IDDRI

WORKING PAPER

N°14/15 NOVEMBER 2015 | CLIMATE

Monitoring decarbonization and resilience in Latin America and the Caribbean

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CLIMATE CHANGE IN LATIN AMERICA AND THE CARIBBEAN

Climate change is already an inherent part of our future that will result in considerable negative effects which are not only inevitable, but also irreversible. In Latin America and the Caribbean (LAC) the effects of climate change and its associated impacts on human and productive systems are already evident. There is a real and current need to adapt and build resilience to climate change that will only become more pressing if global actions to stabilize GHG emissions continue to be postponed.

LAC'S ADAPTATION GAP AND ITS ASSOCIATED RISKS

LAC is not properly adapted to existing climate risks, and there is an "adaptation gap (or deficit)", which is actually part of a larger development deficit. Delayed action in both mitigation and adaptation will increase this deficit. It has been estimated that the total investment necessary in the region to adapt to the inevitable physical effects of climate change is approximately one quarter to one sixth of the costs of these impacts.

SIGNIFICANT MITIGATION EFFORTS ARE NEEDED

Achieving climate stabilization requires the region to reduce its emissions to 1.43 Gt CO_2 by 2050, at a cost of approximately US $100 billion per year. Significant mitigation efforts are still required, given that the region is exposed to increased pressure relating to land use changes and industrialization, which in turn increases energy consumption. However, it is estimated that the co-benefits of mitigation could be as high as 30% to 100% of the total abatement costs.

NATIONAL MANAGEMENT OF THE FIGHT AGAINST CLIMATE CHANGE

The fight against climate change can be tackled as a management issue; both of GHG emissions and climate risk. A National System of Measurement, Reporting and Verification (MRV) facilitates decision-making and national planning; it helps track the achievement of goals; promotes coordination and communication between the sectors; generates comparable and transparent information, and facilitates its exchange; and helps identify and showcase good practices, as well as building trust (both between countries and in the private sector) and increasing the likelihood of international support. Clear institutional agreements and leadership at the highest level are key to boosting low-emissions development, helping to build resilience and promoting comprehensive solutions.

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Zevallos, P., Castro, R., Aldana, R., Apaclla, K. (2015). Monitoring decarbonization and resilience in Latin America and the Caribbean, *Working Papers* N°14/15, IDDRI, Paris, France, 24p.

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This research was funded by the French Government as part of the "Investissements d'avenir" programme under the reference ANR-10-LABX-01.

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This document is an output from a project funded by the UK Department for International Development (DFID) and the Netherlands Directorate-General for International Cooperation (DGIS) for the benefit of developing countries. However, the views expressed and information contained in it are not necessarily those of or endorsed by DFID, DGIS or the entities managing the delivery of the Climate and Development Knowledge Network (CDKN), which can accept no responsibility or liability for such views, completeness or accuracy of the information or for any reliance placed on them.

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ISSN 2258-7071

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SUMMARY

As part of Twenty-First Conference of the Parties (COP 21), debate will be generated on the management and monitoring of climate action at different levels (global, regional and local), with a view to migrating to a low-carbon economy (decarbonization) while at the same time increasing the resilience, necessary for facing the inevitable increase in global average temperatures of at least 1.5°/2°C by 2100 over pre-Industrial Revolution levels.

To this end, it is key to identify and generate the information necessary to efficiently achieve this management and monitoring, integrating both variables in the countries' long-term planning. This is particularly relevant in the LAC region, which, while representing only 11% of global carbon emissions, is already facing the effects of climate change and its associated impacts on human and productive systems.

Recognizing the importance of decarbonization and resilience for LAC, this document seeks to develop ideas and proposals for the future to manage these variables, presenting a set of indicators for monitoring each area and identifying the main challenges for the region, in order to facilitate decarbonization and resilience.

OBJECTIVE

This document seeks to contribute to discussions framed around both the 21st United Nations Climate Change Conference of the Parties (COP 21), which will be held in Paris in late 2015, and the global, regional and local climate-related actions to take post-conference. The document provides information and ideas on monitoring decarbonization and resilience from a Latin America and Caribbean (LAC) perspective, to be discussed during the regional dialogues organized by IDDRI and ECLAC.

1. THE CHALLENGE OF CLIMATE CHANGE: THE RELEVANCE OF DECARBONIZATION AND RESILIENCE

That average global temperature will rise 1.5°/2°C over the pre-industrial level by 2100, the result of the lagged effect of greenhouse gases (GHG) already emitted and accumulating in the atmosphere, is now seen as all but inevitable. Climate change is now considered to be structurally built into our future, to result in significant negative impacts on economic activities, social conditions, and natural assets by 2050 (Vergara et al, 2013).

1.1. What 1.5/2°C means for LAC in terms of impacts and the need to increase resilience

The Latin America and Caribbean (LAC) region is particularly vulnerable to the effects of climate change because of its geographic location, distribution of population and infrastructure, and reliance on fragile natural resources for economic activities and livelihoods (just in Peru, more than a quarter of the economically active population is found in the agricultural sector, and more than half live near the coasts). Key impacts on the region, forecasted to occur by mid-century due to current emissions trends, include the collapse of a significant portion of the coral biome in the Caribbean, the disappearance of most glaciers under 5,000 meters in the tropical Andes, the likelihood that part of the Amazon basin becomes savannah, reduced yields of many staple crops, increased flooding and inundation of coastal zones, increased exposure to tropical diseases, the destabilization of the hydrological cycle in major basins, and the intensification of extreme weather events. More worrisome is the fact that many of these changes are considered to be not only inevitable but also irreversible. Climate change will therefore continue to adversely affect the region over the long term. (Vergara et al, 2013)

The effects of climate change and its associated impacts on human and production systems are already being observed in LAC, with 613 extreme weather and hydro meteorological events occurring from 2000 to 2013, resulting in nearly 14,000 fatalities, over 52 million affected and economic losses of US$ 52.3 billion (IPCC, 2014). The region could lose about 2.2% of its GDP annually by 2050 due to climate change impacts (Vergara et al, 2013).

The concept of resilience describes the "ability of a system to respond to disturbances, self-organize, learn and adapt" (IPCC, 2014). In practice, adaptation involves improving the system's ability to handle disturbances or improve its range of responses to them. Adaptation and building resilience to climate change are real and current needs which will only increase if global actions to stabilize greenhouse gas (GHG) emissions continue to be delayed (Libélula, 2014). The 2015 "el Nino" phenomenon is expected to be the most intense of the last 65 years, affecting countries in South America bordering the Pacific Ocean with rains and droughts. Most of these countries are not ready to face it.

Continuing failure to slow the pace of global warming could jeopardize poverty eradication, because the world's poorest communities are the most vulnerable to climate change. Despite the fact that the region's socioeconomic conditions have improved, there is still a persistently high poverty level in LAC (over 30%), which increases the threat of climate change and threatens human development advances (0.74 as of 2013) (UNDP, 2014). This economic inequality results in unequal access to water, sanitation and adequate shelter, particularly for the poorest groups, which in turn results in lower adaptive capacity to climate change. LAC is not adequately adapted to today's climate risks, and there is an "adjustment gap"

which is actually part of a larger development deficit. Delayed action in both mitigation and adaptation will increase this gap (IPCC, 2014) (UNEP, 2014) (UNDP, 2014).

A first step towards adaptation is to increase resilience to the present climate, establishing priorities based on the needs of LAC countries (IPCC, 2014). It is estimated that the total amount the region should invest to adapt to the inevitable physical effects of climate change would be approximately one quarter to one sixth of the costs of these impacts, proof of its economic efficiency (Vergara et al, 2013). Thus, policies that prevent devastation caused by climatic disasters can collectively protect and sustain human progress (UNDP, 2014). As of today, most investments in adaptation focus on agricultural activities, water resources, coastal areas, biodiversity, and health (Vergara et al, 2013).

1.2. What 1.5/2°C means for LAC in terms of emissions and the need for decarbonization

LAC represents just 11% of the world's total carbon emissions (Vergara et al, 2013). According to the Climate Analysis Indicators Tool (CAIT) developed by the World Resources Institute (WRI), the region's emissions footprint reached 4560.99 $MtCO_2e$ in 2012, while those related to energy and land use, land use change and forestry (LULUCF) reached 40% and 31%, respectively; to be compared to 73% and 6% reached by global emissions in these respective sectors, which clearly shows the importance of the LULUCF sector in LAC emissions.

According to the Inter-American Development Bank (IBD), LAC's emission path under a baseline or business-as-usual (BAU) scenario would bring the region to a level of 6.73 $GtCO_2e$ in 2050 (a 42% increase from 2010) and that the emission shares of transportation and power generation are expected to grow by 50%. Achievement of climate stabilization targets associated with staying below the 1.5/2°C warming threshold requires that the region reduce its emissions to 1.43 $GtCO_2e$ (the IPCC estimates that Latin America should not exceed 50% of the emissions in 2010), which would cost the region approximately US$ 100 billion per year, with an abatement cost of less than US$ 20 per tCO_2e, partially considering the environmental benefits of these measures (Libélula, 2014) (IPCC, 2014 B).

The total carbon footprint of the LAC region has decreased by about 11% since the start of the century, while GDP has grown at an annual rate of about 3%, attributed to a decreased rate of deforestation and improvements in energy efficiency (Libélula, 2014). However, significant mitigation efforts are still required, given that the region is exposed to increased pressure regarding changes in land use and industrialization (the rate of urbanization in LAC exceeds 80%, the highest in the world), which in turn increases energy consumption. Therefore, the region should expect to have to cope with a potential increase in emissions (IPCC, 2014 A).

Large investments have been planned and some have already been made in countries in the region, which could "lock" countries into a business-as-usual (BAU) trajectory which is carbon-intensive and vulnerable to climate change, making the switch to a low carbon economy increasingly costly. However, some investments appear to reflect a trend towards energy diversification (investments in renewable energy in Cuba and nuclear energy in Argentina) and energy efficiency (improvements in transportation and smart cities in Brazil) (Libélula, 2014) (The Global Commission on the Economy and Climate, 2014). LAC is an emerging region, where growth and competitiveness are political priorities; however, this context can also provide opportunities for climate compatible investments (Libélula, 2014).

Structural changes will be required in the economies and patterns of use of the LAC region's natural resources. These changes represent a cost, but are also a real opportunity to achieve greater levels of efficiency, wellbeing, productivity and competitiveness compared with more carbon-restricted international markets. Sustainable actions in LULUCF represent an opportunity for differentiation for the region, to add value to areas that are currently used for low-profit or illegal activities that generate no value for the economy (Libélula, 2014).

There are numerous low- or negative-cost opportunities to reduce emissions in the energy sector in LAC, as well as options that involve the generation of substantial "cobenefits" in terms of improving human health, welfare, increasing food and energy security, efficient use of natural resources and rapid technological development. It has been estimated that the value of cobenefits of mitigation can reach between 30% and 100% of the total abatement cost. (Libélula, 2014). This suggests that within the region's overall mitigation efforts, low-carbon energy strategies (particularly transportation policies in urban zones and the promotion of distributed renewable power in rural areas) should be prioritized, along with mitigation interventions in the waste sector (Vergara et al, 2013). In these areas, mitigation strengthens economic development.

2. THE BENEFITS OF MONITORING PROGRESS

Beyond the obvious need for structural changes in worldwide patterns of development and consumption, the fight against climate change can be approached as an issue of management: managing GHG emissions (what is known as mitigation) and managing climate risks (what is known as adaptation).

Monitoring indicators that are sensitive to being measured are a central part of managing for results. Management guru Peter Drucker coined the phrase "what gets measured gets managed", and there is extensive literature based on this idea. This evident worldwide trend towards a constant setting of goals at a personal and collective level has conferred significant advantages to the monitoring of progress. Among them, we can underscore:

- Monitoring and tracking goals allows focus to be placed on those actions and issues crucial for hitting targets; in other words, they make it possible to prioritize.
- The review and analysis of monitoring results can counteract negativity. Science tells us that human beings tend to focus on the negative, as mentioned by Roy F. Baumeister and Ellen Bratslavsky in their article "Bad is Stronger Than Good", and thus a process that makes it possible to show progress made towards a goal is crucial. This aspect is particularly important for a problem like climate change, where the causes and effects can be "overwhelming". This is why, following up on progress helps to highlight positive trends and capture the attention of different interest groups.
- Finally, monitoring helps to determine which actions and approaches are working and which are not, and supports the process of splitting big goals into smaller and more manageable objectives.

In terms of international climate change management, the discussions and studies conducted within the framework of the United Nations Framework Convention on Climate Change have also reported findings on the benefits of monitoring and reporting progress.

The strongest argument in favor of monitoring the progress of individual and collective goals is that a monitoring and reporting system provides transparency, a key enabler for building trust in collective action among countries and increasing ambition of climate action (IDDRI, 2015) (NORDEN, 2014). Greater transparency also contributes to trust in collective action at a national level, particularly for the private sector, which must make strategic decisions based on an assessment of national and international trends. Likewise, transparency enables the comparability of efforts among countries, and therefore competitive risk assessment.

Currently, the Parties to the UNFCCC are already required to communicate to the COP, through the Convention Secretariat, information on the actions they have taken or expect to take to implement the Convention. This is considered a key aspect in the implementation of the treaty, as it enables the Parties to inform each other of their actions at a national level, in addition to serving as a basis for the COP to assess the Parties' implementation progress.

However, it is difficult for countries, especially developing ones, as this implies considering qualitative elements in addition to quantitative ones. This seems to be particularly complex for adaptation actions. Another noteworthy aspect is that there is a marked focus on mitigation monitoring and reporting of progress in both the COP's decisions and associated literature, also possibly due to the fact that the Convention's ultimate objective is to stabilize levels of greenhouse gases. However, for LAC as a developing region, monitoring all commitments under Article 4 of the Convention is of particular relevance, including the adaptation and financial support of developing countries.

Additionally, periodic monitoring of progress ensures both that information is available for decision-making and also that it is possible to assess the actions that countries are taking to address climate change. This information also drives and improves forward planning.

The analysis of policy and action monitoring results also allows for the identification of potential conflicting policies or perverse incentives (e.g. avoiding maladaptation to climate change), in addition to the identification of missed opportunities to generate synergistic policies. A clear example of conflicting policies when a focus on climate change is applied occurred in Peru, where agricultural policy was the main trigger of deforestation in the Amazon. Chile and Uruguay, where the generation of renewable energy was promoted to improve energy security while also reducing emissions, provide examples of the implementation of synergistic policies. In terms of increased resilience at a region-wide level, there is evidence of efforts to integrate adaptation into disaster risk management as well as water resource management.

3. BASIC DEFINITIONS: WHAT WOULD WE BE MONITORING?

Effectively reducing GHG emissions and vulnerability to climate change involves developing two components. The first is related to having quantitative baseline information and the capability to verify that emissions are truly stabilizing and that resilience is increasing. This requires each country to have a national system for the development of national GHG inventories and scenarios, the capacity to generate and interpret climate change scenarios, and the capacity to develop national communications and biennial reports, among other requirements. A National System of Measurement, Reporting and Verification (MRV) facilitates decision-making and national planning, helps track the achievement of goals, promotes coordination and communication among the sectors, generates comparable and transparent information and facilitates its exchange, helps identify and share good practices, builds trust and increases the likelihood of international support.

The second component relates to enabling conditions – the actions (institutional, regulatory, financial, technological and capacity-oriented, conducive to promoting and facilitating the transfer and sharing of knowledge) which allow the implementation of mitigation and adaptation options, many of which are generally not analyzed quantitatively in terms of the costs of climate change management. Under enabling conditions, it is important to have institutional arrangements that provide guidelines on responsibilities, articulate the different stakeholders involved and clearly establish institutional roles and the development of policies, strategies and plans that would meet the commitments that the country makes. Having clear institutional arrangements and leadership at the highest level are crucial for driving low-carbon development, helping build resilience and promoting solutions.

Despite the institutional arrangements for climate change in most LAC countries, much remains to be done in terms of creating enabling conditions and legislative oversight, as well as involving the private financial sector in policy design. The participation of the financial sector could help specifically in the design of policies leading to the development and design of enabling environments, incentives and instruments such as funds to help reduce barriers and leverage private capital for adaptation and mitigation.

Managing for Development Results (MfDR) is "a public management strategy that involves making decisions based on reliable information about the effects of governmental actions on society" (García López & García Moreno, 2010). Politicians and public managers in LAC have displayed increasing interest in this management strategy, now in an early stage of implementation. MfDR involves five core components: results-based planning; results-based budgeting; auditing, acquisitions and financing management; program and project management; and monitoring and evaluation (García López & García Moreno, 2010). Significantly, the reform agenda for development will be different in each country, depending on the characteristics of the country's particular institutional systems. However, some elements are considered necessary in every case, as they help to organize and guide the process of institutional reforms. First, the involvement of three major stakeholders must be taken into account and a strategy for each must be developed: political authorities, public managers, and civil society and private organizations.

Ongoing monitoring of the progress of LAC countries in terms of MfDR is considered a good "proxy" on the state of the public sector's maturity and its ability to generate enabling environments for mitigation and adaptation. The MfDR Index, presented by the IDB and calculated for most LAC countries, summarizes each country's institutional capacities in the five pillars of MfDR and provides an average for the region as whole.

Returning to the issue of the importance of monitoring results, the institutionalization of monitoring and evaluation as functions implemented across all five MfDR pillars is proposed as part of the best practices for MfDR. The only way to identify if public administration produces the results expected is to have timely and reliable information on the changes public administration promotes (IDB, 2012). This component includes all steps, from the design and consolidation of the systems involved in monitoring and evaluation to increasing accountability on the results of public management.

With MfDR monitoring and evaluation indicators we can see countries' strengths in monitoring and evaluation, based on measures implemented to develop measurement and evaluation systems. At the same time, evaluation results can be considered systemically (García Lopez & García Moreno, 2010). The government's capacity to achieve plans and targets can be determined; together with the planning indicator, these are the most important components of results-based management. It also facilitates comparison between countries and the identification of the region's most significant advancements and the systems that enable it. The indicator, proposed by the IDB, has been calculated for several countries in the region and thus may serve as a reflection of the overall capacity for

monitoring and evaluation of government policies and programs.

The importance of private sector participation (particularly financial) in facilitating the design of policies, incentives and instruments for adaptation and mitigation has been set out above. Box 1 presents a number of useful tools for monitoring private action on sustainability.

3.1. Resilience

Resilience is the ability of social, economic and environmental systems to resist a shock, trend or disturbance, responding or reorganizing in order to maintain its essential function, identity and structure, while retaining the capacity to adapt, learn and transform (IPCC, 2014). Resilience may also be defined as the capacity to adapt, that is, the degree to which adjustments to practices, processes and structures can moderate or eliminate potential damage or make it possible to benefit from opportunities created by a given change in climate (ECLAC, 2012).

Resilience underpins any approach that seeks to secure and sustain human development. At its core, resilience aims to ensure that state, community and global institutions work to empower and protect people. A set of principles and measures are required to build resilience (UNDP, 2014):

- i) *Commitment to universality*: A shared commitment to the universal provision of social services that strengthen social protection and ensure full employment, it would constitute a social and political decision that would lay the foundations for long-term resilience.
- ii) *Responsive institutions and cohesive societies*: The promotion of human resilience requires institutions that take into account and respond to citizen demands. Suitable policies and resources are needed to provide job opportunities and access to health and education, particularly for the poor and other vulnerable groups. Specifically, states that recognize and take steps to reduce inequality between groups (so-called horizontal inequality) are better able to maintain the principle of universality, build social cohesion and prevent and recover from crises.
- iii) *Crisis prevention and response*: Human-caused natural disasters are inevitable, but efforts can be made to mitigate their effects and speed recovery, taking advantage of opportunities to "rebuild better". Disaster preparedness and response frameworks to enhance resilience should be designed from a systems approach that extends beyond immediate crises and threats to address the underlying causes and long-term impacts.

Box 1. Monitoring private sector action

The **Dow Jones Sustainability Index** was launched in 1999 as the first global sustainability benchmark. The index is jointly managed by RobecoSAM and S&P Dow Jones Indices, who monitor the performance of the leading companies in the world based on economic, environmental and social criteria. It is a benchmark for investors who take sustainability into account and also provides a platform of commitment for companies who want to adopt best practices through a sustainability approach. In this case the vision of sustainability results from two aspects. The first is that sustainable business practices are critical to long-term value creation in a world with dwindling resources; second, sustainability factors represent opportunities and risks that competitive companies should pursue (RobecoSAM, 2015). On this basis, it encourages companies and investors to effectively manage the impacts in their environment according to the corresponding sector's opportunities and risks in terms of climate change and efficient resources use.

The **Carbon Disclosure Project** (CDP) is an international organization that provides a global reporting system that drives companies, municipalities and cities to measure, disclose and reduce the impact of their actions on the environment and natural resources (CDP, 2015). The project has had a presence in Latin America since 2008 and reports on companies in Argentina, Brazil, Chile, Mexico and Peru (CDP, 2015). The project collects information, publishes data and generates reports that provide information about the current state of companies and the progress made since they began to address the issue of climate change. Participating companies are invited according to their Standard & Poor's IFCI Latin America Index and their pre-project participation experience. The project currently has 67 participants, who together represent more than 10% of signatory investors worldwide, representing US$ 87 trillion in assets (CDP, 2015).
The CDP's main contributions are transparency by disclosing information and linking results from the information collected.

According to the latest science, hydrological systems have been altered in many regions (including LAC), affecting water quality and quantity. The negative effects on crop productivity are more common than positive ones. In addition, the impacts of extreme events such as heat waves, droughts, floods, cyclones and fires reveal the vulnerability and exposure of some ecosystems and human systems to climate variability (IPCC, 2014). This information matches the needs of developing countries, as synthesis reports show that the priority issues for adaptation are agriculture and food security, followed by the issue of water (UNEP, 2014).

Table 1 presents a set of proposed indicators to monitor political commitments, risk exposure, as well as adaptation plan progress related to access to water and food.

Table 1. Indicators for monitoring resilience

Category	Proposed indicator	Description
Political commitment	Introduce an adaptation component in the Intended Nationally Determined Contributions (INDCs) to the UNFCCC	The parties at the 2014 COP20 in Lima decided to invite countries to include an adaptation component in their INDC submissions in order to communicate adaptation plan progress. This inclusion reflects a commitment by the countries as well as a technical and political effort (UNFCCC, 2014), which implies the development of new capacities applicable to the issue of adaptation and which ultimately favor enhanced resilience. *The Convention Secretariat keeps a record of submitted INDCs in real time.*
	Development of National Adaptation Plans	With national adaptation plans (NAPs) countries can identify adaptation needs in the medium and long term, as well as develop and implement strategies and programs to address those needs. The NAP process aims to reduce vulnerability to the impacts of climate change and facilitate the integration of climate change adaptation in a manner coherent with existing policies, planning processes and strategies, as well as with all relevant sectors and levels. (UNFCCC, 2015). *The Convention Secretariat announced that the submitted NAPs will be regularly monitored in developing countries that are not LDCs. This information is not currently available.*
Risk exposure	Vulnerability and adaptation index for Latin America	Evaluates the risk of exposure to climate change and extreme events in terms of current human sensitivity to that exposure and the capacity of the country to adapt to potential impacts (Maplecroft, 2014). This is currently measured by the Andean Development Corporation (Spanish acronym CAF) and consists of three sub-indices of different risks: exposure index (50%), sensitivity index (25%) and adaptive capacity index (25%). As a whole, this index allows comprehensive understanding of these issues from approaches that go beyond climate to include social, political and economic issues, as well as human development itself, which facilitates action to address natural exposure conditions and prepare areas with higher risks to manage and reduce them.
	Multidimensional poverty index	Measures gaps at the household and individual levels in the fields of education, by measuring years of schooling and school attendance; health, by measuring nutrition and child mortality; and standard of living, taking into account access to electricity, sanitation, water, floor, fuel for cooking and goods (ECLAC, 2013). The standard of living variables make it possible to link sustainable development from a social and environmental approach as far as it includes access to basic resources, which are linked to the adaptation needs of a vulnerable population. *The index has been calculated by UNDP since 2010 and is published annually by the Human Development Report (UNDP, 2015).*
Quantitative indicators	Water productivity total	Water productivity is calculated as GDP in constant prices divided by annual total water withdrawal (World Bank, 2015). Considering the scarcity of the resource, this indicator makes it possible to identify whether resource management maintains the same upward trend of GDP or if progress has been made in decoupling and therefore adaptation to reduced resource availability in the future. *Since 1997 the World Bank has calculated this total approximately every five years, but since 2012 it has been calculated annually in order to rate water use based on the productivity of each country.*
	Drinking water access coverage	Measures global drinking water coverage and how this varies in time and between the monitored countries and regions. It also enables analysis of the specific conditions of each country worldwide. *This index is applied by the World Health Organization along with UNICEF, and could also apply to Latin America and be evaluated according to each country's specifics.*
	Per Capita Food Supply Variability	Measures the food supply in calories per capita per day. It is an indicator recorded by countries and regions within the framework of the Millennium Development Goals of the United Nations (FAO, 2015). *Calculated by the FAO since 1990, the last recorded index was in 2011.*

Another important issue to monitor is the funding gap for adaptation. The United Nations Environment Programme describes this gap as "the difference between the costs of meeting a given adaptation target and the amount of finance available to do so" (UNEP, 2014, p. xiii). A plausible estimate of the costs of adaptation and residual damage for developing countries under a 2°C warming scenario is around US$ 150 billion annually by 2025/2030 and from US$ 250 to 500 million a year by 2050. Under a 4°C warming scenario, studies suggest that these figures would double (UNEP, 2014).

3.2. Decarbonization

Decarbonizing and working towards a low-carbon economy means finding ways to reconcile economic growth with the national mitigation commitments of not exceeding [a] 1.5/2°C [rise in temperature]. It is necessary to point out that decarbonization is one of the great challenges facing LAC countries because they are in a growth phase, producing ever more significant GDP and macroeconomic figures.

However, within LAC there are two clearly distinguishable groups of countries, those in the process of accession to the OECD, and those still focused on improving living standards. The first group, including Colombia and Costa Rica, are demonstrating their commitment to further strengthening their public policies and economic performance, looking to improve competitiveness and meeting the environmental standards required by the OECD. The latter group, including Bolivia and Haiti, are continuing to grow at the same rate as their emissions, in a BAU scenario, as they succeed in achieving development.

The LAC region has enormous proven crude oil reserves, representing 20% of the world total. Even so, it is a net importer of derivatives, despite its production of crude oil being, in terms of energy value, about 42% higher than its demand for derivatives and 52% higher than its derivatives production. This situation merits an up-to-date analysis that includes the industrialization prospects for crude oil in LAC countries, especially in the major oil producers, in order to identify whether the predominant trend maintains the status quo of them being raw materials exporters, or shifts towards these countries becoming producers and exporters of industrial products in the hydrocarbon sector (OLADE, 2013).

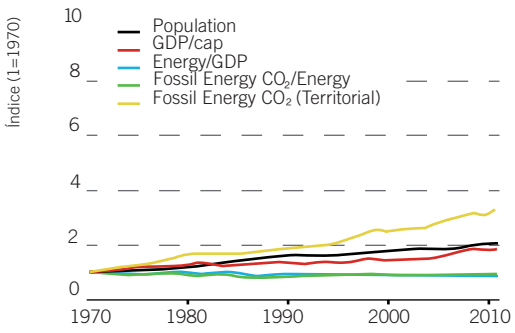
According to the World Bank's "Decarbonizing Development" report (2015), there are three steps needed to reach net zero emissions: i) Plan for a low-carbon future, ii) Transition under a set of guidelines that are efficient, suitable and credible and iii) Manage the transition. The first involves an increase in efficiency, that is, lower carbon emissions from the production of electricity, mass electrification to increase reliance on clean electricity, improving energy efficiency and waste reduction and preserving and increasing natural carbon sinks through improved management of forests and other vegetation and soils. *Transition* refers to setting the right price on carbon, the right policy packages and creating the right conditions for financing. The third stage involves ensuring support for the poor (decarbonization should be an opportunity to reduce inequality) and helping smooth the transition.

The variables and indicators that allow us to frame the development of the low-carbon economy as a national priority include production (GDP, net exports, investment levels, etc.), employment (unemployment rate, composition of the labor force, levels of education), poverty/equality (% poverty, inequality indices, level of family income), taxation (revenue collection rate, public debt, government spending) and environment

Box 2. The Kaya identity: a tool to analyze the drivers of energy-related emissions

The Kaya identity provides a framework of analysis of the drivers of CO_2 emissions from fuel combustion (energy), which are responsible for the majority of global GHG emissions and their variations. For regional emissions it is expressed as a product of four inputs: i) population; ii) GDP per capita; iii) energy intensity of GDP; and iv) carbon efficiency per unit of energy. This tool can be useful for LAC countries to analyze not only the drivers of their energy emissions, but also the possible impact of future policies/regulations of said emissions by projecting the future changes of the inputs.

The graph shows the evolution of these inputs for LAC from 1970 (baseline year) to 2010. Population growth is the predominant impact (+200%), followed by GDP per capita (+190%), showing a downward trend in both GDP energy intensity and carbon efficiency per unit of energy.



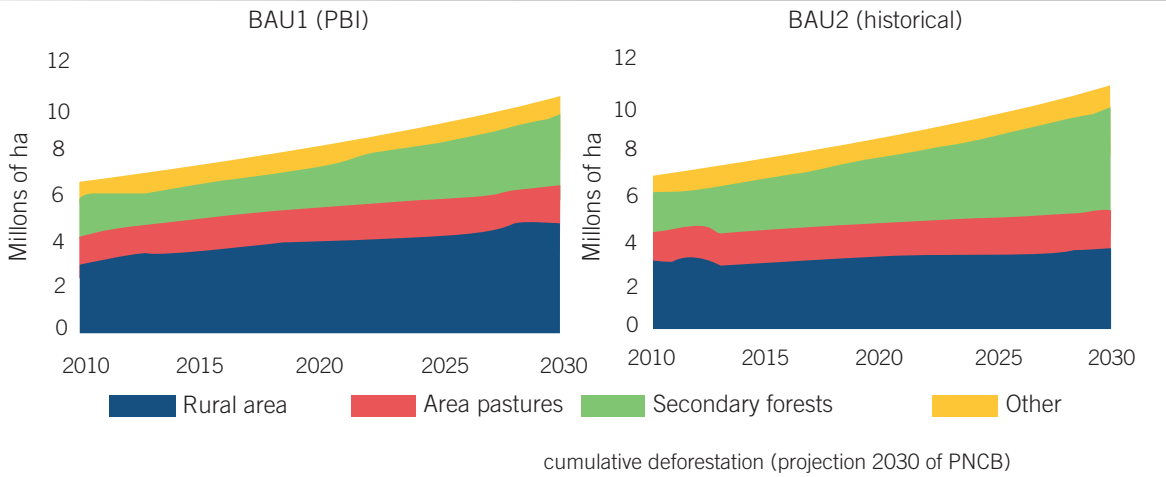
Source: (IPCC, 2014 B)

Box 3. The challenge of monitoring the forestry sector: BAU variation using different methodologies

Many LAC countries are in the process of developing models to predict different land uses and future changes in land use. This chiefly involves changes in vegetation and the resulting impacts on greenhouse gas (GHG) emissions. The issue is crucial for LAC, where a significant loss of forest cover resulting from agricultural and other activities is evidenced. Some LAC countries have already launched these initiatives and are using projection models for agriculture, ranching and deforestation. The models used in LAC vary substantially, responding to the conditions of each country.

In the case of Peru, under the Planning Project on Climate Change (PlanCC), a business-as-usual (BAU) scenario was developed through 2050, using 2009 as the baseline year. IPCC Good Practice Guidelines from 1996 and 2003 were used (Tier 1) to remain consistent with the Second National Communication on Climate Change. The following emission sources were considered: changes in forest biomass (wood, firewood, fire, biomass increase) and conversion of forests to land used for agriculture or livestock (perennial crops, agriculture, pastures). National data from the Ministry of Agriculture (MINAGRI) and the Ministry of Environment (MINAM) and international data from IPCC and FAO guidelines were used. The information and assumptions used in the projections were validated by industry experts; however, uncertainty in the forestry sector is extensive because the real dynamics of secondary forests and the ultimate fate of the other uses (settlements, roads, wetlands, etc.) are unknown, due to poor data, a lack of information and the difficulty of correctly interpreting satellite images, among others. Thus, two forestry BAU alternatives were developed in the process of building Intended Nationally Determined Contributions.

BAU 1 was developed under the assumption that there is a strong econometric relationship between GDP and the evolution of the agricultural and livestock area in the Peruvian Amazon, and BAU 2, is according to the assumption that the agricultural and livestock area of the Peruvian Amazon will follow the linear trend seen in the period 1950-2012. For both BAU scenarios, up to the year 2030, it is assumed that the Amazon area will remain under pressure. This will be partially influenced by migration and the expansion of the agricultural frontier, which will also lead to a degradation of the secondary forests, thus increasing emissions up to 2030. The BAU 1 scenario shows a greater expansion of the agricultural area as it responds to GDP growth and consequently leaves a lower proportion of secondary forests standing, while as BAU 2 involves slower growth of agricultural areas the recuperation of secondary forests could be faster.



Source: Technical Secretariat of the Multi-sector Committee of the INDC created by RS No. 129-2015-PCM

(CO_2eq emissions). There are also instruments to determine the level of human impact on climate, including GHG and the Kaya identity.

For developing country Parties, the existing MRV framework encompasses submitting national communications every four years and biennial update reports (BURs) every two years, undergoing international consultation and analysis (ICA), setting up domestic MRV of domestically supported nationally appropriate mitigation actions (NAMAs), and undertaking MRV of REDD-plus activities for the purpose of obtaining and receiving results-based incentives (UNFCCC, 2014).

The following table presents a set of proposed monitoring indicators for decarbonization in LAC.

In terms of emissions, in 2030, BAU 1 shows 119 million tCO2eq, while in the same year BAU 2 has a figure of 105 million tCO2eq. BAU 1 is considered more robust because this would be the trend if future policies or sectoral programs were not created to avoid deforestation. BAU 2 is ruled out because there is no certainty regarding the behavior of the secondary forests, and in a BAU scenario, i.e., without taking any additional steps to prevent deforestation, such a high recuperation potential of the secondary forests cannot be ensured.

Table 2. Indicators for monitoring decarbonization

Category	Proposed indicator	Description
Political commitments	Presentation of Intended Nationally Determined Contributions (INDCs) to the UNFCCC *The Convention Secretariat keeps a record of submitted INDCs in real time. Moreover the United Nations Environment Programme (UNEP) analyses the INDCs mitigation potential (for INDCs that have been published until the end of September) in its «Emissions Gap Report.*	Under the Paris Agreement, by submitting their INDCs Parties to the UNFCCC offer an individual contribution –based on the country's priorities, capabilities and responsibilities– to the target of staying below the 1.5/2°C threshold. INDC submission implies the country's political commitment and also helps identify benefits not necessarily linked to climate change mitigation (Levin, et al, 2015). This indicator also measures the capacity of developing countries to project a trend or BAU scenario on which to propose mitigation targets. *The Convention Secretariat keeps a record of submitted INDCs in real time. Moreover the United Nations Environment Programme (UNEP) analyses the INDCs mitigation potential (for INDCs that have been published until the end of September) in its "Emissions Gap Report.*
	Formulating and voluntary registration of Nationally Appropriate Mitigation Measures (NAMAs)	The developing countries who signed the Bali Action Plan in 2007 agreed to strengthen their mitigation actions in the context of sustainable development, supported by measurable, reportable and verifiable (MRV) technology, financing and capacity building. NAMAs aim to reduce CO_2 emissions compared to BAU levels by 2020. NAMAs may take various forms, including policy or regulatory intervention at a national or sectoral level. The measures are published voluntarily (UNFCCC, 2014) and measure the capacity of countries to formulate mitigation measures as well as the capacity to generate BAUs and MRV systems by sector. *The Convention Secretariat keeps a record of submitted NAMAs in real time.*
Private sector actions (already developed)	Experience with the Clean Development Mechanism (CDM) - registered projects	The CDM makes emission reduction possible through projects developed by private stakeholders in developing countries by generating certified emission reductions (CERs), which are then sold to companies in developed countries. This mechanism finances the Adaptation Fund under the UNFCCC, which receives 2% of its funding from CDM projects with CERs (UNFCCC, 2015). While the market for these loans currently has an excess supply, project registration represents an indicator of private sector participation as well as an institutional framework for the national approval of mitigation projects, as it follows the same international methodologies, regardless of where the project is implemented. *The CDM Executive Board keeps a record of CDM projects in real time.*
Aggregated quantitative indicators	Total and per capita GHG emissions *There are several sources for these indicators; data submitted by the WRI for 2012 will be used for the first, and the WB figures, updated annually by country, will be used for the second.*	Total GHG emissions measure how much each country contributes to GHG emissions, as well as observe the emissions profile (main sources, main gases). This data is typically submitted both included and excluding the Land Use, Land Use Change and Forestry (LULUCF) sector. In turn, emissions per capita measure a country's carbon dioxide emissions per person and include carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring (World Bank, 2015). *There are several sources for these indicators; data submitted by the WRI for 2012 will be used for the first, and the World Bank figures, updated annually by country, will be used for the second.*

Category	Proposed indicator		Description
Quantitative indicators in relevant sectors	Energy	Kaya Identity*	**Population:** "This includes all residents regardless of legal or citizenship status, with the exception of refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin" (World Bank, 2015). *This is presented annually by the World Bank.* **GDP per capita**:** This is gross domestic product divided by mid-year population" (World Bank, 2015). *This is presented annually by the World Bank.* **Primary energy intensity / GDP** **: This is calculated using the energy consumption and GDP of a country, relating energy consumption to the actual level of economic activity in the country (National Energy Board, 2010). *This is calculated by ECLAC.* **CO_2 intensity from energy:** These are carbon dioxide emissions from solid fuel consumption, mainly emissions from the use of coal as an energy source (World Bank, 2015). *This is calculated annually by the World Bank.*
		Percentage of renewable energy consumption	The percentage of total final energy consumption corresponding to renewable energy sources (World Bank, 2015). The share of renewable resources in the energy mix can be analyzed using this indicator. It has been calculated at a country level by the World Bank since 1990. *This is calculated annually by the World Bank.*
	LULUCF	Net emissions and removal of GHG from LULUCF	Corresponds to the metric tons of CO_2e emissions and GHG removal by the conversion of forests and land to other uses (World Bank, 2015). The indicator is used to monitor forest management and its implications and impact on climate change, as the levels registered decrease as a result of deforestation. *Since 1990 it is measured annually by the World Bank in a number of countries.*
		Annual rate of deforestation	Calculates a country's rate of deforestation based on absolute information on forest cover in 2000 and annual deforestation (FAO, 2001). With it trends by country and subregions in Latin America can be assessed, and it calculates rates that can then be linked to deforestation- and monitoring-related policies. *The indicator has been calculated by FAO and the values have been submitted since 1990.*
		Annual rate of change of primary forest loss	Explains the loss of primary forest by monitoring the area covered by primary forests in the years measured. *The indicator has been calculated by FAO since 1990 (FAO, 2010).*
	Transport	CO_2 emissions from transport	This corresponds to emissions from the combustion of fuel for all transport activity, regardless of the sector, except for international marine bunkers and international aviation (World Bank, 2015). *This is calculated annually by the World Bank.*
	Industry and conumption	CO_2 emissions from manufacturing industries and construction	Includes CO_2 emissions caused by manufacturing and construction. This includes the emissions from the combustion of fuels in industry (World Bank, 2015). *This is calculated annually by the World Bank.*

* The identity is not included for each country in the LAC region. Even so, their components are presented separately.

** For GDP indicators per capita and GDP Primary energy intensity those measurements are presented that consider the use of exchange rates, allowing comparisons to be drawn (despite gaps because of the different levels of development in the LAC region) (ECLAC, 2015).

Source: Technical Secretariat of the Multi-sector Committee of the INDC created by RS No. 129-2015-PCM

4. MONITORING CLIMATE ACTION IN LAC: A PRELIMINARY APPROACH

A preliminary "monitoring tool" that involves those indices described in the previous section is presented below. The tool first sets the "framework" indicators that will be applied to measure progress in terms of institutional capacity and building enabling environments for the comprehensive management of climate change, as well as the capacity to monitor and report progress in decarbonization and building resilience. Secondly, the tool presents the indicators set for the issue of resilience, and then those proposed for measuring progress in decarbonization.

Both the decarbonization and resilience indicators evaluate progress at a country or regional level and compare progress and differences within LAC. While several are already calculated for most LAC countries, it is important to underscore that the frequency of measurement is not the same in all cases, nor is each indicator always measured for all countries in the region. In some cases, they are presented from a global approach for subregions or the LAC region in general only.

The wide range of indices presented in Table 3 highlights progress in terms of MfDR, mitigation and resilience, as well as existing efforts to monitor and evaluate the progress of LAC either by country or the region as a whole.

The scores resulting from the evaluation MfDR shows that only four of the 25 countries evaluated in the region have a high level of MfDR development (scores higher than 3), 15 have an medium level of MfDR development (scores higher than 1.5 and less than 3), and six have a low level of development (scores below 1.5). Most of the countries evaluated score in the middle and are considered in an initial phase of MfDR development; despite their progress in financial management systems there are still weaknesses in monitoring systems and the evaluation of results-based budgeting (García Lopez & García Moreno, 2010).

Resilience indicators show the relationship between climate resilience and broader development issues, including factors such as poverty and access to essential resources. For this reason, the indicators presented in the areas of adaptation, vulnerability and climate resilience help monitor progress against climate change, although it should be understood that this is not the only focus, as it also cuts across other aspects of development (e.g., poverty). The Multidimensional Poverty Index (MPI), together with the Vulnerability Index allow an understanding of the broader situation of how climate change is being tackled in the region. Of the 12 LAC countries with an MPI for 2013, in 8 of them less than 5%of the population is considered multidimensionally poor, while in two countries in the Caribbean, Honduras and Nicaragua, this figures reaches 9% and 10%, respectively. The most acute case is Haiti, where 24% of the population is considered multidimensionally poor (UNDP, 2014).

On the other hand, although the Vulnerability index has not been calculated for all countries, it provides significant findings as it identifies 10 countries with extreme levels of vulnerability to climate change, mainly due to poor performance in adaptation capacity: eight have a high level of vulnerability, seven a medium level and another eight at a low level when taking economic, social, environmental and institutional aspects in its three components (exposure, sensitivity and adaptation) into consideration.

From the perspective of resilience it is possible to relate MPI results to the Vulnerability Index, Haiti being a case in point, since it has the highest MPI in the region and at the same time its vulnerability to climate risk is considered extreme. The same situation holds true for Bolivia and Honduras, both of which also are extremely vulnerable, a fact that diminishes the resilience of both countries to the effects of climate change.

In terms of mitigation, efforts to submit indicators and monitor commitments made by different countries and the region as a whole have been evidenced. An interesting aspect is the importance of understanding the region's characteristics. Quantification of CO_2 eq emissions that differentiate emissions from LULUCF demonstrate that the forestry sector in the region's countries account for a high percentage of emissions, a key indicator for setting realistic targets and mitigation priorities for countries as well as opportunities for collaboration between the countries in the region.

Additionally, there are indicators that summarize political commitment such as the register of INDCs for 5 countries in the region with mitigation targets and quantitative indicators that involve the private sector, like the number of registered CDM projects per country.[1] In addition, there are other sectoral indicators corresponding to LULUCF, energy, industry and construction that monitor CO_2emissions per sector. While there are mitigation indicators linked to CO_2, it is important to highlight the fact that, as in the case of the LULUCF indicators, net emissions and absorption of greenhouse gases, and the annual rate of change in the extent of primary forest, the measure is neither widely nor consistently applied in the region.

1. Data updated in August 2015.

Table 3. Comparating monitoring of the NAMAs

País	NAMAs	Sector							Tipo de registro		
		Energy	Forest	Gestión de residuos	Transport and infrastructure	Agriculture	Residencial and commecial building	Industry	Buscando apoyo para preparación	Buscando apoyo para implementación	Otro, por reconocimiento
Chile	Implementation of a National Forestry and Climate Change Strategy, including the development and implementation of a Platform for the Generation and Trading of Forest Carbon Credits.		x							x	
	Expanding self-supply renewable energy systems (SSRES) in Chile	x								x	
	National Program for Catalyzing Industrial and Commercial Organic Waste Management in Chile			x						x	
	Santiago Transport Green Zone (STGZ)				x					x	
	Clean Production Agreements in Chile	x	x	x	x	x	x	x			x
Colombia	Colombia TOD NAMA				x		x			x	
	Integrated improvement of Road-based Freight sector in Colombia				x						x
Costa Rica	NAMA - Low Carbon Coffee - Costa Rica					x				x	
	Costa Rica Livestock NAMA					x				x	
Mexico	Cogeneration in the mexican Oil and Gas sector	x							x		
	Urban NAMA			x	x		x		x		
	Efficient Cookstoves	x							x		
	Solar Water Heaters	x							x		
	Cogeneration in Mexico	x							x		
	Car Fleet Renewal in Mexico				x				x		
	Disposal and Use of Wastes and Solid and Biomass Residues	x		x					x		
	Fuel Switch in the industry	x							x		
	Fuel Switch for the Power Generation	x							x		
	Renewable Energies and Energy Efficiency in the Private Sector	x							x		
	Emission Reduction Actions Program (NAMA) in Natural Gas Processing, Transport and Distribution System, through fugitive emission reduction	x								x	
	NAMA for New Residential Buildings						x			x	
	NAMA for Sustainable Housing Retrofit						x			x	
	Low Emission Schools						x			x	
	Federal Road Freight Transport NAMA for owner operators and smaller fleet carriers				x					x	
Dominican Republic	Blue Carbon NAMA: Conserve and Restore Mangroves in the Dominican Republic		x						x		
	Tourism and Waste in the Dominican Republic	x		x						x	
	NAMA in Cement/Co-Processing and Waste Sector			x				x		x	
	Energy Efficiency in Public Sector	x								x	
	Reducing Greenhouse Gases (GHG) Emissions in Pig Farms in the Dominican Republic					x				x	
Uruguay	Sustainable Housing Programme						x		x		
	High Integration Program of Wind Energy	x							x		
	Sustainable production with low-emission technologies in agriculture and agroindustry production chains.	x		x					x		
	First introduction of Photovoltaic Solar Energy in the national electrical grid	x								x	
	LNG Terminal with regasification capacity of 10.000.000m3/d of natural gas with possible expansion to 15.000.000m3/d	x			x		x	x			x
	Promotion of renewable energy participation in the Uruguayan primary energy mix	x	x	x	x	x	x	x			x
	Expansion of electricity generation from sustainable forestry biomass byproducts.	x	x								x
Dominica	Low Carbon Climate Resilient Development Strategy	x	x	x	x	x	x	x		x	

Elaborado en base a datos de UNFCCC NAMAs Registry, 2015

In addition, a qualitative comparative analysis has been made of the political commitment of the countries in the region with regard to the NAMAs on the UNFCCC's NAMA Registry, identifying the number of NAMAs, the sectors involved, and the stage they are at.

5. MAIN CHALLENGES FOR RESILIENT AND LOW-CARBON DEVELOPMENT IN LAC

5.1. Challenges related to meeting resilience and decarbonization targets

Global emissions must be reduced by 55% by 2050 (compared to 2010 levels) in order to stay below the 2°C threshold (UNEP, 2014 B). To that end, each country is planning long-term actions through different national and international mechanisms that ensure societies and economies are resilient to global warming and are on the emissions trajectory that the world needs. Some of the main challenges to achieving resilient and low-carbon development in the LAC region are listed below.

- *Competitiveness, investments and decarbonization in LAC*: It currently seems that growth and competitiveness are at odds with decarbonization and building resilience in LAC, due to the fact that neither climate change risks nor environmental and social externalities are included in economic evaluation tools (including cost/benefit analysis of investments, internal rates of return on projects and the value of domestic output, among others).
- P*olitical decisions that prioritize the short term*: Incorporating a dimension of climate risk and decarbonization into strategies and investments must be done in a long-term context, that is, 10, 20 or even 50 years, taking into consideration climate scenarios and long-term investments, as well as the benefit of future generations. LAC political cycles are typically three to five years, making it difficult to prioritize a climate change agenda on the political agenda.
- *The "mitigation is expensive" paradigm*: There is a belief in the LAC region that energy sector mitigation is expensive. While it is true that the use of new technologies like renewable energy requires capital injections and often subsidies as well, the same also occurred with conventional energy technology yet with the difference that fossil fuel infrastructure has been under development for decades, reducing its current cost, especially in petroleum-rich countries.
- *Recognizing external threats:* The LAC region must understand how and why it is vulnerable. Reliable information should also be used to plan resilient development paths and progress should be monitored and evaluated.
- Policy action considering risk management: Risk management must be incorporated into investment initiatives, infrastructure and poverty reduction.

There are several other challenges, including the lack of dialogue with the private sector, deficient technology and business innovation, an informal economic sector, persistent poverty and inequality, and sectionalism.

5.2. Challenges related to monitoring and reporting

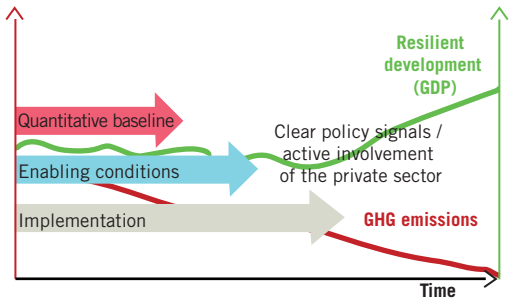
Developing countries, particularly in the LAC region, face high degrees of uncertainty over how to measure and report actions that ensure societies and economies that are resilient to global warming and are on the emissions trajectory that the world needs. Some of the main challenges that lead to such high degrees of uncertainty are due to (IDDRI, 2015) (Libélula, 2014) the following:

- On an international level, the need for clarity on the purpose of the existing international reports is clear: the guidelines for the Biennial Update Report (BUR) do not explicitly state the report's central purpose, resulting in varying quality of the information provided by country. There is a need for standardized guidelines and methodologies and greater coverage of support programs and capacity building to help countries which set overall economic or sectoral targets under the Cancun Agreement report progress on the same. These challenges only increase with the new transparency requirements to be approved in Paris.
- LAC has low technical, administrative and political capacity to participate in the current system of transparency under the UNFCCC. This is evident from the low rate of BURs submitted by LAC countries (only Chile, Peru and Brazil).
- There is a gap in existing government information systems and public administration to facilitate the process of identification, formulation and effective evaluation of actions in LAC. Moreover, the management model of most LAC countries separates sector management, which fails to provide an organic coordination with a comprehensive and systematic view, essential for implementing a national MRV system.

6. FORWARD-LOOKING IDEAS AND PROPOSALS FOR MONITORING DECARBONIZATION AND RESILIENCE IN LAC

The idea of "pathways" could be applied to both decarbonization and building resilience. According to the IPCC, "climate-resilient pathways are development trajectories of combined mitigation and adaptation to realize the goal of sustainable development that help avoid dangerous anthropogenic interference with the climate system" (IPCC, 2014).

Figure 1. Towards a resilient and low-carbon development trajectory



Source: Compiled by author

The graphic outlines an ideal trajectory that achieves decarbonization over time while increasing resilience. Three steps are necessary to achieve this: i) Develop quantitative baseline information on which to measure/develop the actions needed, thereby defining the target to be achieved; ii) Create enabling conditions (regulatory framework, institutional capacities, management systems and MRV) for said actions; and iii) Identify and implement the action portfolios within the proposed deadlines, which will be periodically reviewed/updated. Another noteworthy aspect is the importance of private sector involvement, which should give clear signals to encourage active participation based on building enabling conditions, and thus channel the resources they manage into various action portfolios. An initial phase has also been identified in which actions tend to be "no-regrets"- more strongly oriented towards increasing economic and public spending efficiency- and a second phase in which investment as a whole becomes resilient and low carbon.

Below are a number of proposals for priority actions:

- Position climate change in LAC: The climate change agenda must be designed and linked to each country's urgent development needs (poverty, health, safety, etc.) and the issue of climate change must be "de-greened" and made into a cross-cutting issue, while raising awareness of the issue as a step towards participation by decision makers and consumers.
- Incorporate climate risks and disasters into the financial system: Ensure that future investments are climate resilient and identify business models, strategies and plans that generate social and commercial cobenefits. National development plans must also take into consideration resilience guidelines.
- Design resilient development trajectories and monitor their progress: LAC must identify external threats and what makes them vulnerable in order to assess their progress. National Adaptation Plans should also point to a focus on resilience.
- Design and implement integrated strategies that strengthen urban systems resilience: Reduce vulnerability to climate and disaster risk, ensuring sustainable urban development.
- Establish institutional arrangements and systems that facilitate resilience building and the monitoring of its progress.

Likewise, a solid system of transparency is key to increasing a country's ambition of climate action, a critical component for the future Paris Agreement. This system should (IDDRI, 2015) (NORDEN, 2014):

- Be aligned and consistent with the UNFCCC's principles of universality, self-differentiation and no backsliding.
- Include a system of continuous improvement ('ratcheting of ambition').
- Build metrics and methodologies for shared inventories.
- Include accounting principles for the land use sector, including the sector's emission and removal coverage, as well as accounting principles for internationally transferable emission units, including principles to ensure quality and the prohibition of double-entry accounting.

In order to facilitate LAC compliance, these actions need to be coupled with MRV-friendly guides and backed by technical, financial, and capacity-building support (NORDEN, 2014).

As mentioned above, international MRV systems are biased in terms of mitigation issues. Moreover, while providing important quantitative information for analyzing individual and collective efforts and providing clarity on the mitigation gap, they do not integrate qualitative aspects that measure countries' capacity to create enabling

environments, nor do international systems comprehensively address adaptation or provide the means for implementation.

Thus, the combination of indicators presented in sections 3 and 4 is expected to contribute to creating a more integrated system. In order to take advantage of monitoring indices and ultimately their contribution to decision making, these must be accompanied by a correct understanding of the similarities and differences between countries in the region. This approach would favor both cooperation for setting and achieving targets that contribute to low-carbon and climate-resilient development, and for making decisions based on the priorities and needs of each country or region in particular.

REFERENCES

Alianza Clima y Desarrollo (2012). La Gestión de Riesgos de Eventos Extremos y Desastres en América Latina y el Caribe: Aprendizajes del Informe Especial (SREX) del IPCC, disponible en www.cdkn.org/srex.

BID (2010). La gestión para resultados en el desarrollo. Avances y desafíos en América Latina y el Caribe. Banco interamericano de desarrollo.

BID (2012). Libro de buenas prácticas de gestión para resultados en el desarrollo en latinoamérica y el caribe. Banco Interamericano de Desarrollo.

CDP (2015). *CDP. Acerca de CDP.* Obtenido de http://www.cdpla.net/es/acerca-de-cdp

CDP América Latina (2014). *Aprovechando las oportunidades de colaboración entre ciudades y empresas para economías sostenibles.*

CEPAL (2012). Efectos del cambio climático en la costa de América Latina y el Caribe. Vulnerabilidad y Exposición. Comisión Económica para América Latina y el Caribe. Santiago de Chile, Chile.

CEPAL (2013). *La medición multidimensional de la Pobreza*. Recuperado el 21 de Agosto de 2015, de http://www.cepal.org/deype/noticias/documentosdetrabajo/5/49665/LCL3615e.pdf

CEPAL (2015). *BIEE-Base de Indicadores de Eficiencia Energética*. Recuperado el 21 de Agosto de 2015, de http://www.biee-cepal.enerdata.eu/

Deprez, A., Colombier, M., Spencer, T. (2015). Transparency and the París Agreement: driving ambitious action in the new climate regime, *Working Papers* N°03/15, IDDRI, París, France, 28p

Evaluación del Grupo Intergubernamental de Expertos sobre el Cambio Climático [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea y L.L. White (eds.)]. Organización Meteorológica Mundial, Ginebra, Suiza, 34 págs. (en árabe, chino, español, francés, inglés y ruso).

FAO (2001). *Causas y tendencias de la deforestación en América Latina.* Roma. Obtenido de http://www.fao.org/docrep/007/ad680s/ad680s05.htm

FAO (2010). *Evaluación de los recursos forestales mundiales 2010. Informe principal.* Roma: Obtenido de: http://www.fao.org/docrep/013/i1757s/i1757s.pdf.

FAO (2014). *Panorama de la seguridad alimentaria y nutricional en América Latina y el Caribe 2013.* Obtenido de http://www.fao.org/docrep/019/i3520s/i3520s.pdf

Fey *et al.* (2015). Decarbonizing Development: Three Steps to a Zero-Carbon Future. Climate Change and Development. Washington, DC: World Bank.

García López, R., & García Moreno, M. (2010). *La gestión para resultados en América Latina y el Caribe. Avances y desafíos para América Latina y el Caribe.*

IPCC (2014). Cambio climático 2014: Impactos, adaptación y vulnerabilidad – Resumen para responsables de políticas. Contribución del Grupo de trabajo II al Quinto Informe de IPCC (2014a). *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.* Cambridge, United Kingdom and New York: Cambridge University Press.

IPCC (2014b). *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.* Cambridge, United Kingdom and New York: Cambridge University Press.

Evaluación del Grupo Intergubernamental de Expertos sobre el Cambio Climático [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea y L.L. White (eds.)]. Organización Meteorológica Mundial, Ginebra, Suiza, 34 págs. (en árabe, chino, español, francés, inglés y ruso).

Levin, K., Rich, D., Bonduki, Y., Comstock, M., Tirpak, D., McGray, H., Waskow, D. (2015). *Designing and preparing Intended Nationally Determined Contributions (INDCs).*

Libélula (2014). *Reconciling development with the need to decarbonize the economy.* París: Institut du développement durable et des relations internationales.

Libélula y E3G (2014). *Hacia una Ruta Nacional de Financiamiento para el Perú.* Lima y Londres.

Mapplecroft (2014). *Índice de vulnerabilidad y adaptación al cambio climático en la región de América Latina y el Caribe.* CAF.

MINAM (2015). Supuestos y Metodologías contempladas como parte de las Contribuciones Nacionales en Mitigación. Ministerio del Ambiente. Lima, Perú

NORDEN (2014). *Accounting Framework for the Post-2020 Period.* Dinamarca.

OECD (2000). "Evaluation Feedback for Effective Learning and Accountability (EFELA), sec. 7.3", EFELA: Workshop Report, 33rd Meeting 22-23 November 2000,Tokyo, 26-28 September 2000, http://www.oecd.org/dac/evaluation/2667326.pdf

PlanCC (2014). Escenarios de Mitigación del Cambio Climático en el Perú al 2050. Reporte Final - Proyecto Planificación ante el Cambio Climático del Perú, Resultados de la Fase 1.

PNUD (2014). *Informe sobre Desarrollo Humano 2014.* Nueva York: Programa de las Naciones Unidas para el Desarrollo.

PNUD (2014). Informe sobre Desarrollo Humano 2014. Sostener el Progreso Humano: Reducir vulnerabilidades y construir resiliencia. Programa de las Naciones Unidas para el Desarrollo. Nueva York, Estados Unidos.

PNUD (2015). *Preguntas frecuentes-Índice de pobreza multidimensional (IPM)*. Obtenido de http://hdr.undp.org/es/faq-page/multidimensional-poverty-index-mpi#t295n2120

REN21 (2015). *Renewables 2015. Global Status Report.* París.

RobecoSAM (2015). *About us*. Recuperado el 21 de Agosto de 2015, de Dow Jones Sustainability index: http://www.sustainability-indices.com/sustainability-assessment/corporate-sustainability.jsp

RobecoSAM (2015). *Dow Jones Sustainability indeces*. Recuperado el 21 de Agosto de 2015, de http://www.sustainability-indices.com/about-us/dow-jones-sustainability-indices.jsp

The Global Commission on the Economy and Climate (2014). *The New Climate Economy Report.* Washington: WRI.

UNDP (2014). *UNEP Datos. El IDH ajustado por la desigualdad.* Obtenido de http://hdr.undp.org/es/content/el-idh-ajustado-por-la-desigualdad-idh-d

UNEP (2014). The Adaptation Gap Report 2014. Nairobi: United Nations Environment Programme (UNEP).

UNEP (2014 A). *The Adaptation Gap Report 2014.* Nairobi: United Nations Environment Programme.

UNEP (2014 B). *The Emissions Gap Report 2014.* Nairobi: United Nations Environment Programme.

UNICEF y Organización Mundial de la Salud. (2012). *Progresos en materia de agua potable y saneamiento. Informe de actualización 2012.* Nueva York y Ginebra.

UNFCCC (2014). *Handbook on Measurement, Reporting and Verification for Developing Country Parties.* Bonn: United Nations Climate Change Secretariat.

UNFCCC (2014). *Intended Nationally Determined Contributions (INDCs)*. Recuperado el 21 de Agosto de 2015, de http://unfccc.int/focus/indc_portal/items/8766.php

UNFCCC (2014). *Report on Sources of Support for the preparation of Intended Nationally Determined Contributioins (INDCs). Revised technical note.*

UNFCCC (2014). *United Nations Framework Convention on Climate Change*. Recuperado el 21 de agosto de 2015, de http://unfccc.int/adaptation/workstreams/national_adaptation_plans/items/6057.php

UNFCCC (2015). *Unied Nations Framework Convention on Climate Change*. Obtenido de https://cdm.unfccc.int/about/index.html

UNFCCC (2015). *Workshop on experiences, good practices, lessons learned, gaps and needs on the process to formulate and implement national adaptation plans (AC/LEG) [PPT].* Bonn.

Vergara, W. *et al.* (2013). *El Desafío Climático y de Desarrollo en América Latina y el Caribe: opciones para un desarrollo resiliente al clima y bajo en carbono.* Banco Interamericano de Desarrollo.

World Bank (2015). *World Bank. Data.* Obtenido de http://data.worldbank.org/

World Energy Council (2010). *Eficiencia Energética: Una Receta para el Éxito*. Recuperado el 08 de Agosto de 2015, de http://www.worldenergy.org/wp-content/uploads/2012/10/PUB_Eficiencia_Energetica_Una_receta_para_el_exito_2010_WEC.pdf

Table 4. Herramienta de monitoreo de resiliencia y descarbonización en ALC

Country	MfDR		Resilience										
	MfDR index (score obtained)	MfDR: Index follow up and monitoring (score obtained)	INDC adaptation component***	Development of NAPs	Vulnerability Index 2014: exposure, sensitivity and adaptability (value and level)	Sustainable Development Index: MPI 2013 (value)	Total water productivity 2013 (constant 2005 US$ GDP per cubic meter of total freshwater withdrawal)	Drinking water coverage 2010 (percent)	Variability in food supply per capita 2011 (kcal/capita/day)	Presentation of INDCs*	BAU presented in INDCs (million tCO_2eq)	Number of NAMAs registered with UNFCCC***	
	: low : medium : high												
Argentina	2	1,2	Yes	Information on construction monitoring by the UNFCCC	6.66-average	0,01	8,8	Indicator calculated for the LAC region. 94%.	8,8	Yes	-		
Bolivia	0,8	1,1	-		2.48-extreme	0,10	6,8		28,0	-	-		
Brazil	3,7	3,4	Yes		5.77-average	0,01	16,1		43,6	Yes	-		
Chile	3,9	4,5	Yes		9.54-low	-	4,8		30,3	Yes	N/A	5	
Colombia	3,2	3,7	Yes		4.30-high	0,03	18,1		26,3	Yes	s.d.	2	
Costa Rica	2,6	3	Yes		7.70-low	-	12,1		38,6	Yes	-	2	
Cuba	-	-	-		3.90-high	-	13,6		18,9	-	-		
Ecuador	2,1	1,7	Yes		3.76-high	-	5,9		13,4	Yes	-		
El Salvador	1,7	0,65	-		0.79-extreme	-	9,2		34,0	-	-		
Guatemala	2	1,5	Yes		0.75-extreme	-	10,9		66,2	Yes	-		
Haiti	1,3	1,15	Yes		0.58-extreme	0,24	4,2		83,1	Yes	-		
Honduras	1,9	2,3	Yes		0.92-extreme	0,10	7,4		53,4	Yes	-		
Mexico	3,2	3,3	Yes		4.47-high	0,02	13,0		9,4	Yes	2030: 1110	15	
Nicaragua	1,7	1	-		1.19-extreme	0,09	5,4		53,1	-	-		
Panama	1,7	0,95	-		5.57-average	-	28,8		22,9	-	-		
Paraguay	1,3	0,4	Yes		1.58-extreme	-	5,4		62,7	Yes	-		
Peru	2,4	1,2	Yes		4.98-high	0,04	9,1		28,2	Yes	2030: 269		
Dominican Republic	1,8	1,4	Yes		1.01-extreme	0,03	9,1		13,2	Yes	-	5	
Uruguay	1,8	1,3	Yes		8.33-low	-	7,2		46,4	Yes	-	5	
Venezuela	-	-	-		3.64-high	-	8,6		11,2	-	-		
Antigua and Barbuda	-	-	-		5.64-average	-	123,0			-	-		
Bahamas	0,8	1	-		8.68-low	-	-			-	-		
Barbados	1,6	1,2	Yes		9.77-low	-	34,1		67,0	Yes	-		
Belize	0,5	0,4	Yes		2.25-extreme	0,03	13,5			Yes	-		
Dominica	-	-	Yes		3.85-high	-	26,0		74,0	Yes	-	1	
Grenada	-	-	Yes		9.58-low	-	67,8			Yes	-		
Jamaica	1,6	0,55	-		1.5-extreme	-	-		20,0	-	-		
Puerto Rico	-	-	-		-	-	71,6			-	-		
St. Kitts and Nevis	-	-	-		6.24-average	-	-		28,0	-	-		
Saint Vincent	-	-	-		9.63-low	-	60,4		12,0	-	-		
St. Lucia	-	-	-		8.25-low	-	62,1			-	-		
Trinidad and Tobago	1,6	0,8	-		7.22-average	0,01	82,7		19,0	Yes	2030: 103		

Calculated using database: Climate and Development Alliance (2012), García Lopez & García Moreno (2010), FAO (2014), Mapplecroft (2014), (2015), UNDP (2014), UNFCCC (2015), WRI (2015) and World Bank (2015).

Decarbonization												
Number of registered CDM projects	CO_2 emissions per capita 2012 (metric tons)	GHG emissions excluding LULUCF emissions 2012 (million tCO_2eq)	GHG emissions including LULUCF emissions 2012 (million tCO_2eq)	Kaya Identity Components: Population 2014 (millions of people)	Kaya Identity Components: GDP per capita 2014 (thousand $ at current international prices)	Kaya Identity Components: Primary energy intensity considering PPP 2010 (koe/$00p)	Kaya Identity Components: CO_2 intensity from energy 2011 (kg of energy use per kg of oil equivalent)	Renewable energy consumption 2012 (percent)	Net emissions and absorption of GHG by changes in land use and forestry (metric tons of CO_2 equivalent)	Annual rate of change in the extent of primary forest (2005-2010 in 1000 ha/year)	CO_2 emissions from transport 2012 (% of total fuel combustion)	CO_2 emissions caused by the manufacturing industry and construction 2012 (% of total fuel combustion)
44	4,7	338,0	405,0	41,8	-	0,2	2,4	8,8	-	0	25,6	18,0
4	1,6	46,0	136,5	10,8	6,4	0,1	2,1	28,0	-	-200	38,4	11,3
338	2,2	1Ê012,6	1Ê823,1	202,0	16,2	0,2	1,6	43,6	-	-2336	45,2	27,6
102	4,6	100,7	93,7	17,8	22,3	0,2	2,4	30,3	-	-10	28,5	16,6
63	1,5	154,1	199,7	48,9	13,0	-	2,3	26,3	-	-14	40,9	23,2
17	1,7	12,6	5,0	4,9	14,4	0,1	1,7	38,6	2005: -3.5	0	69,8	15,1
2	3,2	45,0	34,8	11,3	-	-	3,2	18,9	-	0	6,8	27,8
32	2,3	55,0	138,2	16,0	11,3	0,1	2,6	13,4	-	12	48,4	14,3
7	1,1	11,7	13,1	6,4	8,0	0,1	1,6	34,0	-	0	50,4	16,7
20	0,8	23,2	39,3	15,9	7,5	-	1,0	66,2	-	-68	52,3	16,6
-	0,2	7,7	7,9	10,5	1,8	-	0,6	83,1	-	0	45,9	17,4
29	1,1	19,8	47,7	8,3	4,4	-	1,8	53,4	-	0	39,8	15,7
191	3,9	723,9	748,9	123,8	17,2	0,2	2,5	9,4	2006: 70.2	-44	35,1	13,4
12	0,8	13,9	42,7	6,2	4,8	0,2	1,6	53,1	-	-27	40,9	12,3
21	2,6	16,0	22,1	3,9	20,6	0,1	2,4	22,9	-	0	36,9	27,8
2	0,8	36,9	111,0	6,9	8,4	0,2	1,1	62,7	-	0	89,5	5,1
60	1,8	88,2	159,5	30,8	12,1	0,1	2,6	28,2	-	-177	38,7	21,2
14	2,2	31,2	31,2	10,5	13,1	0,1	3,0	13,2	-	-	33,4	11,5
25	2,3	34,6	14,8	3,4	20,9	0,1	1,8	46,4	-	1	39,0	9,7
-	6,4	283,9	396,7	30,9	17,5	-	2,7	11,2	-	-	29,4	32,8
						-						
-	5,8	1,1	1,1	0,1	21,8	-	-	-	-	-		
1	5,2	4,1	4,2	0,4	23,5	-	-	1,4	-	0		
-	5,6	3,3	3,3	0,3	13,4	-	-	1,4	-	0		
1	1,7	9,6	14,6	0,3	-	-	-	1,4	-	0		
-	1,7	0,2	0,3	0,1	10,7	-	-	1,4	-	n.s.		
-	2,4	2,1	1,9	0,1	11,9	-	-	1,4	-	0		
2	2,9	8,8	9,6	2,7	-	-	2,7	14,7	-	n.s.	23,6	30,7
	-	-	-	3,5	-	-	-	1,4	-	0		
-	5,1	0,3	0,3	0,1	22,7	-	-	1,4	-	-		
-	2,2	0,3	0,3	0,1	10,6	-	-	1,4	-	0		
-	2,3	1,1	1,1	0,2	10,4	-	-	1,4	-	n.s.		
-	37,2	40,1	40,4	1,3	-	-	2,5	0,3	-	0	8,3	52,4

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