluting fuels for cooking and heating.** In recent years, the use of solid fuels for cooking has decreased in LAC as many households transitioned to LPG, natural gas, and electricity cooking. Use of electric vehicles has also grown in recent years and is expected to keep growing due to commitments to cut public transportation emissions and shifts in consumer preferences.
- **Investment in EE is emerging throughout the energy value chain in LAC.** Sectors such as industry and construction are incorporating energy-efficient practices into their operations as cost-saving strategies. EE is expected to grow to meet the SDG commitment of doubling the global rate of improvement in energy efficiency by 2030[154] and meeting the needs of demographic expansion and changes in the coming years.

This chapter will focus on these solutions given their potential in the LAC context and their increased adoption in the region.

DISTRIBUTED GENERATION

Solar photovoltaic technology is the most common small-scale solution for decentralized electricity generation in LAC, representing 90 percent of the installed capacity. Biogas systems are a distant second,[155] followed by other technologies such as small-scale turbines and small-scale hydropower. In recent years, several distributed energy projects have been implemented across the region (see Figure 32) signaling promising growth for the nascent technology.

Figure 32: Sample of Distributed Generation Projects in LAC (Non-exhaustive)[156]



152. (United States Environmental Protection Agency n.d.)
153. (United States Environmental Protection Agency n.d.)
154. (IDB 2015)
155. (ABM 2017)
156. 1 to 4, 7 & 8: (IDB 2017); 5. (Renewables Now 2016); 6. (World Bank 2019)

Figure 33: Small-scale Hydropower in Guatemala Case Study[157]

"Local and national governments partnered with OLADE for the development of this $800,000 power plant. But most importantly, for the capacity-building of this community and their brand-new community enterprise."

Challenge

- The community of Batzchocolá with more than 140 families had limited access to energy and infrastructure. The closest power grid connection to these communities was 28 km away
- Main barriers to electricity access were the limitation of financial resources for setting up the infrastructure and affordability for local villagers, who were mostly in poverty

Approach to Address the Challenge

- Modelling indicated that the optimal solution was to install a 90kW sustainable hydropower plant using local water resources
- The multi-stakeholder model involving the government, international cooperation, private initiatives, NGOs, and organized communities enabled technical and financial management of the project
- The sustainability project is based on creating a community enterprise (ASHDINQUI), which includes all community members
- Project management, operation, and maintenance were entrusted to ASHDINQUI after conducting training sessions, information and awareness workshops, and community assemblies, as well as ensuring prior informed consent and a gender equity approach

Outcomes

- Approach to address the challenge

The expansion of DG can deliver a range of benefits in terms of energy efficiency, access, and quality, as well as economic and social benefits. DG allows the population in energy poverty conditions to have access to a reliable energy service. These models also provide **economic benefits** as they can become a new source of income when the surplus energy is sold on the national grids,[158] and the power generated usually has lower and more stable pricing: between 10 to 70 percent reduction in bills.[159] Finally, DG can also improve **social outcomes** such as educational attainment and increased women's employment (e.g., in Nicaragua, electricity access using community-managed small-scale plants has led to an increase in educational attainment by up to 0.74 grades among children in Jinotega County[160]).

Further expansion of DG still faces four critical challenges: 1) regulation, as regulatory frameworks to promote competition and allow for new players in the energy generation spaces remain weak, and fiscal incentives and subsidies are low and net-metering policies are weak or non-existent across the region; **2) finance**, due to limited access to new forms of funding or innovative financing mechanisms such as crowdfunding, social impact bonds, and market-based mechanisms that could catalyze resources; **3) infrastructure**, due to the lack of widespread local technological standards and low adoption of ICT systems for monitoring and payment management; and **4) capacity**, given a low level of long-term engagement between communities or operators and distributors, inadequate training and workforce development and limited understanding within local and national governments on the benefits of distributed generation.

DG projects have been successfully deployed throughout the region, as shown by the case of Guatemalan small-scale hydro. Guatemala managed to develop a multi-stakeholder model for rural energy development in isolated areas involving the government, international cooperation, private initiatives, and NGOs, as presented in Figure 33.

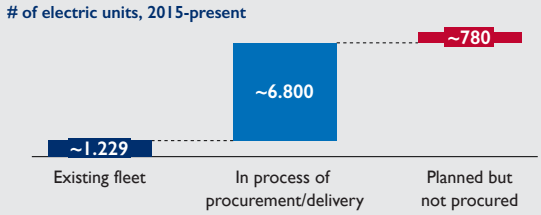
157. (IDB and Alliance for Rural Electrification 2017)
158. (RevistaDigital 2013)
159. (RevistaDigital 2013)
160. (World Development 2012)

USE OF MODERN ENERGY SOURCES

Modern energy is expanding in the region across sectors, with cleaner mobility showing significant momentum. Other sectors, like cooking and heating, are also transitioning to modern energy sources, like liquefied petroleum gas (LPG) and electricity, reducing the significant adverse effects of using solid fuels.

The transition to cleaner mobility options is gaining momentum in the region. Multiple countries in the region are testing incentive systems such as tariff and VAT exemptions. Several local and national governments have made commitments to transition to e-buses and e-taxis during the coming years (see Figure 34) and have already started this transition (e.g., e-buses have increased from close to zero to ~1,200 in the last five years). There is also an increased demand for electric vehicles, including both cars and commercial fleets.[161] Electric bicycle and scooter ventures have increased in several cities in the region, such as Mexico City, Bogota, and Sao Paulo.[162] This chapter focuses on increasing the adoption of cleaner mobility given its high contribution to emissions (36 percent of total greenhouse gases come from the transportation sector[163]) and pan-regional scope.

Figure 34: Public Transportation E-buses in LAC[164]



Selected Cities	Existing fleet	In process of procurement/delivery	100% of e-buses procured by:
Bogota	483	From 631 up to 2,000	2035
Santiago	410	From 265 up to 4,300	2026
Mexico City	120	From 130 up to 430	2025
Sao Paulo	16	Up to 100	2028

Cleaner mobility can reduce emissions, lower costs of ownership, and improve health conditions for the region. The transition to electric buses can eliminate 25 percent of current black carbon emissions in cities.[165] In **economic** terms, e-buses decrease mobility systems' total costs and promote new business models where emerging stakeholders can play a more significant role. The total cost of ownership of an e-bus can be equal to or even lower than that of a diesel bus, given ongoing savings in fuel and maintenance.[166] Finally, transitioning to electric fleets will provide substantial **public health** benefits like helping address the regional air pollution crisis, where eight out of ten people in LAC breathe air considered unhealthy according to the World Health Organization.[167]

But there are challenges to further increase electric mobility including 1) regulation challenges such as limited incentives for operators to transition to e-buses and weak national and city mobility plans around modern mobility;[168] **2) financial constraints** due to the lack of innovative financing mechanisms that allow for cost and risk sharing, crucial to making the economic case to stakeholders. Furthermore, there is limited access to attractive financing terms and grants or resources from development finance institutions or donors.[169] There are **3) infrastructure challenges** given the lack of public infrastructure for e-buses.[170] The most crucial improvements would include expanding the grid capacity for transmission and increased availability of charging stations. Finally, there are **4) capacity limitations** as there is weak knowledge and understanding from multiple stakeholders (e.g., policymakers, utilities, and transport authorities).

An example of one of the major cities transitioning to electric buses is Sao Paulo. The city has the goal of making 100 percent of its procured buses electric by 2028 and has already started the journey to transition to e-buses (Figure 35).

161. (Bloomberg New Energy Finance 2019)
162. (ZEBRA 2020)
163. (WHO 2019)
164. Dalberg analysis with city's official data
165. Dalberg analysis with city's official data
166. (ZEBRA 2020)
167. (WHO 2019)
168. (IEA 2017)
169. (ICCT 2017)
170. (ZEBRA 2020)

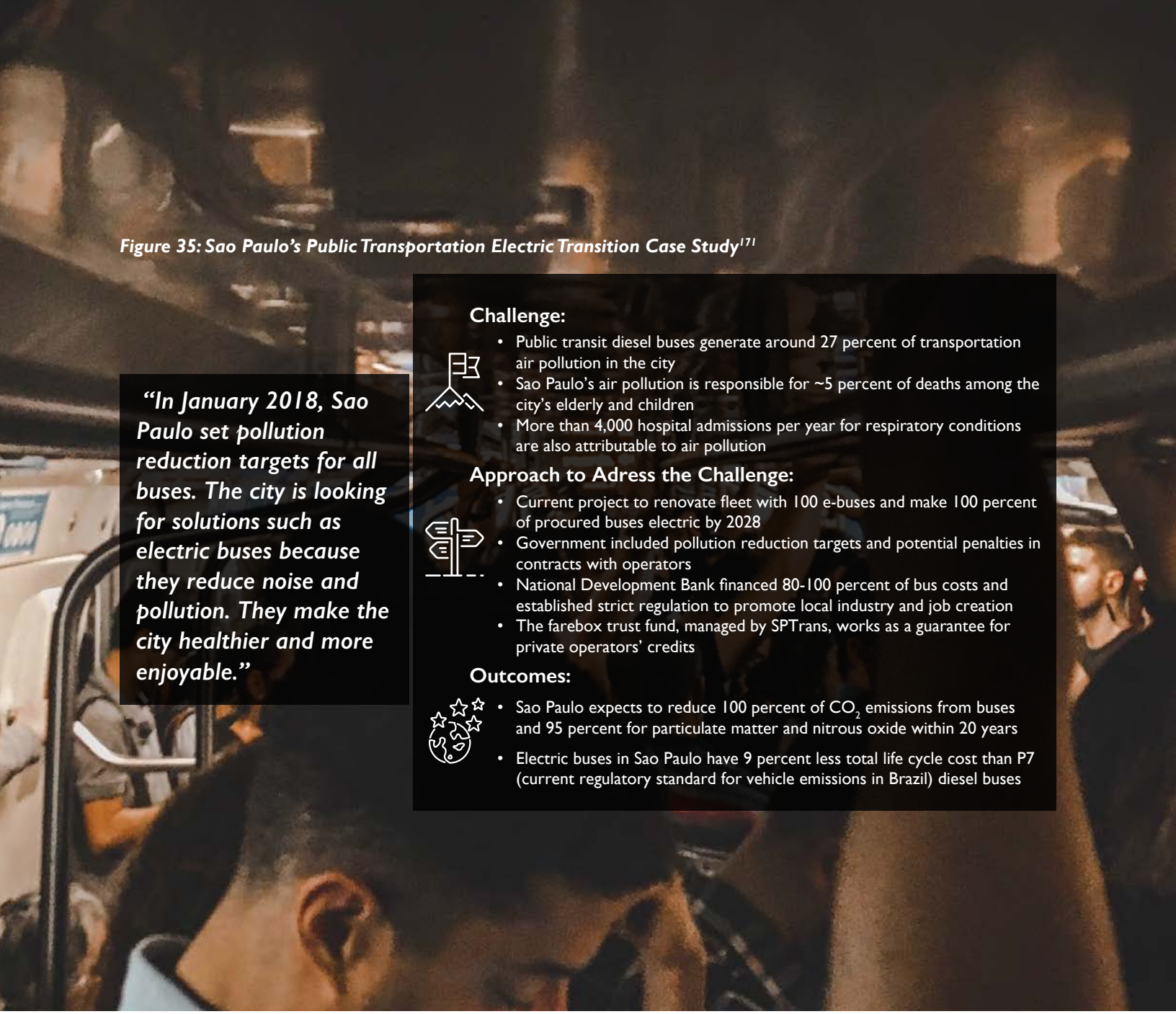


Figure 35: Sao Paulo's Public Transportation Electric Transition Case Study[171]

"In January 2018, Sao Paulo set pollution reduction targets for all buses. The city is looking for solutions such as electric buses because they reduce noise and pollution. They make the city healthier and more enjoyable."

Challenge:

- Public transit diesel buses generate around 27 percent of transportation air pollution in the city
- Sao Paulo's air pollution is responsible for ~5 percent of deaths among the city's elderly and children
- More than 4,000 hospital admissions per year for respiratory conditions are also attributable to air pollution

Approach to Adress the Challenge:

- Current project to renovate fleet with 100 e-buses and make 100 percent of procured buses electric by 2028
- Government included pollution reduction targets and potential penalties in contracts with operators
- National Development Bank financed 80-100 percent of bus costs and established strict regulation to promote local industry and job creation
- The farebox trust fund, managed by SPTrans, works as a guarantee for private operators' credits

Outcomes:

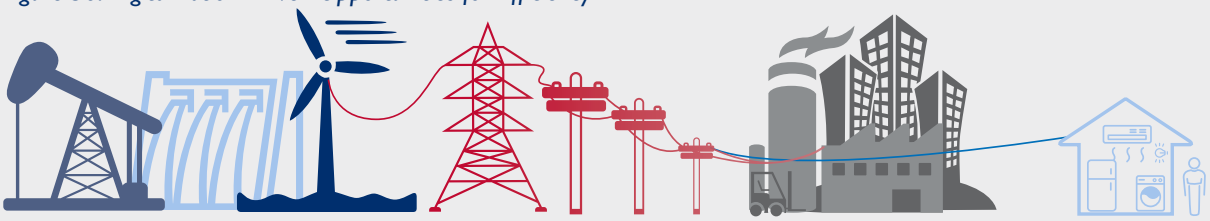
- Sao Paulo expects to reduce 100 percent of CO_2 emissions from buses and 95 percent for particulate matter and nitrous oxide within 20 years
- Electric buses in Sao Paulo have 9 percent less total life cycle cost than P7 (current regulatory standard for vehicle emissions in Brazil) diesel buses

ENERGY EFFICIENCY (EE)

Due to rapid increases in energy demand, efficiency across the value chain will be required to meet the needs of the population. The total energy use in LAC is projected to increase by 70 percent in the next 20 years.[172] There are several opportunities to be more energy-efficient across the energy value chain that can help meet this demand and achieve Target 7.3 of the SGDs to double EE relative to the global average improvement rate of 1.3 percent. The rise of digitalization, in particular, presents opportunities for efficiency across the energy value chain in LAC (see Figure 36).[173, 174]

171. (Cadernos de Saúde Públic 2017); (Government of Brazil 2018)
172. (IDB n.d.)
173. (IDB 2020)
174. (The Magazine of Green Economy 2018); (Bloomberg NEF 2017)

Figure 36: Digitalization Driven Opportunities for Efficiency



Generation

Process automation and data logging to improve energy supply
Examples:
- Big data
- Cloud analytics
- Artificial intelligence
- Internet of things

Distribution

Monitoring and control of energy losses, line expansion and maintenance
Examples:
- Big data
- Artificial intelligence
- Drones
- Smart meters

Industrial & Commercial Sectors

Efficient process management for decision-making
Examples:
- Smart meters
- Sensors
- Cloud computing
- Internet of things
- Mobile apps

Consumer Use

Appliances with digital and remote energy control
Examples:
- Mobile apps
- Internet of things
- Smart meters

In the generation and distribution of energy, digitalization has gained traction for monitoring and improving efficiency. For instance, energy resources can be optimized by aligning supply and demand using big data (e.g., CTG in Brazil automated the hydroelectric plant to increase efficiency, safety, and reliability and saw a performance improvement of up to 20 percent[175]). To improve distribution procedures, the internet of things can be applied to smart pipelines and networks in order to enable automated controls to enhance network resilience, security, and efficiency. Field operators can improve monitoring using mobile access to maps, data, work management tools, and real-time experience (e.g., the Peruvian electricity system operator, COES, which remotely manages the dispatch of the power plants to maintain the system's frequency, reducing up to 70 percent of operating and maintenance costs[176]).

Further down in the value chain, industrial and commercial sectors can save energy through technology and innovation that improves EE. This is the case of the construction sector, where low-energy materials, energy-efficient appliances, and digitalization minimize the resources and energy required for construction and operation[177] (e.g., construction companies Colombian Pactia and Azimut use tools from the 4.0 revolution, such as automation and smart technology, to make energy-efficient buildings, allowing savings of 26 percent in their energy consumption between 2018 and 2019, an environmental impact equivalent to not emitting more than 530 tons of CO_2 per year[178]). Promising practices are also present in the industrial sector, where digitization is enabling better control of processes, resulting in greater energy efficiency[179] (e.g., the Procter & Gamble plant in Guanajuato, Mexico, has implemented energy efficiency in operations and equipment such as changes in lighting, installation of motion sensors, use of pumps, and replacement of chillers,[180] saving 10 million KW in three years, equivalent to an approximately 20 percent reduction [181]).

Finally, end-user energy-efficient products have become widely available (see Figure 37), and consumer demand for this type of product is growing. According to a survey from the Inter-American Development Bank on EE, half of households in LAC are willing to spend money to buy appliances that reduce their electricity bill. An estimated 23 percent of households would be willing to buy more energy-efficient appliances, but cannot afford them. Twenty-nine percent of LAC households are already using energy-saving light bulbs.[182]

175. (Canal Energia 2020)
176. (IDB 2020)
177. (OLADE 2019)
178. (La República 2020)
179. (Energy News 2019)
180. (GTO 2019)
181. (Alto nivel 2010)
182. (IDB 2019)

Labeling Standards for Energy Efficiency in Some Products in LAC[183]

	Home appliances	Air Conditioning	Illumination	Heaters
Mexico	✓	✓	✓	✓
Nicaragua	✓	✓		
Costa Rica	✓	✓	✓	
Panama	✓			
Colombia	✓		✓	
Cuba	✓	✓	✓	
Ecuador	✓	✓	✓	
Chile	✓		✓	
Argentina	✓	✓	✓	✓
Brazil	✓			
Uruguay	✓	✓	✓	

EE can deliver a range of benefits including environmental benefits, due to the use of energy-efficient technologies that prevent CO_2 emissions. It is estimated that between 2015 and 2030, energy efficiency practices can reduce CO_2 emissions by around 11 percent in Central America and the Southern Cone, and by 3 percent in the Caribbean.[184] Regarding **economic benefits,** energy-efficient technologies can generate savings in both generation and final use (e.g., Argentina, Brazil, Chile, Colombia, Mexico, and Peru saved a total of 1,091 GWh per year due to the use of efficient refrigerators between 2005 and 2012[185]). Finally, in terms of **health outcomes,** energy efficiency can provide potential improvement in the quality of life and health (e.g., in homes with wood-based stoves, the implementation of energy-efficient appliances decreases the probability of respiratory diseases[186]).

Despite advances in EE, there are still challenges to overcome to increase EE further:[187, 188] **1) regulation challenges** given the lack of energy-efficient regulation and sector-specific regulations and guidelines, lack of local standards and certification, and weak enforcement of the existing regulation (e.g., according to an OLADE survey, 37 percent of the sector considers that its implementation and enforcement is bad[189]); **2) finance challenges,** due to limited access to financing given the high costs of new technology and low availability of innovative financing mechanism for energy efficiency (e.g., pay per kilowatt saved); **3) technology challenges** such as lack of innovation and local development (e.g., only 39 patents in the energy sector in 2010 were from LAC, compared to 1,359 in North America, 1,791 in Europe, and 1,859 in Asia[190]); and **4) awareness challenges** as there is a need to educate and promote the business case for energy efficiency across different sectors to increase private sector engagement.

One example of implementing energy-efficient practices by the private sector is the case of Iberostar hotels in Central America. The hotel chain sought to decrease costs and implement more environmentally friendly practices, managing to reduce energy consumption by 85 percent (Figure 38).

183. (IDB 2015); (OLADE 2017)
184. (OLADE 2017)
185. (Jannuzzi 2017)
186. (Hernández 2020)
187. (OLADE 2019)
188. (CAF 2016)
189. (OLADE 2019)
190. (CAF 2016)

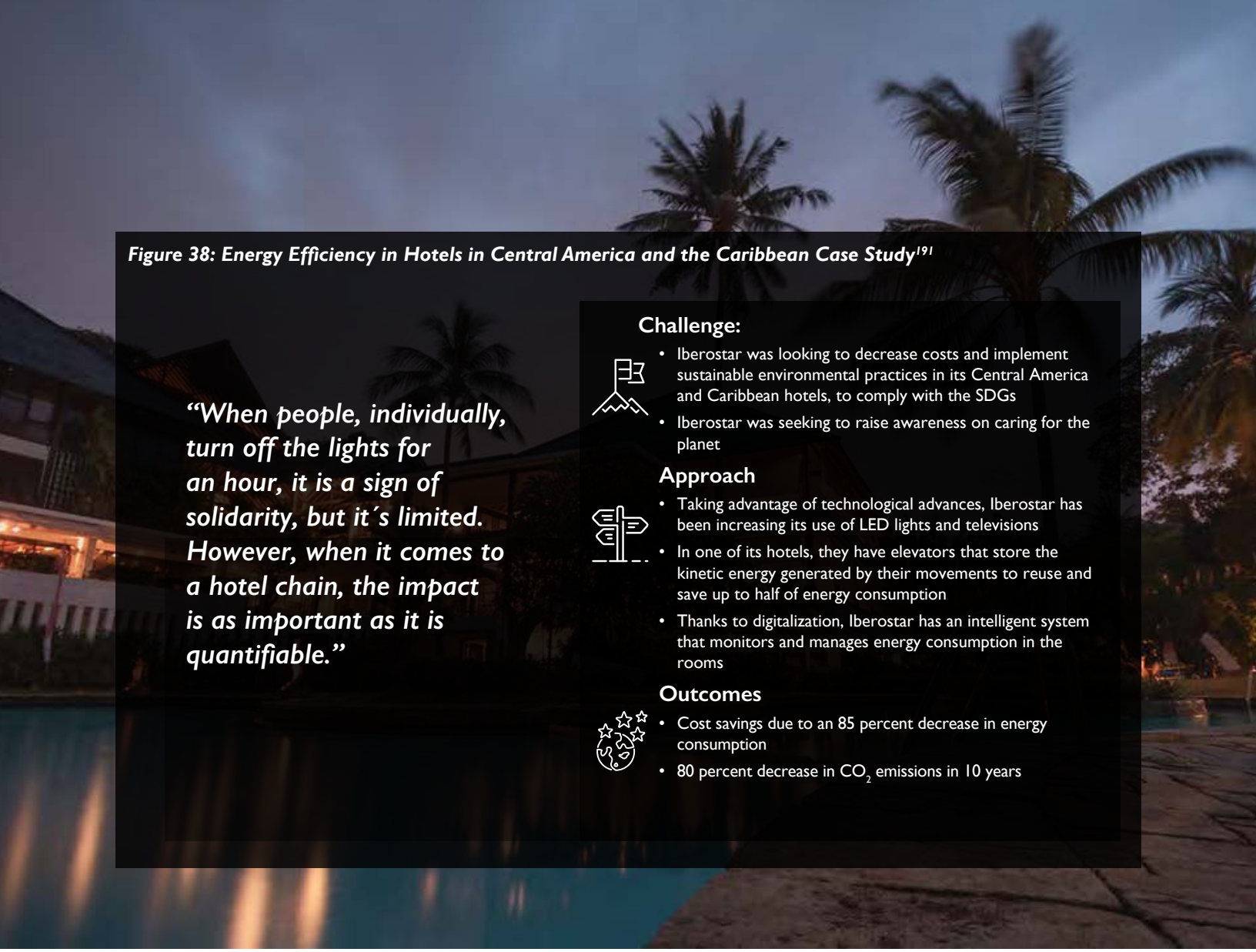


Figure 38: Energy Efficiency in Hotels in Central America and the Caribbean Case Study[191]

"When people, individually, turn off the lights for an hour, it is a sign of solidarity, but it´s limited. However, when it comes to a hotel chain, the impact is as important as it is quantifiable."

Challenge:

- Iberostar was looking to decrease costs and implement sustainable environmental practices in its Central America and Caribbean hotels, to comply with the SDGs
- Iberostar was seeking to raise awareness on caring for the planet

Approach

- Taking advantage of technological advances, Iberostar has been increasing its use of LED lights and televisions
- In one of its hotels, they have elevators that store the kinetic energy generated by their movements to reuse and save up to half of energy consumption
- Thanks to digitalization, Iberostar has an intelligent system that monitors and manages energy consumption in the rooms

Outcomes

- Cost savings due to an 85 percent decrease in energy consumption
- 80 percent decrease in CO_2 emissions in 10 years

CALL TO ACTION

A holistic, cross-sectoral approach is needed to tackle the underlying drivers of unsustainable natural resource exploitation. Making progress usually requires cross-cutting approaches that draw on resources and capabilities from local communities and support from the government, private sector, civil society, academia, and donors. The high-level ideas outlined in this section are often interdependent; they need to be implemented in tandem to be effective (e.g., support for alternative livelihoods alongside legal enforcement).

To increase access and use of modern energy, stakeholders in LAC from the public sector, civil society, private sector, and academia must take the following measures (see Table 5).

191. (Iberostar 2017)

Table 5: Calls to Action by Stakeholder

Public Sector

Strengthen regulatory framework and its application and enforcement

- Develop incentives and market-based mechanisms to encourage the transition to modern energy sources, e.g., avoid fossil-fuel pre-tax subsidies
- Develop regulation to encourage the integration of distributed generation and decentralized generation into the grid
- Develop energy efficient guidelines by sector or industry for more efficient energy consumption (e.g., guidelines for construction to incorporate best practices in energy efficiency)

Strengthen local and national planning

- Incorporate cleaner mobility plans as part of local and national government plans (e.g., electric trains, e-buses)
- Develop local and national commitments to transition to a modern energy matrix

Develop financing mechanisms to incentivize private sector engagement in energy efficiency

- Provide direct loans, grants, equity, or guarantees to private sector projects
- Develop bonds for distributed generation, clean energy, energy efficiency (e.g., efficient building bonds)

Civil Society

Participate in decision-making for renewable energy projects

- Participate in public consultation processes around energy projects for the community
- Engage in community-driven distributed generation projects to increase access, quality, and affordability of electricity

Drive behavioral change

- Modify energy consumption patterns to be more efficient (e.g., turn off lights, unplug home appliances)
- Modify buying patterns to shift consumer preferences toward home appliances that are more efficient or rely on modern energy sources

Private Sector

Develop business models to enable increased access to energy and improve quality of energy

- Develop and implement business models to expand access to modern energy – distributed generation models clearly linked to productivity hubs that will benefit from electricity and be able to pay for the service
- Promote support from utilities to build awareness around distributed generation benefits and provide technical assistance on how to adapt systems to new renewable business models
- Formulate financial and viable technical plans for modern energy projects (e.g., e-buses project)

Investment in improving energy efficiency

- Increased engagement of private sector companies in adopting energy-efficient practices and technologies
- Develop a clear business case for them and the environment (as part of cost reduction and CRS)

Collaborate with government

- Participate in policymaking processes related to renewable energy sectors and energy efficiency
- Increased participation of the private sector in developing renewable energy projects

Academia and Research Institutions

Innovate

- Develop new energy efficiency technologies

Expand offer and curriculum update

- Expand technical capacity and human resources for clean energy labor markets – e.g. increase number of engineering graduates

Engage the community

- Serve as "hubs" in their communities on adaptation issues
- Advocate for specific adaptation policies at the local, state, and national levels

Research

- Support building evidence of what works

USAID can bring various capabilities and can play a crucial role in supporting other actors to further expand access and use of modern energy sources across the region.

SUPPORT GOVERNMENTS TO EXPAND TECHNICAL CAPACITY

- Build local capacity on renewable energy, distributed generation, cleaner mobility, and energy efficiency
- Support governments across the region in developing regulation on distributed generation, energy efficiency plans (with sector-specific detail), and plans to transition to cleaner fuels for the transportation sector

FACILITATE KNOWLEDGE EXCHANGE ACROSS COUNTRIES (CROSS-MISSION LEARNINGS)

- Cross learning from other Missions – USAID has deep experience in setting up distributed energy projects across the region. Both successful and failure experiences should be broadly disseminated so as to learn from them

SUPPORT PRIVATE SECTOR ENGAGEMENT FOR INCREASED ACCESS TO AND USE OF CLEAN ENERGIES

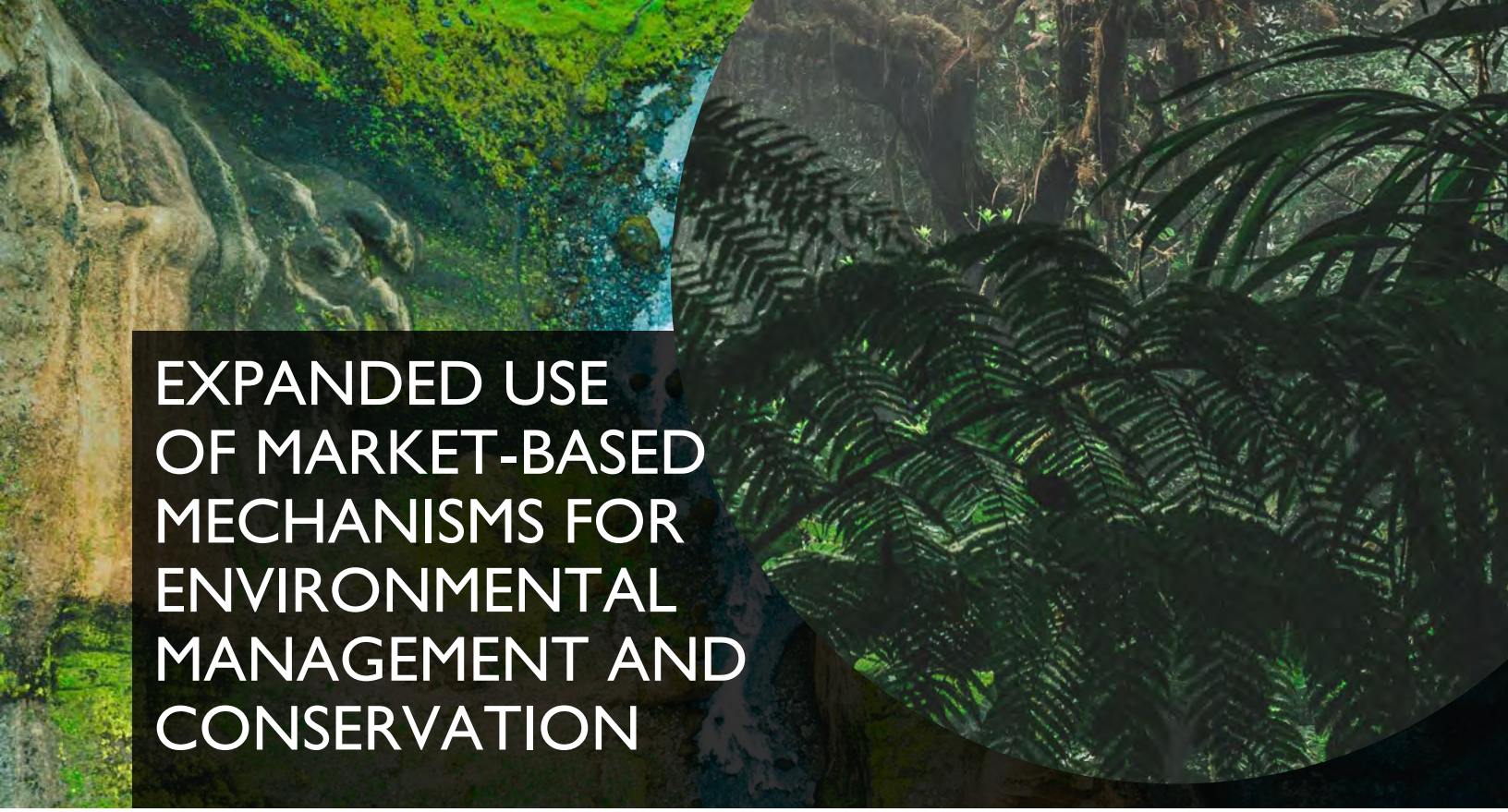
- Increase the engagement of private sector companies to incorporate renewable energies and energy efficiency practices (as a pre-requisite for some sectors or geographies to work with USAID)
- Support the development of public-private partnerships for energy projects
- Promote training and guidance for utilities to transition to distribute generation models in alliance with ministries and regulators

PROVIDE AND SUPPORT ACCESS TO CATALYTIC CAPITAL TO TRANSITION TO MODERN ENERGIES OR IMPLEMENT ENERGY EFFICIENCY PRACTICES

- Develop a risk-sharing plan for implementing modern energy projects
- Provide direct financing
- Support to scale innovation with proven results through access to finance

SUPPORT THE DEVELOPMENT OF MARKET-BASED MECHANISMS FOR ENERGY PROJECTS

- Remove market barriers for private sector participation



EXPANDED USE OF MARKET-BASED MECHANISMS FOR ENVIRONMENTAL MANAGEMENT AND CONSERVATION

INTRODUCTION

"Market-based mechanisms (MBMs) [for environmental management and conservation] refer to alternatives, complements, or supplements to nature management that depend on market forces, financial mechanisms, or other economic instruments, and align economic incentives with environmental outcomes to encourage entities (e.g., private companies) to solve environmental issues."[192] Examples of MBMs include environmental taxes, subsidies/incentives, fees and charges, deposit-refund systems, green bonds, voluntary commitments, payment for ecosystem services (PES), and tradeable permits and quotas (P&Q). In LAC, the most common and expanding MBMs are:

- **PES occur when someone that is preserving the environment gets paid to do so by a beneficiary or user of that ecosystem service.**[193] PESs have gained more traction in recent years across the region, with programs implemented for water, carbon, landscapes, and a few bundled sectors. The protection of water sources is the most common application in LAC, with a total of 25 water funds; there are only 16 in other regions.[194]
- **Tradeable P&Q are rights granted for the use of natural resources. Typically, a maximum number of permits or quotas is established by a regulator and allocated and sold to users who can either exercise the right or trade the right to another user. Trading of rights enables those who value the resource the most to acquire the right to use the resource, resulting in the most economically efficient allocation of the resource.** Tradable P&Q have grown in the region, but there is still room to expand. By 2017, OECD's Database on Policy Instruments for the Environment (PINE)[195] reported 15 tradable permit systems (compared to 27 in North America and 65 in Europe). Mexico started piloting an emissions trading system in 2020, while Colombia, Chile, and Brazil have expressed interest in establishing one.

192. (United States Environmental Protection Agency, 2000)
193. (UNDP, n.d.)
194. (Alianza Latinoamericana de Fondos de Agua, 2020)
195. (OECD, 2017)

- **An environmental tax is a government charge to an activity proven to have a specific adverse effect on the environment.**[196] Environmentally related tax revenues (ERTRs) have slowly grown in the region, reaching 1.1 percent of GDP on average in 2018; however they remain well below the OECD average of 2.3 percent.[197] In the last six years, Mexico, Chile, Argentina, and Colombia have implemented carbon taxes, and Brazil has expressed interest in doing so, signaling the potential for ERTRs to increase.[198]
- **A green bond is a debt instrument used to finance environmental-related projects** From 2014-2019, the annual green bonds issuance volume in LAC grew 18-fold to $3.6 billion.[199]

While each of these market-based mechanisms has advantages, they also face different challenges, as shown in Table 6.

Table 6: Benefits and Challenges of Select Market Based Mechanisms

MECHANISM	BENEFITS	CHALLENGES
Payment for Ecosystem Services	• Makes the value of ecosystems explicit, enabling greater willingness to manage these assets optimally • Supports and empowers communities to benefit directly from environmental stewardship • Limit the use or exploitation of resources to a maximum that (in theory) represents an optimal usage level	• Requires technical expertise to correctly price or value assets and services • Requires significant monitoring to ensure ecosystems are maintained as intended
Tradable Permits and Quotas	• Limit the use or exploitation of resources to a maximum that (in theory) represents an optimal usage level • Allocate usage or rights based on the highest value (economic efficiency) or least cost for compliance (cost-effectiveness)	• Establishing the appropriate or optimal cap may be difficult due to uncertainty or limited data • Ensuring the allocation of rights also delivers equitable outcomes
Environmental Taxes	• Generate public revenue that can be used for positive purposes, including compensating those hurt by the downstream impact of taxes • Provide corrective price signals or incentives to market actors • Understanding optimal tax levels is relatively clear	• It is difficult to generate political support and to operationalize
Green Bonds	• Build on existing (and often well-functioning) capital markets and finance ecosystems • Can be used to mobilize significant funds for large-scale projects	• Relatively new market, with a limited track record • Dependence on the underlying financial ecosystem means existing inequities and biases in these systems are likely to shape the green bond market as well

196. (OECD, 2005)
197. (OECD, 2020)
198. (The World Bank, 2020)
199. (Initiative Climate Bonds, 2019)

PAYMENT FOR ECOSYSTEM SERVICES (PES)

PES programs have flourished in LAC, with the first national PES program established in Costa Rica in 1997. PES in LAC have mainly focused on local-level water solutions, followed by those that address a bundle of sectors.

Moreover, the LAC region leads the world in the number of water-focused PES (i.e., water funds), currently with 25 funds created (vs. 16 in the rest of the world) and ~15 under development (vs. 13 in the rest of the world). Water funds allow downstream water users such as brewers or municipal water authorities (service buyers) to finance the upstream provision of a clean, regular water supply. The fund's resources are directed toward conservation activities such as reforestation. To date, water funds in LAC have resulted in 227,000 hectares of conserved forest and have the potential to affect 89 million people.[200]

Figure 39: Water Funds in LAC [201]

PES schemes can deliver a range of environmental, economic, and social benefits. By channeling payments or incentives toward environmental stewardship, PES contributes directly to positive **environmental outcomes**, such as decreased deforestation and degradation and improved water quality and availability. PES also result in **economic benefits** such as increased income for populations providing the services, often indigenous and other vulnerable populations. As a result of increased incomes, PES drive **social benefits** such as expanded services for vulnerable populations (e.g., in the Colombian Amazon, 15,000 families have benefited from PES programs, including indigenous and low-income farmer communities[202]).

However, key challenges impede the further expansion of PES across the region, including 1) technical and operational challenges as it is difficult to define the correct price or value assets and services,[203] and given that there is insufficient monitoring to ensure ecosystems are maintained as intended[204] and insufficient evidence on PES social impact;[205] **2) structural and organizational challenges** due to complex land ownership structures (e.g., Costa Rican, Mexican, and Ecuadorian PES programs all recognized title and tenure as a key challenge)[206] and difficulty involving local stakeholders (e.g., little understanding among rural and indigenous communities); and **3) political and regulatory obstacles**, including lack of awareness of PES and its role in environmental management and limited regulatory frameworks to support PES (e.g., in Mexico, the PES program for water resources was hampered by a lack of robust laws).[207]

PES have been successfully deployed throughout the region, as shown by the case of the Sao Paulo Water Fund. This fund was created in 2007 to restore 12,000 hectares of Atlantic Forest by working with local communities, implementing soil conservation practices on 4,000 hectares and conserving 67,000 ha of forest that are critical to the watershed ecosystem's health [208] (see Figure 40).

200. (Alianza Latinoamericana de Fondos de Agua, 2020)
201. (Alianza Latinoamericana de Fondos de Agua, 2020)
202. (El Congreso, 2020)
203. (Mongabay, 2017)
204. (Finney & Montagnini, 2011)
205. (Profor, 2012)
206. (Profor, 2012)
207. (Watershed Markets, n.d.)
208. (Fondos de Agua, 2019)

Figure 40: Sao Paulo Water Fund Case Study[209]

"The Water Fund has proved its value by supporting governments with the best available science for decision-making, which increases coordination and capacity for an integrated watershed management." – Latin America Water Funds Partnership

Challenge:

- Greater São Paulo, home to 20 million people, is one of the most water-stressed cities in Latin America
- Before its water crisis, Sao Paulo consumed 4 percent more water than was available, a deficit of 3,000 liters per second.

Approach

- The São Paulo Water Fund was created in 2007, with the goals to restore 12,000 ha of Atlantic Forest by working with local communities, implement soil conservation practices in 4,000 ha, and conserve 67,000 has of forest critical to watersheds ecosystem health
- The fund has mobilized a broad coalition of stakeholders to conserve and restore green infrastructure as a cost-efficient solution to providing quality water in sufficient quantity to greater São Paulo

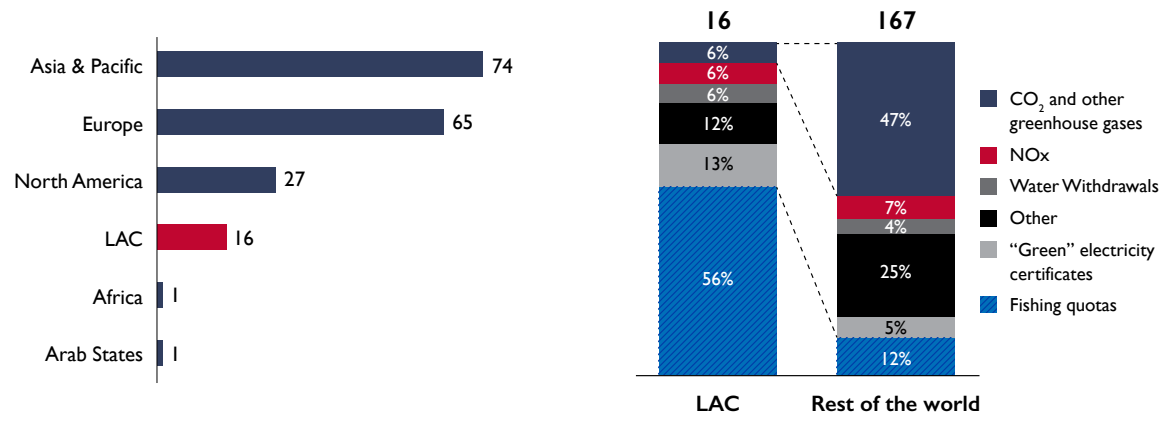
Outcomes:

- By 2018, the implemented area was 8,278 ha; 400 families directly benefited and $32.1 million in leveraged resources

TRADABLE PERMITS AND QUOTAS (P&Q)

Although tradable P&Q are not new to LAC, the region trails behind others in their implementation (Figure 41). Of the existing tradable P&Q in LAC, more than half of them are fishing quotas; carbon markets are only starting to develop. Historically, carbon market P&Q have been complex and costly to implement, and as such, have only been employed by developed countries.

Figure 41: Characteristics of Tradable P&Q in LAC[210]



209. (Fondos de Agua, 2019)
210. (OECD, 2017)

Beyond permits and quotas for fisheries' management, Emissions Trading Systems (ETS) are emerging in the region, with Mexico, Brazil, Chile, and Colombia either piloting their own or expressing interest in doing so.[211] ETS create incentives to reduce emissions cost-effectively, and they represent almost 50 percent of all P&Qs globally. ETS are an option for LAC to adhere to more cohesive and ambitious climate policy actions. In 2020, Mexico launched a pilot ETS, covering power, oil, gas, and other industrial sectors. These sectors account for ~40 percent of the country's greenhouse gas emissions.[212] The second phase of the pilot will be launched in 2023. ETS are also under consideration in countries such as Colombia, Chile, and Brazil.

Tradable P&Q have resulted in positive environmental, economic, and governance outcomes. The environmental benefits of P&Q include limiting the exploitation of natural resources to a level that, in theory, represents the optimal usage. Successful cases of environmental management using P&Q include hunting permits in Mexico,[213] and commercialization of water rights and the NOx emissions compensation system in Chile.[214] **Economic benefits** include allocating usage rights based on the highest value or least cost for compliance (e.g., carbon pricing systems, which do not dictate by how much entities must reduce emissions; rather, they send economic signals to let emitters determine whether it makes more business sense to continue emitting and pay the price or cut emissions). In terms of **governance**, the greatest benefit is that tradable P&Q can be implemented without developing laws or large bureaucratic programs (e.g., Chile implemented its emissions transaction program for industrial boilers before adopting the Environmental Bases Law and establishing the National Environmental Commission[215]).

However, the main challenges limiting the adoption of tradable P&Q are the political will to incorporate and the technical knowledge to design them. Technical and operational challenges include **1) difficulty establishing the appropriate or optimal cap** due to a lack of adequate baseline data and ongoing monitoring;[216] **2) complex allocation of rights** to ensure equitable outcomes; **3) inadequate monitoring and enforcement** (e.g., in multispecies and transnational fisheries);[217] and **4) limited evidence on social impacts** given the nascency of some instruments in the region and a lack of well-conducted studies. Increased adoption of tradable P&Q has also been hindered by political and regulatory challenges such as: **1) limited awareness of tradable P&Q and benefits for environmental management** given that there are few pilot programs with stakeholder involvement to communicate the benefits of tradable P&Q; and **2) lack of political will to include tradable P&Q as an environmental management tool** (e.g., only three countries in the region – Mexico, Colombia, and Chile – have regulatory bases to implement ETS pilot programs).[218]

A successful example of a tradable P&Q program is the fishing permit market in Chile. This case suggests that tradable P&Q programs are crucial to improving resources, given that fish species requiring fishing licenses improved their condition (more details in Figure 42).

211. (The World Bank, 2020)
212. (The World Bank, 2020)
213. (Trinidad, 2019)
214. (Trinidad, 2019)
215. (Calfucura, Coria, & Sánchez, 2017)
216. (Tietenberg, n.d.)
217. (Fundación Terram, 2019)
218. (International Carbon Action Partnership, 2018)

Figure 42: Chile Fishing Permit Market Case Study[219]

"The 2020 fisheries report reveals improvements in horse mackerel, cod, and other key resources. The report also shows that there is a common denominator among the resources that improve: all of them are subject to tradable fishing licenses or special fishing permits."

Challenge:

- By 2012, 70 percent of the main fishing resources of Chile were collapsed or in the process of overexploitation
- Ninety percent of the fishing industry was dominated by 4 large companies

Approach:

- In 2012, the Chilean general law on fishing and aquaculture established a system of tradable fishing licenses
- Licenses are granted through annual auctions, where no bidder may be awarded more than 40 percent of the quota subject to auction
- For each type of marine animal, a lot is assigned in tons on which the fishing percentages are estimated
- Fishing permits are assigned according to the region, the fishing class, and the season of the year (from January to June, and from July to December)

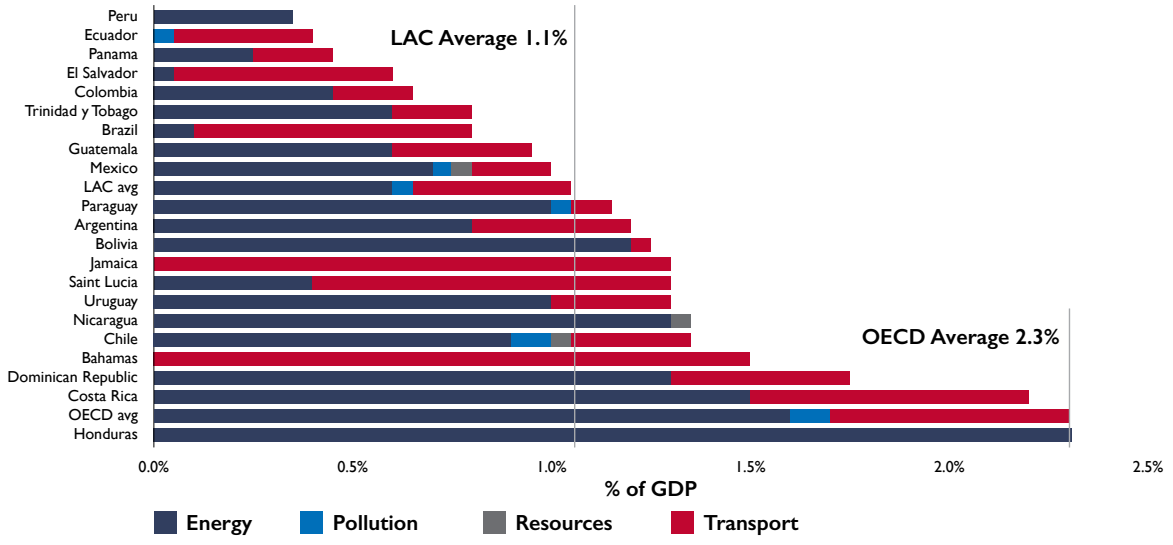
Outcomes:

- The number of species at risk of collapse has decreased from eight to five during 2019
- In 2019, of the 27 species monitored, 26 improved or maintained their condition compared to the previous year

ENVIRONMENTAL TAXES

Revenues from environmental taxes are growing in LAC, having increased from 0.9 percent of GDP in 2010 to 1.1 percent of GDP in 2018.[220] However, revenues lag behind other regions (Figure 43). Approximately two-thirds of environmentally related tax revenues in LAC come from taxes on energy, primarily on diesel and petrol (0.6 percent of GDP on average). These also include carbon taxes. [221]

Figure 43: Overview of Environmental Taxes in LAC[222]



219. (La Tercera, 2012); (Industrias Pesqueras, 2019); (Ministry of Economy Promotion and Tourism, 2020); (Industria Pesquera, 2020); (Subpesca, 2020)
220. (OECD, n.d.)
221. (OECD, n.d.)
222. (OECD, 2020)

Carbon tax adoption is emerging in the region, as four countries have implemented a carbon tax and Brazil is considering doing so (see Figure 44). A carbon tax is a form of direct carbon pricing linked to the level of CO_2 emissions. It can exist alongside other energy taxes. Seventy-five percent of carbon taxes in LAC are imposed upstream (e.g. on oil producers, coal producers, and energy importers).[223] Only Colombia and Mexico allow for the use of carbon offsets as a substitute to paying the tax. [224, 225] Furthermore, LAC will soon implement the Carbon Pricing in the Americas (CPA) platform, which will enable countries to share pricing experiences and present an opportunity for regional collaboration.[226]

Figure 44: Carbon Tax Initiatives in LAC[227]

As a result of environmental taxes, the LAC region has obtained environmental, economic, and social benefits. The main **environmental benefit** is that these taxes create economic incentives for positive environmental outcomes such as reducing energy use and carbon emissions (e.g., one of the objectives of carbon taxes in Colombia is to discourage the use of fossil fuels[228]), while the main **economic benefits** are that they give consumers and businesses flexibility to determine the least-costly way to reduce environmental damage. Environmental taxes also have **social benefits**, such as generating revenue that can be used for positive purposes, including compensating those hurt by the downstream impact of taxes (e.g., if countries such as Bolivia, Ecuador, and Venezuela implemented carbon taxes, with an optimal tax level between \$20 to \$50/tCO_2, they would obtain benefits on GDP of between 1.16 - 3.01 percent[229]).

Despite the existence of some environmental taxes in the region, LAC countries are lagging in revenue collected and in mainstreaming new types of taxes due to several challenges, including 1) technical and operational challenges given that there are insufficient accurate measurement tools for emission sources, which makes it challenging to set an adequate carbon price; **2) limited awareness and involvement of the private sector** as private sector players are unaware of the benefits of taxes (e.g., Brazil and Mexico had voluntary simulations with the private sector to evaluate price mechanisms to reduce emissions);[230] and **3) political and regulatory obstacles** as it has been difficult to generate political support and operationalize taxes, there is a lack of regional collaboration, and tax revenues have not been used effectively (i.e., carbon taxes could hurt productivity if there are no policies to reuse tax revenues properly).[231]

Colombia's carbon tax is a successful example of an environmental tax in LAC. Due to Colombia's strong regulatory framework, the carbon tax reduced fossil fuel emissions by 38 percent from 2017 to 2018 (see more details in Figure 45).[232]

223. (UN Environment, 2019)
224. (UN Environment, 2019)
225. (Konrad Adenauer Stiftung, 2018)
226. (Konrad Adenauer Stiftung, 2018)
227. (The World Bank, 2020)
228. (Konrad Adenauer Stiftung, 2018)
229. (CIAT, 2017)
230. (Konrad Adenauer Stiftung, 2018)
231. (CIAT, 2017)
232. (Rona, 2019)

Figure 45: Carbon Taxes in Colombia Case Study[233]

"In the country, this tax, which is $5 per ton of carbon emitted, yielded revenues of $148 million in 2017 and $91 million in 2018."

Challenge:

- In Colombia, emissions associated with fossil fuels represent ~35 percent of the country's total emissions
- In 2015, under the Paris Agreement, Colombia committed to reduce its emissions by 20 percent compared to the emissions projected for 2030

Approach:

- In Law 1819 of 2016, Colombia included the carbon tax within a green tax package
- The carbon tax is up-stream, charged to producers and importers of liquid fossil fuels
- In the liquid fossil fuel value chain, the organizations in charge of exploration, production, transport, and refining are the tax collectors. Wholesale fuel buyers, fuel stations, industrial producers, and consumers are direct carbon taxpayers
- The carbon tax is accompanied by compensation so that companies can avoid paying the tax collector, instead offsetting their pollution by purchasing carbon credits from eligible mitigation projects
- The tax is recalculated every year to take inflation into account

Outcomes:

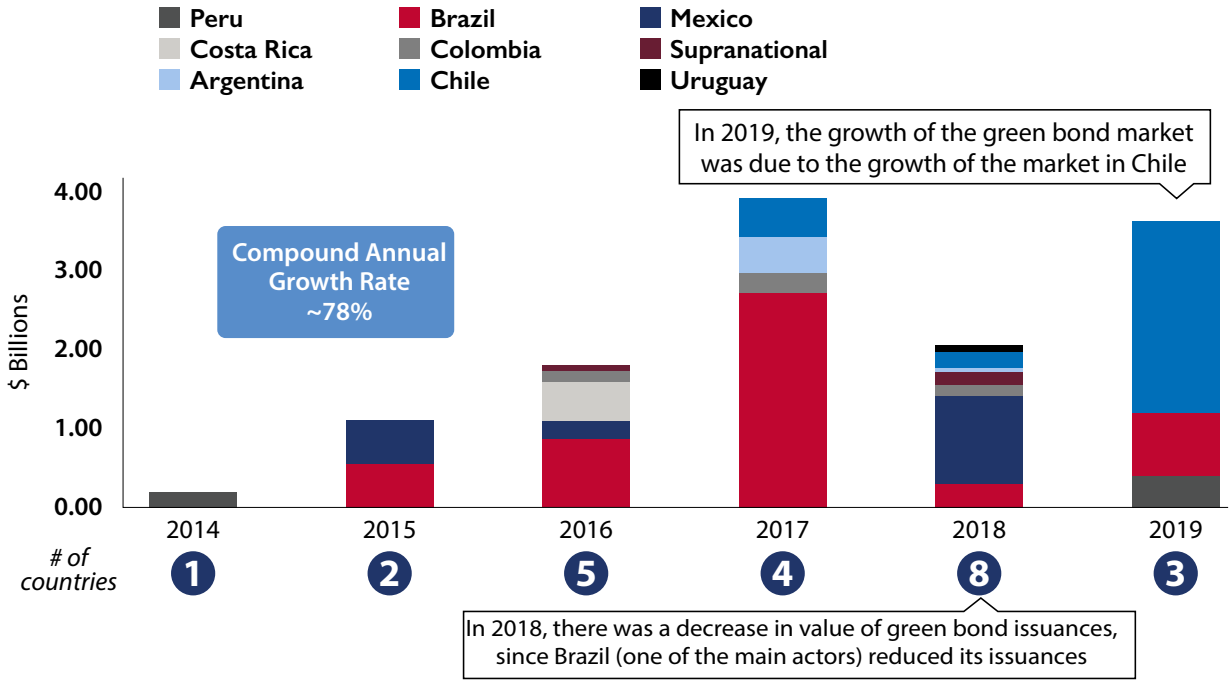
- It is estimated that the tax has caused a reduction of around 38% in fossil fuel emissions in the period 2017-2018
- In 2019, income from the tax was $111 million
- In 2017, carbon taxes represented 67 percent of Colombia's environmental taxes

GREEN BONDS

The green bond market has expanded rapidly in LAC over the past few years and is expected to continue growing, driven by investments in green infrastructure.[234] Between 2014 and 2019, a total of USD 12.6 billion was granted in LAC through 52 issuances.[235] However, through 2019, LAC issuers have only contributed with 2 percent of the global green bond issuance volume (1 percent of bonds and 5 percent of issuers).[236] Local green bond issuance has also shown size and maturity limitations (some maximum issuances have been lower than USD 300 million, while the maximum maturities are seven to nine years).[237]

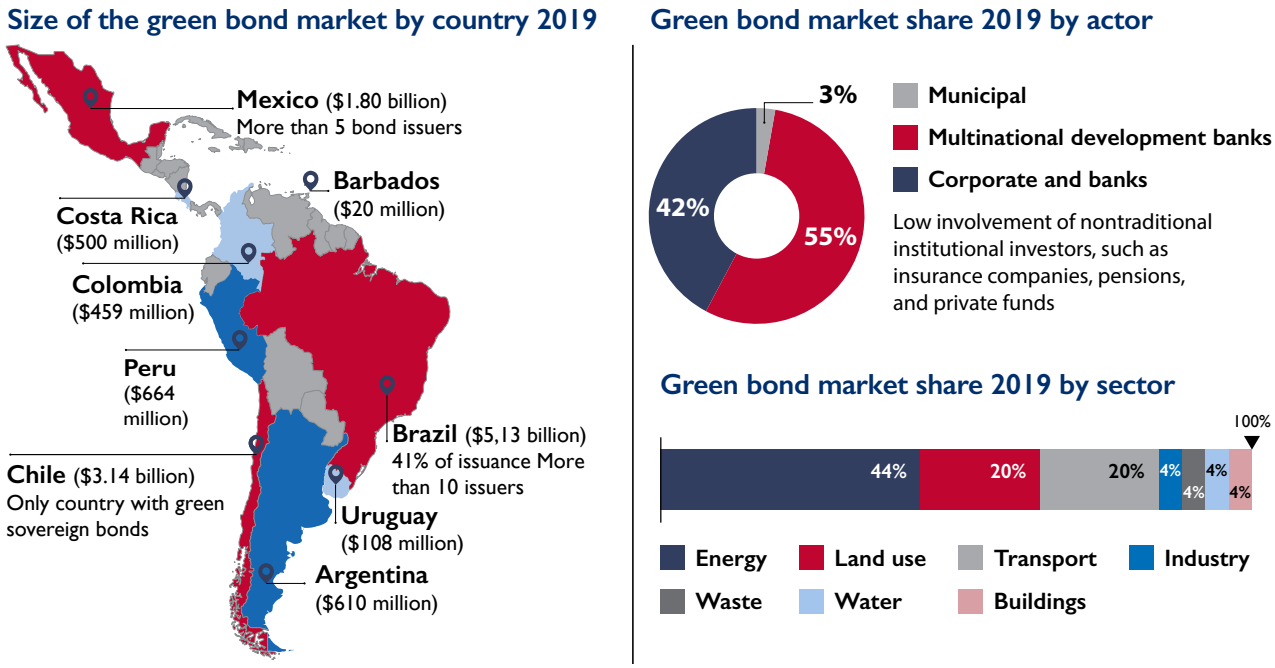
233. (Rona, 2019); (Government of Colombia, 2016); (IIIEE, 2017); (UN Environment, 2019); (Konrad Adenauer Stiftung, 2018); (The World Bank, 2020); (Semana, 2020)
234. (Climate Bonds, 2019)
235. (IDB, 2019)
236. (Climate Bonds, 2019)
237. (ECLAC, 2017)

Figure 46: Green Bond Market Growth in LAC 2014-2019[238]



Throughout the region, green bonds are most common in Brazil. They have been mainly led by multinational development banks and have mostly funded energy projects. Figure 47 shows a snapshot of the green bond market per country, the share of bonds by actor, and a breakdown of green bonds by sector of focus.

Figure 47: Green Bond Market in LAC [239]



238. (Climate Bonds, 2019)
239. (Climate Bonds, 2019); (ECLAC, 2017)

Green bonds have large-scale environmental and economic benefits and are helping to close the financing gap to transition to a greener economy. The largest **environmental benefit** of green bonds is that they increase investment in environmental projects, including renewable energy, energy and water efficiency, sustainable transportation, and sustainable land-use.[240] Green bonds also have important **economic benefits** as they are able to mobilize significant funds for large-scale projects (e.g., green bonds would help to close the financial gap of annual investments of between $40–50 billion through 2030 to achieve a greener economy in the region).[241]

For the green bond market to continue growing, it must overcome key operational and private sector challenges. Technical and operational challenges include **1) early-stage market challenges** such as how the market largely depends on the underlying financial ecosystem and might absorb existing inequities and biases, and given limitations due to the size and maturity of bonds;[242] **2) limited availability of emission guarantors** since today the IDB is the main guarantor and assistant in bond issues; and **3) inefficient monitoring platforms** as LAC countries still need to develop the Green Bond Transparency Platform (GBTP), which will provide precise data on the use of revenues and the presentation of environmental impact reports.[243] Key private sector challenges include **1) insufficient involvement of the private sector** given limited involvement by some investors (e.g., pension funds) who have large pools of savings and little involvement in projects other than energy (e.g., infrastructure since the LAC region has an annual infrastructure deficit of $50 billion);[244] and **2) limited transparency** given that only 53 percent of green bond issuers surveyed in LAC report how their deal proceeds are allocated and what their environmental impact is.[245]

Despite these challenges, green bonds have been successfully issued in the region. In 2019, the first green bond was issued in the Caribbean to finance a clean-energy project (see Figure 48).

Figure 48: Caribbean Green Bond Case Study[246]

"The Climate Bond Standard Board approved the certification of WREL green energy bonds as consistent with addressing the two degrees Celsius warming limit in the Paris Agreement."

Challenge:

- In 2019, the Williams Renewable Energy Limited (WREL) company sought funds to finance a project for solar photovoltaic systems in the Caribbean (Barbados)

Approach:

- WREL financed a solar energy business through a $20 million green energy bond program
- First green bond in the Caribbean
- Partners: CIBC First Caribbean International Bank (banker), IADB (bond guarantor), and PwC (auditors)

Expected Outcomes:

- The project will benefit the island of Barbados by reducing fuel imports and the islands' carbon footprint

Lessons:

- Initial green projects serve as a benchmark to establish viability and replicate successful procedures
- Development banks and multilateral organizations could serve as guarantors and advise on bond issuance processes so that the bond market grows in the region
- Standard projects that provide generic solutions to environmental issues are more easily understood in the green bond market, unlike projects with a higher degree of complexity

240. (Climate Bonds, 2019)
241. (IDB, 2019)
242. (ECLAC, 2017)
243. (Environmental Finances, 2020)
244. (Environmental Finances, 2020)
245. (Environmental Finances, 2020)
246. (Climate Bonds Initiative, n.d.); (Climate Bonds Initiative, 2019); (Barbados Today, 2019)

CALL TO ACTION

A holistic, cross-sectoral approach is needed to tackle the underlying drivers of unsustainable natural resource exploitation. Making progress usually requires cross-cutting approaches that draw on resources and capabilities from local communities and support from the government, private sector, civil society, academia, and donors. The high-level ideas outlined here are often interdependent; they need to be implemented in tandem to be effective (e.g., support for alternative livelihoods alongside legal enforcement).

To increase the adoption of market-based mechanisms, stakeholders from the public sector, civil society, private sector, and academia must take the following measures (see Table 7).

Table 7: Calls to Action by Stakeholder

Public Sector

Expand and complement existing regulation

- Develop regulations with an environmental focus, considering market mechanisms for their execution
- Discourage polluting industries through new regulation (e.g., gradual reduction of fossil fuel subsidies)
- Develop a robust financial system and regulation to manage bond risks adequately
- Develop policies to encourage investors to invest in green projects

Strengthen technical capacity

- Include technical experts in monitoring and formulating market mechanisms (to set the right levels or quotas)
- Design the appropriate valuation of environmental services, so that the PES are properly executed

Strengthen monitoring and tracking

- Develop guidelines for effective monitoring and tracking of environmental damage or benefits to allow for trading

Civil Society

Facilitate the communication of economic tools to vulnerable communities

- Develop effective communication instruments to make indigenous and farming communities aware of the advantages of market-based mechanisms (mostly for PES and tradable P&Q)
- Involve indigenous communities and vulnerable communities in the design of local market mechanisms

Help discourage illegal activities

- Develop campaigns that reduce the value of illegal activities, such as illegal logging or wildlife trafficking, where alternative solutions are offered through market-based mechanisms

Private Sector

Develop business model innovation

- Involve technical knowledge for the application of market mechanisms within their processes and business models (e.g., PES)
- Formulate financially and technically viable projects on the green economy

Increase financing and investing

- Increase engagement of private sector companies as investors for green projects
- Visualize business case for investing in green infrastructure

Academia and Research Institutions

Research

- Develop research to quantify the impact of market-based mechanisms on improving the environment

Monitor and track

- Support implementation of monitoring protocols to certify impacts (e.g., reduced emissions)
- Expand evidence data on the impact of market-based-mechanisms

USAID can bring various capabilities and can play a crucial role in supporting other actors further to expand the adoption of market-based mechanisms across the region:

SUPPORT GOVERNMENTS IN EXPANDING TECHNICAL CAPACITY

- Provide technical expertise in the monitoring and formulation of market mechanisms
  (e.g., to set the right levels and quotas)
- Design the appropriate valuation of environmental services, so that the PES is properly executed

FACILITATE KNOWLEDGE EXCHANGE AND COLLABORATION ACROSS COUNTRIES (CROSS-MISSION LEARNINGS)

- Cross learning from other Missions, e.g., Colombia carbon tax implementation
- Facilitate the sharing of experiences on emissions trading through the Carbon Pricing in the Americas Platform

SUPPORT PIPELINE DEVELOPMENT FOR GREEN BONDS

- Engage private sector companies to showcase business opportunities in the green economy
- Support private sector companies in developing "bankable projects" to access resources available through green bonds
- Provide a risk-sharing mechanisms that enable "riskier projects" to access financing

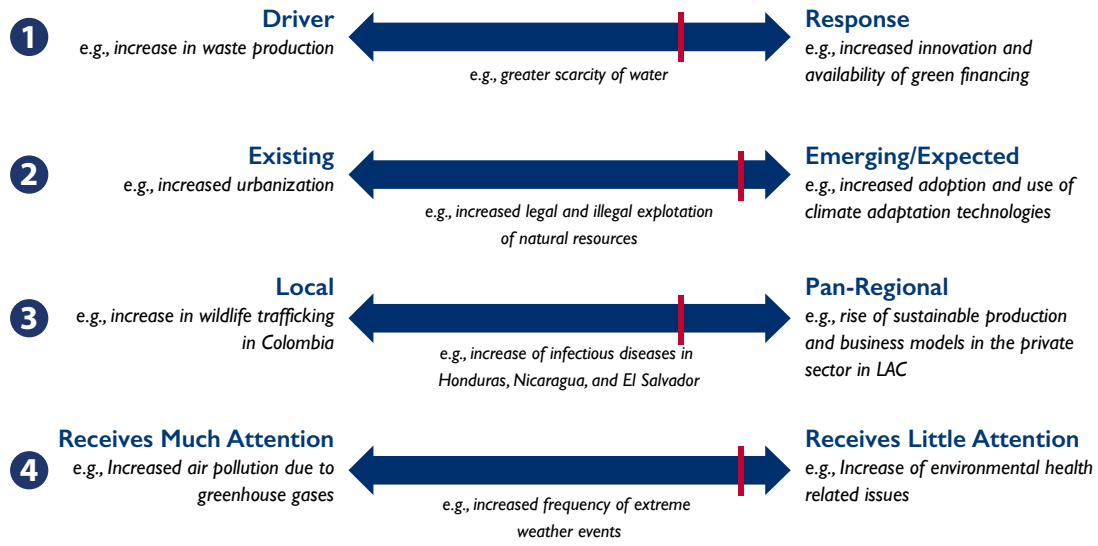
ANNEXES

ANNEX 1: METHODOLOGY

This analysis employed a three-step approach to selecting five priority environmental trends for Latin America and the Caribbean. First, the research team conducted desk research, expert interviews, and discussions within USAID teams to identify a medium list of potential trends. The team reviewed more than 50 reports and databases related to the environment and energy landscape in Latin America and the Caribbean. The set of sources included multilateral organizations, research centers, universities, civil society organizations, national and subnational governments, and media outlets. Some examples include the Inter-American Development Bank, the World Bank, FAO, ECLAC, OECD, Alliance for Rural Electrification, The New Humanitarian, Open Democracy, Stanford University, World Energy Council, etc.

Second, priority characteristics were determined for the portfolio of trends by understanding USAID and USG interests and preferences. For example, trends were preferred to be more related to responses to environmental issues than to their drivers, as this could increase the space for potential action. Along the same lines, emerging or expected trends were prioritized over currently existing ones. Also, in order to champion a coordinated effort across the region, pan-regional trends were preferred over more local dynamics.

Figure 49: Priority Characteristics of the Trends



Vertical red line indicates analytical focus preference of USAID.

After the definition of the characteristics, the team came up with the following shortlist of trends

- Increased exploitation of natural resources
- Greater scarcity of water
- Increase of planetary health issues
- Increased access and use of modern energy sources
- Increased adoption of climate adaption
- Increased adoption of environmental regulations
- Expanded use of market-based mechanisms for environmental management and conservation
- Rise of sustainable production and business models in the private sector
- Increased citizen engagement in environmental issues

Finally, the team applied the prioritization criteria to obtain a shortlist of the most relevant trends. These criteria have two main components. First, the potential for impact, which is defined as the size of the problem or benefit that the trend has the potential to solve or create. A crucial part of this is the impact on vulnerable populations, including migrants, indigenous peoples, and women and girls. The second component of the criteria is the potential role and relevance for USAID. This includes the opportunity to leverage USAID's core strengths, its additivity and opportunity to collaborate with other donors, consistency with U.S. government policy and Congressional guidance for funding, and policy alignment with USAID Mission and Bureau priorities.

ANNEX 2: INTERVIEW LIST

Throughout the assessment, we received valuable insights from experts across USAID and LAC. We would like to express our sincerest gratitude to everyone who supported us in this endeavor with their time and input. This document could not have been possible without their valuable insights.

Trend	USAID Reviewers	Experts
1. Increased legal and illegal exploitation of natural resources	Cristy Johnson Liza Cushion Ana Villegas	Luis Zambrano / Professor at UNAM Paulo Eduardo Artaxo / Professor at Federal University of São Paulo Beto Borges / Director of the Communities and Territorial Governance Initiative at Forest Trends Benjamin Schapiro / USAID Jessica Rosen / USAID Kim Thompson / USAID Mary Rowen / USAID Gustavo Vargas / USAID Monica Romo / USAID
2. Increased adoption and use of climate adaptation technologies and policies	Ana Villegas	Andy Jarvis / Director Policy Analysis Research Area at CIAT Carlos Ruiz Garvia / Regional Lead UNFCCC Claudia Octaviano / General Director at National Institute for Ecology and Climate Change - Mx Esteban Bermudez / UNEP Climate Change Mitigation Coordinator
3. Expanded use of market-based mechanisms for environmental management		Kristina McNeff / Program Officer at Gordon and Betty Moore Foundation Carolina Herrera / Manager, Green Finance & Climate Change at NRDC Thomas Black / USAID Felizia Bacall /Managing Director at U.S. International Development Finance Corporation Jason Fleming / USAID
4. Increase of environmental-related human health issues	Lucy Mize	Carlos Corvalan / Coordinator of the Interventions for Healthy Environments at WHO Agnes Soares da Silva / Regional Advisor Environmental Epidemiology at PAHO Dr. Jorge Abelardo Falcón / Project Coordinator at Fundación Carlos Slim Rob Cohen / USAID
5. Increased access and use of cleaner energy sources	Christine Pendzich Simone Lawaetz	Federico Fische / Regional Coordinator, CA at Alternative and Sustainable Energy Inc. Jorge Barrigh / Co-Chairman LAC Council on Renewable Energy (LAC-CORE) Lennys Rivera Albarracín / Director of Energy Integration at OLADE Manuel Cerrato / USAID

ANNEX 3: ACRONYMS

ABM	Mexican Banks Association
AI	Artificial Intelligence
CAF	Latin-American Development Bank
CAFTA-DR	Dominican Republic-Central America Free Trade Agreement
CATIE	Tropical Agronomic Research and Teaching Center
CIAT	International Center for Tropical Agriculture
CIMMYT	International Center for Maize and Wheat Improvement
CO_2	Carbon Dioxide
DALY	Disability-Adjusted Life-Year
DG	Distributed generation
E-buses	Electric Buses
ECLAC	Economic Commission for Latin American and the Caribbean
EPA	United States Environmental Protection Agency
ERTR	Environmentally Related Tax Revenues
ETS	Emissions Trading Systems
FAO	Food and Agriculture Organization of the United Nations
FARC	The Revolutionary Armed Forces of Colombia
GBTP	Green Bond Transparency Platform
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GPS	Global Positioning System
GSM	Global System for Mobile
Gt	Gigatons
GTO	Government of the State of Guanajuato
GW	Gigawatt
GWh	Gigawatt per Hour
ha	Hectares
HSI	Humane Society International
ICCT	International Council on Clean Transportation
IEA	International Energy Association
IDB	Inter-American Development Bank
IoT	Internet of Things

IPCC	Intergovernmental Panel on Climate Change
ITN	Insecticide-Treated Nets
IUU	Illegal, Unreported, and Unregulated
kg	Kilograms
kW	Kilowatt
kWh	Kilowatts per Hour
LAC	Latin America and the Caribbean
LPG	Liquefied Petroleum Gas
m	Meters
mm/yr	Millimeters per Year
MBM	Market-Based Mechanisms
MIT	Massachusetts Institute of Technology
Mtoe	Megatons of Oil Equivalent
MRV	Monitoring, Reporting and Verification
MW	Megawatt
NAP	National Adaptation Plan
NDC	Nationally Determined Contributions
NOx	Oxides of Nitrogen
OECD	Organization for Economic Cooperation and Development
OLADE	Latin-American Energy Organization
PAHO	Pan American Health Organization
PES	Payment for Ecosystem Services
PM	Particulate Matter
PR	Projection
P&Q	Permits and Quotas
RFID	Radio-Frequency Identification
SAGARPA	Mexican Ministry of Agriculture and Rural Development
SDG	Sustainable Development Goals
TCO_2	Total Carbon Dioxide
UNDP	United Nations Development Programme
VBD	Vector-Borne Diseases
WHO	World Health Organization
ZEBRA	Zero Emission Bus Rapid-Deployment Accelerator

ANNEX 4: GLOSSARY

Adaptation readiness	Measures a country's ability to leverage investments and convert them to adaptation actions. It includes economic, governance and social readiness
Climate adaptive capacity	The ability of society and its supporting sectors to adjust to reduce potential damage and to respond to the negative consequences of climate events
Climate exposure	The extent to which the future changing climate conditions stress human society and its supporting sectors. Exposure captures the physical factors external to the system that contribute to vulnerability
Climate sensitivity	The degree to which people and the sectors they depend upon are affected by climate-related perturbations. The factors increasing sensitivity include the degree of dependency on climate-sensitive sectors and the proportion of populations sensitive to climate hazard due to factors such as topography and demography
Climate vulnerability	Measures a country's exposure, sensitivity, and ability to adapt to the negative impacts of climate change
Distributed generation	Distributed generation refers to a variety of technologies that generate electricity at or near where it will be used, such as solar panels and combined heat and power
Economic readiness	The investment climate that facilitates mobilizing capital from the private sector
Energy efficiency	The use of relatively less energy to perform a determined task – that is, eliminating energy waste
Governance readiness	The stability of the social and institutional arrangements that contribute to the investment risks. A stable country with high governance capacity reassures investors that the invested capital could grow under the help of responsive public services and without significant interruption
Market-based mechanisms	Alternatives, complements, or supplements to nature management that depend on market forces, financial mechanisms, or other economic instruments, and align economic incentives with environmental outcomes in order to encourage entities to solve environmental issues
Modern energy sources	Refers to cleaner sources of energy, as measured by reduced polluting emissions when compared to more traditional fuels
Net-metering	A billing mechanism that credits energy system owners for the electricity they add to the grid
Planetary health	An emerging field focused on understanding the health implications of human-driven disruption and transformation of the planet's natural systems
Payment for ecosystem service	Occur when someone that is preserving the environment gets paid to do so by a beneficiary or user of that ecosystem service
Social readiness	Social conditions that help society to make efficient and equitable use of investment and yield more benefit from the investment
Vector-borne diseases	Human illnesses caused by parasites, viruses, and bacteria that are transmitted by vectors such as as mosquitos

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