UNIVERSIDAD DEL AZUAY

Faculty of Legal Sciences

International Studies Degree

ANALYSIS OF PROJECTS IMPLEMENTED WITH CLIMATE FINANCE IN THE DECENTRALIZED AUTONOMOUS MUNICIPAL GOVERNMENT OF CUENCA IN THE PERIOD 2018-2024

Authors:

Tomalá Piedra Matías Nicolás

Reinoso Portilla Julián Nicolás

Director:

Mgtr. Diana Alexandra García Orellana

Cuenca – Ecuador

2025

DEDICATION

I dedicate my thesis to my mother and my sister, who have been by my side every step of the way, offering me their unconditional support. To my grandparents, for their constant love and for motivating me at every stage of this journey to become a professional. This achievement is also yours.

I dedicate this thesis to my family, mom and dad, thank you for your support, understanding, love and advice, and to all my classmates who have been part of this unique stage in my life.

ACKNOWLEDGMENTS

I want to express my gratitude to my professors Ana María Bustos, Diana García, and Fernando Lima for always being at the forefront of our work and, above all, for their patience and for not giving up during this process. Furthermore, I thank the University of Azuay for allowing me to have one of the best experiences of my life and for leaving a lasting mark on me.

I am grateful to my examining committee, Dr. Ana María Bustos, whose rigorous standards and keen observation were fundamental in achieving the project's objectives. I also thank my professor, Diana García, and Fernando Lima, whose support and patience were essential, encouraging us to improve each day of this process. And finally, I thank the University for allowing me to have the best years of my life, which will leave an indelible mark on my heart.

Analysis of projects implemented with climate finance in the Decentralized Autonomous Municipal Government of Cuenca in the period 2018-2024

ABSTRACT

Climate finance has become a key factor in sustainable urban management in Cuenca, demonstrating how international resources have transformed local government through electric mobility projects and energy optimization of waste. In Ecuador, local governments have faced technical and financial limitations that have hampered their ability to sustain climate action programs. The city serves as a model for implementing projects supported by CAF, KfW, and the French Development Agency, aimed at reducing emissions and strengthening urban resilience. The methodology was based on data triangulation, integrating document review, case studies, and semi-structured interviews. This allowed for a comparison of institutional and citizen perspectives. The findings showed that the Integrated Transportation System (SIT) and the Pichacay Sanitary Landfill significantly reduced greenhouse gas emissions, leading to energy efficiency and fostering inter-institutional cooperation. However, challenges persisted related to the high level of involvement of external actors from international cooperation and the lack of local financial autonomy, reaffirming the importance of establishing robust climate governance and sustainable urban planning.

Keywords: local climate governance, climate finance, sustainable mobility, climate action, mitigation.

Análisis de proyectos implementados con financiamiento climático en el Gobierno Autónomo Descentralizado Municipal de Cuenca en el periodo 2018-2024

RESUMEN

El financiamiento climático se consolidó como un factor fundamental para la gestión urbana sostenible en Cuenca, mostrando que los recursos internacionales transformaron la administración local mediante proyectos de movilidad eléctrica y optimización energética de residuos. En el contexto de Ecuador, los gobiernos locales afrontaron las limitaciones técnicas y financieras que condicionaron su capacidad para sostener programas de acción climática. La ciudad es un modelo a seguir al ejecutar proyectos apoyados por la CAF, el KfW y la Agencia Francesa de Desarrollo, cuyo objetivo es reducir emisiones y fortalecer la resiliencia urbana. La metodología se fundamentó en triangulación de datos, integrando revisión documental, estudios de caso y entrevistas semiestructuradas, esto hizo posible comparar puntos de vista institucionales con respecto a los ciudadanos. Los hallazgos mostraron que el Sistema Integrado de Transporte (SIT) Y EL Relleno Sanitario de Pichacay disminuyeron de forma significativa los gases de efecto invernadero, lo que condujo a una eficiencia energética y fomentó la cooperación entre instituciones. No obstante, persistieron los retos vinculados con la alta participación de actores externos de la cooperación internacional y la falta de autonomía financiera local, reafirmando la importancia de establecer una gobernanza climática sólida y una planificación urbana sustentable.

Palabras clave: gobernanza climática local, financiamiento climático, movilidad sostenible, acción climática, mitigación.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

The following thesis was structured with the objective of analyzing the projects implemented with climate finance in the autonomous, decentralized municipal government of Cuenca during the period 2018-2024. Specifically, the cases of the Integrated Transportation System (SIT) and the biogas capture and energy utilization project at the Pichacay Sanitary Landfill were examined, as both provided concrete examples of how national and international financial mechanisms contributed to sustainable urban management and climate change mitigation.

This work arose from the central problem of the limited capacity of local governments to access, manage, and sustain long-term climate finance. In the case of Cuenca, while significant projects were implemented in the areas of sustainable mobility and waste management, challenges persisted related to weak inter-institutional coordination and a lack of comprehensive planning. This situation prevented the consolidation of an urban development model aligned with national and international strategies for mitigating and adapting to environmental problems.

This work was developed with the aim of understanding how climate finance influenced the planning and implementation of sustainable urban projects, evaluating the opportunities, limitations and results achieved by the decentralized autonomous municipal government of Cuenca within the framework of local climate action.

The first chapter developed the theoretical framework, which addressed the fundamentals of climate change, international agreements, and national climate action instruments.

The second chapter presented the state of the art, which included a review of the literature on local climate governance, the role of local governments, and experiences in sustainable mobility and waste management.

The third chapter detailed the methodology, which is based on a qualitative approach with data triangulation that included a literature review, case studies, and semi-structured interviews.

In the fourth chapter, the results were finally presented, focusing on the analysis of the two case studies, contrasted with the interviews, which allowed the identification of their sources of funding and progress and limitations.

CHAPTER 1.
Theoretical Framework

1.1. Climate Change

Climate change refers to the sustained alteration of average temperatures and weather patterns on the planet. Throughout Earth's history, these variations have been primarily linked to natural phenomena, such as changes in solar radiation, large volcanic eruptions, and variations in Earth's orbit. These processes have generated climatic transformations in different geological periods, significantly influencing the balance of the climate system.(Naciones Unidas, 2025a). However, the current scientific community maintains that these natural factors are not sufficient to explain the speed or magnitude of the transformations we are experiencing today(Naciones Unidas, 2025b).

In recent decades, the scientific community has clearly indicated that human activities are the primary cause of contemporary global warming. Since the Industrial Revolution, the sustained increase in the burning of fossil fuels such as coal, oil, and natural gas, along with deforestation, industrial expansion, and intensive agricultural and livestock practices, has exponentially increased the concentration of greenhouse gases in the atmosphere. The main mechanism of this phenomenon lies in the accumulation of these gases, which act as a layer that traps heat from solar radiation, intensifying the so-called greenhouse effect. Among the most influential compounds are carbon dioxide (CO_2) and methane (CH_4). CO_2 comes primarily from the burning of fossil fuels in sectors such as transportation, power generation, and industry, as well as from deforestation and land-use change. Methane, on the other hand, is significantly associated with agricultural activity, waste management systems, and the extraction and processing of fossil fuels.(Naciones Unidas, 2025b).

The impact of these emissions is evident in the current atmospheric composition: CO_2 concentrations have exceeded 420 parts per million (ppm), a level not seen for approximately three million years. (Sexto Informe de Evaluación del IPCC, 2023).There is a profound anthropogenic footprint on the climate system, clearly reflected in the aforementioned figure, which confirms that current changes are fundamentally due to human activity. In this context, the most significant sectors in the generation of greenhouse gas emissions include energy, industry, and transportation. Thus, contemporary climate change cannot be understood as a simple natural phenomenon, but

rather as the direct result of a development model based on the intensive exploitation of resources, making it one of the greatest environmental, economic, and social challenges of the 21st century.(Sexto Informe de Evaluación del IPCC, 2023).

The importance of understanding and addressing climate change lies in its direct implications for life on Earth and the stability of natural and human systems. Its effects include an increase in extreme events such as heat waves, floods, and droughts; biodiversity loss; ecosystem disruption; and disruptions to food security and access to water. Furthermore, this phenomenon, known as climate change, significantly impacts the economy, public health, and social equity, especially in vulnerable communities. Recognizing this importance allows for the development of policies, mitigation and adaptation strategies, and international cooperation to reduce risks and ensure sustainable development for present and future generations.

This phenomenon has direct and indirect impacts on multiple strategic sectors. In the case of Ecuador, climate change primarily affects the energy sector, agriculture, industrial process management, and land use, directly impacting food security, national production, and, in general, the population's quality of life (EFIC, 2021). Furthermore, the country's geographic location and high ecosystem diversity make it particularly vulnerable to phenomena such as droughts, floods, biodiversity loss, and natural resource degradation.

1.2. Agreements and Instruments for Climate Change Management

1.2.1. United Nations Framework Convention on Climate Change

Through collaborative efforts, the United Nations Framework Convention on Climate Change (UNFCCC) constitutes the main and most important regulatory framework to address climate change, with the participation of 197 countries. It recognizes climate change as a latent global threat and establishes the foundations and mechanisms to address it, with clear objectives to stabilize greenhouse gas (GHG) concentrations.(Naciones Unidas, 1992a).

Furthermore, the UNFCCC has developed monitoring and transparency mechanisms, such as national emissions reports, greenhouse gas inventories, and international review systems, which allow for the assessment of each country's progress in meeting its commitments. These instruments strengthen trust among the parties and promote accountability, which is essential in a process that depends on international

cooperation. In turn, the Convention encourages the participation of diverse non-state actors, such as civil society, the private sector, and local communities, recognizing that addressing climate change requires an inclusive and multi-sectoral approach.(Naciones Unidad, 1992).

One of the most significant contributions of the Framework Convention is the principle of "common but differentiated responsibilities" (CRBD), which recognizes that all countries must take measures to address the issue. However, not all countries have the same responsibility or the same resources to combat it. Therefore, the most industrialized countries bear an even greater responsibility because they have historically polluted more than less developed countries, while developing countries should, with financial and technological support, contribute to the effort.(Naciones Unidas, 1992b).

One of the most important contributions of the United Nations Framework Convention on Climate Change was the Conference of the Parties, which was signed in 1992 during the Earth Summit in Rio de Janeiro. The initiative was born with the intention of bringing countries together to discuss and propose solutions and coordinate joint actions to address climate change. The convention entered into force in 1994, and since then, the ratifying states have met annually to review progress, establish new commitments, and strengthen international cooperation.(Jonattan Rodríguez Hernández, 2024).

In the context of this research, the COPs represent a central element because the international instruments that enable climate finance, such as the Green Climate Fund and the Adaptation Fund, depend on their resolutions and solutions. These are some of the decisions made at the global level that subsequently translate into investment opportunities for local governments. The Cuenca Municipal Government is included as a key player in obtaining financing sources, due to the policies and agreements established at the COPs, which are the rules under which countries and cities can access financial and technical resources to implement mitigation and adaptation projects.

Furthermore, the COPs not only promote the creation of financial mechanisms but have also established a greater scope of responsibility for local governments. Regarding climate action, since COP 21, the fundamental role of cities and municipalities in implementing national climate commitments has been officially recognized, strengthening the link between global decisions and local policies. In this sense, the case

of Cuenca is highly relevant within this framework, analyzing the international decisions adopted by the COP, which are materializing in concrete financing and climate action programs at the local level (Jonattan Rodríguez Hernández, 2024).

The first COP took place in Berlin in 1995, where the groundwork was laid for the Kyoto Protocol (1997), which established binding emissions reduction targets for nations. Subsequently, at COP21 in Paris (2015), the Paris Agreement was adopted, committing all countries to keep the increase in global temperature below 2°C and striving to limit it to 1.5°C. Today, the COPs are the primary forum for global climate negotiations, where governments, organizations, and civil society discuss how to address the climate crisis, finance the green transition, and ensure equitable climate action.(Jonattan Rodríguez Hernández, 2024).

1.2.2. Kyoto Protocol

With the aim of shortening and limiting greenhouse gas emissions, the UNFCCC resolved to create the Kyoto Protocol, approved on December 11, 1997, and in force on February 16 , 2005.(United Nations Climate Change, 2012). It is important to note that this Protocol assigns differentiated responsibilities to countries according to their level of development, recognizing that the most industrialized countries have contributed significantly to high levels of pollution.

The Kyoto Protocol is based primarily on the principles and provisions established by the United Nations Framework Convention on Climate Change and is structured around its annexes. In this sense, it relies on the concepts of common but differentiated responsibilities and respective capabilities, obligating these nations to assume a proactive role in reducing polluting emissions.

A key aspect of the Kyoto Protocol is the implementation of emissions trading mechanisms, which allow governments to set a maximum limit on the amount of greenhouse gases that companies can emit. This system incentivizes countries to reduce their greenhouse gas emissions, prioritizing the effective reduction of pollution over the geographical location of the emission sources.(United Nations Climate Change, 2012).

Consequently, the Kyoto Protocol allows developed countries to allocate a portion of their resources to green investments. These projects not only have a specific purpose but also aim for long-term positive environmental and social impacts. These investments can be part of strategic sectors, potentially leading to technological innovation,

sustainable infrastructure, organic agriculture, and clean energy sources (Gerardo Ulises Otero Delgado, 2025).

In this way, governments not only comply with international standards for emissions reduction, but also promote or incentivize a more balanced economic model, which can adapt to the challenges of environmental problems.

In the Ecuadorian context, we are seeking international funding to support the implementation of sustainable projects in our local government. Through mechanisms such as the Kyoto Protocol and the Clean Development Mechanism (CDM), several countries have invested in initiatives in Latin America aimed at reducing environmental impacts and strengthening environmental resilience. In our case, Ecuador has implemented renewable energy and waste management programs thanks to international cooperation, which seeks to make the country and our local government more sustainable and environmentally resilient.

In our city of Cuenca, the biogas capture and combustion system at the Pichacay landfill serves as an example . This system transforms citizens' waste into clean energy, yielding significant benefits while simultaneously reducing pollution in the city. Furthermore, the introduction of electric buses and the strengthening of the Cuatro Ríos tram project also reduce pollution levels and are clear examples of clean transportation. These projects, mentioned earlier, are supported by international organizations such as the Development Bank of Latin America and the Caribbean (formerly the Andean Development Corporation, CAF) and the German Development Bank (KfW), demonstrating the benefits of the Kyoto Protocol at the local level.

We can say that the Kyoto Protocol is not limited to a framework of international obligations, but also serves as a driving force for cities like Cuenca to access economic and technological resources that can generate change and, ultimately, a transition towards a more sustainable city. In the end, these global commitments have a direct benefit for the population and the environment.

Consequently, the protocol encourages developed countries to make green investments, focused on projects that generate positive impacts in areas such as sustainable infrastructure, organic agriculture, clean technologies, and companies with responsible environmental policies. In this way, governments not only fulfill their

obligations but also promote a more sustainable and environmentally friendly economic model.

1.2.3. Paris Agreement

Adopted in 2015 during the 21st Conference of the Parties (COP21), the Paris Agreement is considered the cornerstone of international climate policy, as it, like the Kyoto Protocol, involves all countries, not just the most industrialized. The importance of the Paris Agreement lies in its near-universal participation, its flexibility to adapt to national realities, and the incorporation of mechanisms for financing, transparency, and climate justice.(Naciones Unidas, 2015).

However, the Agreement faces significant challenges, such as the limited willingness of some States to fulfill their commitments and the complexity of coordinating actions among different countries due to their limited commitment to meeting their emissions reduction targets, which could weaken the agreement's overall effectiveness (Naciones Unidas, 2015). Furthermore, coordinating actions among countries is complex due to the different economic, political, and social realities of each nation, making it difficult to implement joint measures effectively . Its main objective is to limit the global average temperature increase to well below 2°C above pre-industrial levels, with an effort to limit it to 1.5°C. (Naciones Unidas, 2024)This goal is based on scientific evidence provided by the Intergovernmental Panel on Climate Change (IPCC), which warns that exceeding 1.5°C would have irreversible impacts on ecosystems, biodiversity, and the lives of millions of people.(Naciones Unidas, 2024).

Furthermore, the Paris Agreement establishes climate commitments through unconditional and conditional scenarios. Unconditional scenarios correspond to commitments that each country can fulfill solely with its national resources, representing the minimum possible action given its financial, technological, and institutional capacities. In contrast, conditional scenarios are more ambitious commitments that a country would only be willing to undertake if it receives international support in the form of financing, technology transfer, or capacity building. In this way, developing countries can express both what they can guarantee on their own and what they could achieve with external cooperation, consistent with the principle of common but differentiated responsibilities. (United Nations Framework Convention on Climate Change, 2015).

In another area , the Paris Agreement has brought about a significant shift in how countries embrace their commitments to address climate change. This is because it introduced a permissive system that allows for action and targets to be set according to each country's specific circumstances. This agreement recognizes that not all states have the same capabilities or resources to address the consequences of environmental problems; hence the distinction between unconditional and conditional commitments. Unconditional commitments refer to actions a country can undertake with its own resources, while conditional commitments rely more on international organizations that provide development, financial, technological, and technical support.

This separation is especially important for developing countries like ours. Ecuador needs to obtain foreign climate finance, which is essential for implementing better policies and projects related to environmental protection. The Paris Agreement serves as the policy framework, supporting the creation of international funds such as the Adaptation Fund and the Green Climate Fund. These international mechanisms aim to reduce the gap between countries and support the implementation of projects that address environmental problems in the city. These international mechanisms allow local governments to access resources that are difficult to obtain locally, enabling them to carry out mitigation and adaptation projects. They also allow for the maintenance and expansion of existing projects, as local government resources are often insufficient.

In Cuenca, all these agreements are reflected in specific initiatives that aim to meet the global objectives of the agreement, namely reducing emissions from public transportation, waste management, and the transition to clean energy. In Cuenca, the development of the tramway, the Cuatro Ríos project, and the biogas exploration and combustion project at the Pichacay landfill are clear examples of how international objectives can be applied in an urban context, thanks to the support of international cooperation and funding.

The Paris Agreement not only establishes standard commitments but also focuses on connecting global action with local realities. In the case of Cuenca, these agreements have allowed for linking international mitigation and adaptation goals with concrete projects, demonstrating that global climate policies are only effective when they produce visible results in a given territory.

Within the Agreement, there are particularly important articles that regulate these commitments. Article 13 establishes a strengthened transparency framework, requiring countries to submit clear and regular information on their emissions, the mitigation and adaptation measures they adopt, and the financial and technological support they receive or provide. This mechanism aims to build trust among States and ensure the comparability of commitments.(United Nations Framework Convention on Climate Change, 2015).

In the context of this thesis, the principle of transparency takes on particular relevance, as access to international climate finance depends largely on the clarity, monitoring, and reporting of local progress in mitigation and adaptation. Transparency in project management allows organizations (CAF, KfW) to demonstrate the effectiveness of resource use, strengthening institutional credibility and opening opportunities to apply for new financial support.

In this way, Article 13 not only represents an obligation of States to the international community, but is also applied as a management and control tool that conditions access to local climate funds, which promotes transparent environmental governance.

Article 9 focuses on climate finance, establishing that developed countries have an obligation to provide financial resources to developing countries to support their mitigation and adaptation efforts. It also reaffirms the collective goal of mobilizing $100 billion annually until 2025 and promoting transparent, progressive, and predictable climate finance.(Paris Agreement, 2015).

Furthermore, the Paris Agreement is reflected in state actions through biennial reports on mitigation and adaptation measures. In addition, platforms such as SINGEI were created, representing one of the most significant advances, as it comprises a set of processes, methodologies, and procedures that enable the collection, analysis, and reporting of information related to National Greenhouse Gas Inventories (INGEI), thus contributing to national decision-making and compliance with UNFCCC commitments (Ministerio de Ambiente y Energía, 2024).

In this way, Cuenca is contributing to the mitigation and adaptation actions committed to in the Paris Agreement through the implementation of several environmental projects. With the support of international cooperation, projects such as the Integrated Transportation System (SIT) and the biogas capture and combustion project

at the Pichacay Sanitary Landfill have been developed , both backed by international climate finance.

Finally, although the Paris Agreement does not establish a strict system of annexes like the Kyoto Protocol (with Annex I and non-Annex I Nations), it does include an annex to the decisions that support it. This annex details essential operational guidelines, such as the conditions for the Agreement to enter into force, the requirements for implementing the main articles, and how financing, transparency, and the overall balance of commitments will be managed.

In summary, the Paris Agreement promotes a flexible yet binding system where countries must make clear commitments under both unconditional (using their own resources) and conditional (relying on external aid) circumstances. These commitments are supported by a framework of transparency (Article 13), the provision of financing (Article 9), and additional regulations within the annex, allowing global climate goals to be tailored to each nation's capabilities and responsibilities.

1.2.4. Intergovernmental Panel on Climate Change (IPCC)

The Intergovernmental Panel on Climate Change (IPCC) was created by the United Nations Environment Programme (UNEP) with the mission of comprehensively and scientifically assessing all available information on climate change, including mitigation and adaptation options. It is important to note that the IPCC is responsible for conducting scientific research to ensure the achievement of its primary objective (PNUMA, 2021).

The IPCC's main tasks are to create reports that assess the state of climate change, examine possible future scenarios based on different policies and emission levels, investigate the environmental, social, and economic effects of climate change, and provide advice for mitigation and adaptation at the global level. Its documents, such as the Assessment Reports and Special Reports, are key resources for governments and international organizations to make climate-related policy decisions (Sexto Informe de Evaluación del IPCC, 2023).

The IPCC's relevance lies in the fact that it provides reliable and agreed-upon scientific information, helps decision-makers develop climate policies, and promotes international collaboration to address the challenges of climate change.(Climate Change 2023 Synthesis Report, 2023b).

Assessment reports and special reports are published by the IPCC to establish the scientific basis for international agreements, which include the United Nations Framework Convention on Climate Change, the Kyoto Protocol, and the Paris Agreement. Over time, warnings about increasing greenhouse gas emissions and the risks to ecosystems have led countries to adopt mitigation and adaptation policies tailored to their specific needs and circumstances (Climate Change 2023 Synthesis Report, 2023b).

In the case of Ecuador, the Intergovernmental Panel on Climate Change has become directly involved in national instruments, such as the national climate change strategy and the national climate change adaptation plan. These documents guide the country's climate action solutions and also define the responsibilities at each level of government. For example, decentralized autonomous governments, such as that of Cuenca, are tasked with integrating climate change management into their development and land-use plans, as well as promoting projects that foster sustainability and resilience in the city (MAATT, 2023).

Similarly, the IPCC's recommendations are not confined to the international scientific sphere, but are reflected in policies and programs applicable at the national and local levels. In the city of Cuenca, this is reflected in sustainable mobility initiatives linked to climate finance. The projects and actions undertaken are a key example of how national commitments to reduce emissions and adapt to climate change are aligned with the recommendations of the Intergovernmental Panel on Climate Change, while also adhering to established international agreements (Climate Change 2023 Synthesis Report, 2023a).

We can say that the IPCC has the essential function of providing the scientific research upon which national and local policies in our country are based. It should be emphasized that its reports can lead to the implementation of strategies and improve the technical capacity to seek new financing mechanisms that allow local governments to implement climate commitments in specific territories (PNUMA, 2021).

In general terms, climate rationale, according to module seven of the capacity-building program for accessing climate finance, is the scientific and technical basis that demonstrates the relationship between climate, climate options, and social benefits. This provides evidence of the need for a project and the contribution of a process that reduces emissions and is more climate-positive and resilient. This scientific and technical basis

helps to understand, from a climate perspective, why to undertake a project; it not only explains the reasons but also demonstrates how the project fosters a new, sustainable model for addressing environmental challenges (Programa de Naciones Unidas para el Desarrollo – PNUD Ecuador, 2021).

Furthermore, the climate rationality approach is particularly relevant to this work, as it helps explain why many local initiatives, even with financial support, do not always align with sustainability goals. In the context of climate projects related to areas such as sustainable mobility or waste management, this approach helps to understand this concept, revealing it as a cognitive and social barrier that can lead to underestimating various signals when implementing these projects. Understanding these issues allows for the design of more effective policies and mechanisms capable of fostering environmental awareness (Botzen, 2025).

Regarding the local government of Cuenca, the Integrated Transportation System (SIT) focuses on reducing emissions and generating sustainable mobility. Similarly, the biogas capture and combustion project at the Pichacay Sanitary Landfill is focused on mitigating greenhouse gases. These projects clearly reflect the practical application of climate rationale in projects addressing environmental problems in Cuenca, as they identify a local climate issue. In this case, the pollution generated by transportation and solid waste in the city incorporates scientific data, such as greenhouse gas (GHG) inventories. They also propose concrete mitigation measures, such as electric transportation. Regarding the transportation and energy use of methane, the Pichacay Sanitary Landfill project demonstrates the impact of projects that benefit the society and environment of Cuenca by reducing pollution and, consequently, improving the quality of life in the city (Programa de Naciones Unidas para el Desarrollo – PNUD Ecuador, 2021).

1.3. Climate Finance

Climate finance refers to the financial resources and instruments used to support climate action, whether by mitigating its causes or adapting to its impacts. Since the transition to a low-carbon, climate-resilient economy requires large-scale investment, this type of financing is essential. The magnitude of the climate challenge demands that both public policies and private investment decisions incorporate climate risk as a key element

in project planning and implementation.(Programa de las Naciones Unidas para el Desarrollo, 2025).

Climate finance resources can come from multiple sources: public or private, national or international, bilateral or multilateral. They are channeled through a variety of financial instruments, such as grants, donations, concessional loans, guarantees, green bonds, or equity investments. These funds are used for activities ranging from reducing greenhouse gas emissions (mitigation) to improving the adaptive capacity and resilience of vulnerable communities to the effects of climate change.(Naciones Unidas, 2025).

In this context, financial mechanisms have been established under the supervision of the United Nations Framework Convention on Climate Change (UNFCCC) to provide support to developing countries. Some of the most important of these are the Green Climate Fund (GCF), the Global Environment Facility (GEF), and the Adaptation Fund (AF). These funds aim to reduce the financial capacity gap between developed countries and those facing greater risks and fewer resources to address climate change.(Naciones Unidas, 2023).

In accordance with the Convention's principle of "common but differentiated responsibilities and respective capabilities," developed countries have an obligation to provide financial support to developing countries. This commitment was reaffirmed in the Paris Agreement, which also encourages, for the first time, voluntary contributions from developing countries that are able to make them. The objective is to ensure that financial flows are aligned with sustainable, climate-resilient, and low-carbon development.(UNFCCC, 2024).

In conclusion, we can say that these agreements complement each other with the aim of guaranteeing the availability of sufficient resources to address environmental problems. Through these international instruments, it is possible to ensure, to a certain extent, that projects are feasible, sustainable in the long term, and have a positive impact on society.

1.3.1. National Policy Instruments for Climate Change Management

In Ecuador, there are several public policy instruments through which lines of action, objectives, scenarios, and climate change actions are identified, the implementation of which requires a series of financial, technological, and human resources.

These policy instruments have been designed as guidelines that organize and coordinate the actions and measures the country needs to address climate change and adapt to its effects, as well as to tackle the loss and damage caused by those negative impacts. Furthermore, these instruments broadly define the resources needed for their implementation, including financing, technology, and skills, within the context of national climate change management.

National climate change strategy

Ecuador's National Climate Change Strategy (ENCC) is a state policy that aims to guide the country's actions to address climate change through mitigation and adaptation to its emissions and impacts, integrating these principles across all productive sectors and levels of government. Its main objective is to reduce the vulnerability of the population, ecosystems, and infrastructure while promoting a sustainable, low-carbon development model.(República del Ecuador. Ministerio del Ambiente., 2012).

This strategy is based on principles such as mainstreaming and social participation. The ENCC seeks to articulate national policies such as strengthening climate governance and territorial planning, as this instrument constitutes a guide for climate action in Ecuador.(República del Ecuador. Ministerio del Ambiente., 2012).

Nationally Determined Contribution (NDC)

It is the This is the official commitment presented by Ecuador to the United Nations Framework Convention on Climate Change to contribute to the fulfillment of the Paris Agreement, in which Ecuador establishes its goals for reducing greenhouse gas emissions and its adaptation actions to the impacts of climate change, considering its status as a developing country.(Republica del Ecuador, 2025).

Furthermore, the NDC seeks to balance economic development with environmental sustainability strategies, promoting key sectors such as energy, transportation, and waste management, and aligning with national policies such as the National Climate Change Strategy. In short, the NDC presents Ecuador's national and international commitment to move towards more carbon-conscious development, reinforcing its participation in global climate action (República del Ecuador, 2025).

Adaptation plan

It seeks to reduce or limit greenhouse gas emissions, which contribute to problems like global warming, and can also improve the capacity of ecosystems to absorb carbon, for example, through forest conservation and reforestation. It aims to reduce greenhouse gas emissions by decreasing the use of fossil fuels, while also promoting sustainable land management and the adoption and expansion of clean technologies in cities worldwide.(República del Ecuador, 2012).

The National Adaptation Plan states that it seeks to strengthen the country's capacity to address the negative impacts of climate change, prioritizing food sovereignty, sustainable agriculture, water and natural ecosystem management, public health, and risk management in the face of extreme events. In practice, these initiatives would be reflected in the conservation of high-altitude moorlands, the optimal management of water resources, territorial planning, and measures to prevent flooding in vulnerable cities.(República del Ecuador, 2012).

Unlike the National Mitigation Plan, the Adaptation Plan seeks to address some of the unavoidable effects of climate change. It analyzes how to prepare the country to face these effects in a planned manner, aiming to minimize damage and turn opportunities into positive outcomes for Ecuador's sustainable development.(República del Ecuador, 2012).

The Adaptation Plan prioritizes key areas that have become urgently needed due to their vulnerability in the country. Water and natural ecosystem management is a central focus, aiming to conserve páramos (high-altitude Andean ecosystems) and forests, and to guarantee the supply of water sources while regulating the water cycle. Another key area is food sovereignty, which seeks to promote agroecological practices and crop diversification to make crops more resilient to external climatic conditions. Regarding health and well-being, the plan aims to reduce health risks resulting from the measured rise in temperatures and the proliferation of diseases. Finally, risk management, a key component, includes strengthened early warning systems and territorial planning to address the consequences of environmental problems.(República del Ecuador, 2012).

Mitigation plan

Adaptation refers to the adjustments and variations in human and natural systems to cope with the current and potential future effects of climate change. The National Climate Change Strategy comprises a set of measures designed to reduce the vulnerability of social, economic, and environmental systems to the impacts of climate change,

addressing both the problems it generates and the opportunities it presents. While mitigation seeks to prevent the problems of climate change, adaptation aims to respond to its inevitable effects, as these effects can lead to droughts, floods, disease, and economic hardship in our city.(República del Ecuador, 2012).

The National Adaptation Plan states that it seeks to strengthen the country's capacity to address the negative impacts of climate change, prioritizing food sovereignty and sustainable agriculture, water and natural ecosystem management, public health and human settlements, and risk management in the face of extreme events. Implemented, these initiatives would be reflected in the conservation of high-altitude moorlands, the optimal management of water resources, territorial planning, and measures to prevent flooding in vulnerable cities.(República del Ecuador, 2012).

Unlike the national mitigation plan, the adaptation plan seeks to address some of the unavoidable effects of climate change. It analyzes how to prepare the country to face these effects in a planned manner, aiming to minimize damage and turn opportunities into positive outcomes for Ecuador's sustainable development.(República del Ecuador, 2012).

The Adaptation Plan prioritizes key areas that have become urgently needed due to their vulnerability in the country. Water and natural ecosystem management is a primary focus, aiming to conserve high-altitude moorlands and forests, guarantee the supply of water sources, and regulate the water cycle. Another crucial area is food sovereignty, which seeks to promote agroecological practices and crop diversification to make crops more resilient to external climatic conditions. Regarding health and well-being, the plan aims to reduce health risks resulting from the gradual rise in temperatures and the proliferation of diseases. Finally, risk management, with its strengthened focus on early warning systems and territorial planning by residents to address the consequences of environmental problems, is also a key component.(República del Ecuador, 2012).

National Climate Finance Strategy EFIC

Ecuador has a system that supports the nation's climate strategy, aiming to mobilize and manage funds to implement measures that reduce and adapt to climate change through specific actions. Its objective is to improve the country's capacity to obtain, manage, and direct funds from diverse national and international public, private, and cooperation sources, ensuring that financing is effective in reducing vulnerability and emissions. The EFIC (Ecuadorian Climate Change Funding Strategy) promotes clarity, sustainability, and

collaboration among institutions, guiding investment toward key sectors such as energy, transportation, agriculture, waste management, and ecosystem protection. Thus, it becomes an important resource for fulfilling the commitments made in the National Climate Change Strategy (ENCC) and the Nationally Determined Contribution (NDC), ensuring that Ecuador's climate policies have the necessary financial support and are sustainable in the long term.(EFIC, 2021).

1.3.2. Climate Finance in Ecuador

In Ecuador, as a developing country, climate finance has been a fundamental tool for strengthening and establishing environmental management, while simultaneously fulfilling the international commitments implemented under the Paris Agreement. In recent years, the country has implemented institutional initiatives aimed at creating monitoring, transparency, and efficiency in public spending related to climate change, in accordance with the Sustainable Development Goals and global environmental policies .

One of the highlighted instruments is the Orientation of Spending Classifier for Environment and Climate Change Policies (GOGPACC), which was implemented by the Ministry of Economy and Finance in 2022.

The purpose of this approach is to link the activities of budgetary programs with strategic, environmental, and climate goals, verifying the extent to which public policies are being incorporated into institutional budgets and streamlining their monitoring during budget execution. In short, the GOGPACC identifies what portion of national public spending is directly related to climate action, thus ensuring more efficient resource management and budget transparency (Ministerio de Economía y Finanzas, 2022).

Similarly, the Climate Change Activities Catalog (CACC), which aims to identify and quantify the amounts invested in mitigation and adaptation projects, can help identify funding gaps for achieving the country's climate goals. It is an efficient mechanism because it facilitates resource mobilization by identifying the sectors that receive the most investment and are most vulnerable and in need of greater financial support (EFIC, 2021).

These initiatives generated by our country strengthen environmental institutions and facilitate coordination and a better distribution of resources among levels of government, especially local governments. Thanks to this, the local government of Cuenca can access budget planning and resources from cooperation funds, thus improving

the planning and implementation of projects that address environmental problems in the country and in cities, with a focus on sustainability (Mgs. Alexander Posso, 2024).

In the case of Ecuador, being a developing country, progress has been made in the area of climate finance, where the initiative of the Climate and Environment Policy Expenditure Orientation Classifier (COGPACC) has emerged, which aims to "Link the activities of the programs contained in the institutional budgets related to climate change and with the strategic objectives and goals of global planning and public policies to verify the extent to which they are being incorporated into the budget, as well as to facilitate their monitoring in budget execution." (Ministerio de Economía y Finanzas, 2022).

The Climate Change Activities Catalogue (CCAC) aims to identify the amounts invested in climate change to ensure the proper mobilization of resources and facilitate the quantification of existing financing gaps for achieving climate goals. Furthermore, it allows for the identification of sectors that concentrate the largest amounts of resources and the continuous monitoring of financing flows for mitigation and adaptation projects.(EFIC, 2021).

Figure 1

Uses of the Climate Change Activities Catalogue

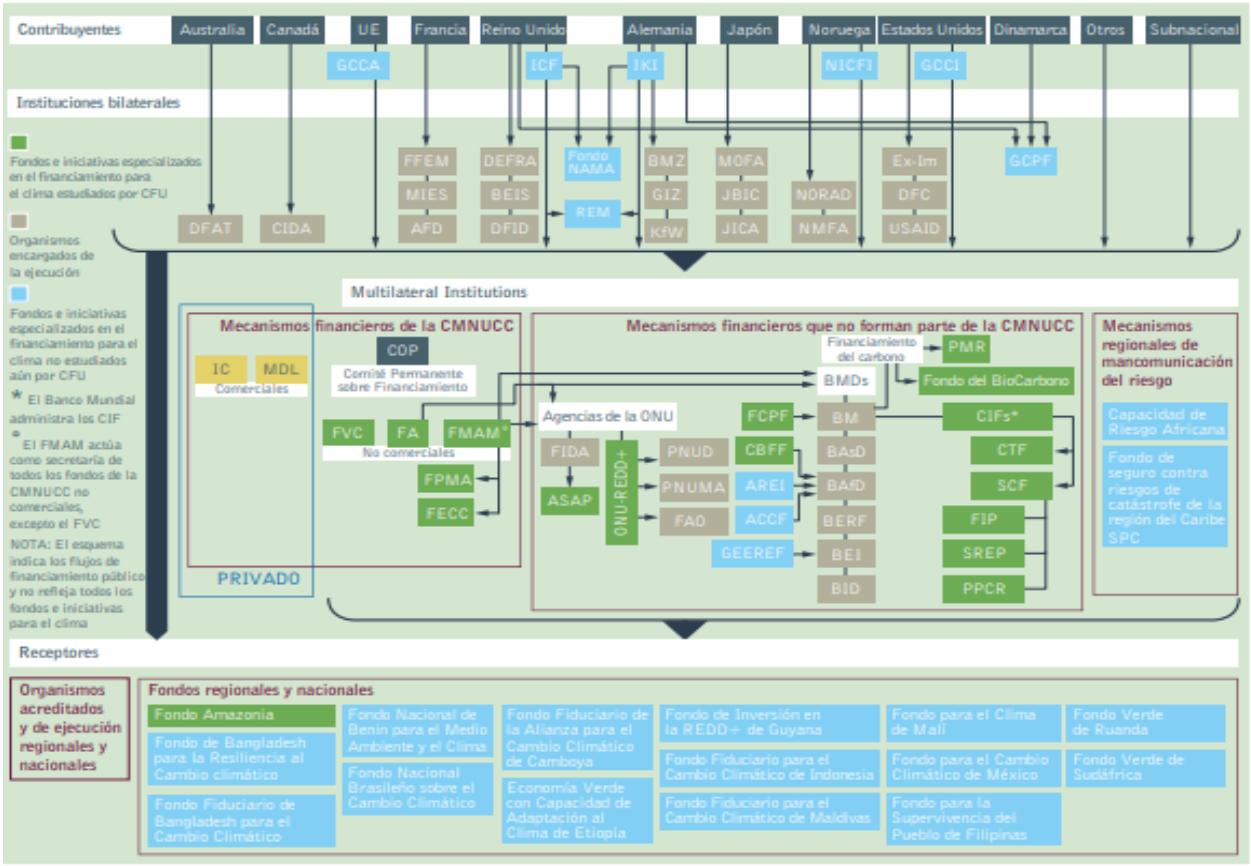
(EFIC, 2021)

1.3.3. Financial Structure of the International Environmental System

The graphic below illustrates the global network that channels resources for climate finance. Its purpose is to show how funds from developed countries are distributed through various mechanisms and institutions, both bilateral and multilateral, until they reach the recipient countries. This system aims to support initiatives to mitigate and adapt

to climate change, foster cooperation among nations, and improve local capacities to address the effects of global warming.

Figure 2
Financial Structure of the International Environmental System



(Climate Funds Update, 2020)

Uses of the Climate Change Activities Catalogue

The diagram shows how the global climate finance system is organized—that is, how funds to combat climate change are mobilized from donor nations to recipient nations. At the top are the donor countries, which are primarily developed nations such as Australia, Canada, the European Union, France, the United Kingdom, Germany, Japan, Norway, the United States, and Denmark. Each of these countries has national funds and agencies dedicated to climate cooperation, such as the International Climate Initiative in Germany, the International Climate Fund in the United Kingdom, or USAID and DFC in the United States. These agencies direct resources to financing programs, which can be bilateral or multilateral.(Climate Founds Update, 2020).

Bilateral institutions are government agencies or ministries that directly implement projects in partner countries. They work through cooperation agreements to support specific initiatives to mitigate or adapt to climate change, such as the development of renewable energy, waste management, or ecosystem protection.(Climate Founds Update, 2020).

At the center of the chart are the multilateral institutions, which manage the majority of international funds. These are classified into two main categories. The first encompasses the financial mechanisms belonging to the United Nations Framework Convention on Climate Change, which are overseen by the Conference of the Parties. Among these mechanisms are the Green Climate Fund, the Global Environment Facility, and the Adaptation Fund, which finance projects in developing countries to reduce emissions and strengthen resilience to climate change.(Climate Founds Update, 2020).

The second group includes financial mechanisms that are not part of the United Nations Framework Convention on Climate Change , such as multilateral development banks (the World Bank, the Inter-American Development Bank, the African Development Bank, among others). It also includes specialized funds, such as the Clean Technology Fund, the Strategic Climate Fund, and the Pilot Programme for Climate Resilience. Regional risk management mechanisms also exist, such as natural disaster insurance funds in Africa and the Caribbean.(Climate Founds Update, 2020).

Finally, at the bottom of the diagram are the recipients, which are developing countries or national and regional institutions responsible for implementing climate

projects. These include national funds such as the Bangladesh Climate Resilience Fund, the Mexico Climate Trust Fund, and the South African Green Climate Fund, which channel international resources to local actions tailored to the specific needs of the region.(Climate Founds Update, 2020).

1.3.4. Climate Finance Instruments

Climate finance is classified into different categories: repayable, non-repayable through bonds, grants, donations, loans, etc., each with its own operating procedures and purpose. Repayable finance refers to loans or credits that countries must repay within a specific period, with or without interest. This type of funding generally comes from development banks or financial institutions at a global level. The intention is that these funds be used for climate change mitigation and adaptation initiatives, but always under certain conditions that guarantee the proper use of the money.(Manual Sobre Financiamiento Climático: Mecanismos y Oportunidades Para América Latina y El Caribe, 2024).

On the other hand, non-reimbursable financing includes funds that do not need to be repaid, such as donations or grants. This type of financing is essential for developing nations, as it allows them to implement climate projects despite limited access to debt. These resources are typically provided by governments, global organizations, or cooperation agencies, and are intended to support projects that genuinely help combat climate change without increasing debt (Climate Funds Update, 2020).

Climate bonds are another way to finance climate-related initiatives, but in a more "reverse" way, if you will. Governments, companies, or banks create them to attract private sector investment, and in return, investors receive a financial return. It's interesting to note that the money raised is earmarked exclusively for projects that meet environmental requirements, which helps attract private funds to climate action. (Manual Sobre Financiamiento Climático: Mecanismos y Oportunidades Para América Latina y El Caribe, 2024).

Grants are funds allocated to developing countries to implement actions aimed at mitigating or adapting to climate change, without the need for repayment, except in cases of non-compliance. There are also repayable grants, which are awarded once the necessary expenses have been validated. Similarly, donations are completely free contributions without requirements, while technical assistance includes the involvement

of specialists who provide guidance, conduct research, or transfer technology, generally at no cost to the country or entity receiving the aid.(Climate Founds Update, 2020).

On the other hand, loans and credits are forms of financing that require repayment: loans are offered for a specific amount with interest, while credits function as a line of credit that can be used as needed, similar to a credit card. There are also guarantees, which protect the fulfillment of payment obligations if the borrower defaults, and private capital, which refers to direct investment in projects in exchange for a share of the profits. Finally, results-based payments are made only after it has been verified that the agreed climate objectives have been met.(Climate Founds Update, 2020).

In conclusion, these methods complement each other with the goal of ensuring that there are sufficient resources to address the challenges of climate change; through these means, it can be guaranteed that projects are feasible, sustainable, and that they truly generate a positive effect on the environment.

1.4. Impact of Climate Finance on Urban Management

Sustainable urban management has become essential for addressing the rapid growth and complexity of 21st-century cities. In this context, access to climate finance is a key factor in transforming urban planning models toward more resilient and environmentally responsible approaches. This financing allows resources to be channeled toward projects that integrate mitigation and adaptation into territorial management, promoting green infrastructure, sustainable mobility, and improved natural resource management. (CEPAL et al., 2009).

One of the most important factors is the Sustainable Development Goals (SDGs), as they constitute the global roadmap for guiding actions. In this case, SDG 11, "Sustainable Cities and Communities," is responsible for promoting and coordinating public policies, responsible investments, and citizen participation. Climate finance facilitates the realization of these goals, enabling the design and implementation of sustainable projects. In this way, investments not only address current demands for basic services but also ensure the resilience of cities to future climate impacts.(Naciones Unidas, 2023a).

In this process, international organizations, United Cities and Local Governments (UCLG) play a key role by fostering cooperation among local governments and promoting innovative financing mechanisms. UCLG drives strategies that strengthen

local governance and inter-institutional coordination, enabling cities to access climate funds and develop projects that reduce emissions, improve quality of life, and strengthen urban resilience.(UCGLU, 2021).

Climate finance is not just a financial resource, but a transformative tool that enables cities to move towards sustainable urban management. Its impact is evident in the possibility of implementing policies for clean transportation, green infrastructure, energy efficiency, and proper waste management, thereby consolidating more sustainable, competitive territories better prepared to face the challenges of climate change.

1.5. Challenges and Dependence on Local Financing

Local financing can leverage resources by implementing tactics and financial resources at the municipal or local government level to support projects aimed at mitigating and adapting to climate change within their territory. For local communities to be able to implement climate solutions tailored to their specific contexts and needs, it is essential to have these resources, which can come from private, public, or alternative sources (United Nations Climate Change, 2025a).

In practical terms, the city of Cuenca faces numerous obstacles in funding local climate-related actions. The municipality's economic autonomy and capacity to generate independent income are diminished because most of its resources come from transfers from the central government. This is compounded by budget constraints, which generally focus on immediately addressing basic services or infrastructure needs. The problem is that climate and environmental projects typically require medium- and long-term investments, which do not align with the logic of immediate spending. Therefore, the Cuenca Municipal Government (GAD Municipal de Cuenca) ends up seeking international aid and external resources, which are its primary source for implementing climate change mitigation and adaptation initiatives.(United Nations Climate Change, 2025b).

Climate finance at the local level faces numerous challenges, with limited coordination between available resources, technical capacities, and access to sustainable technologies. Among the main obstacles is the difficulty in accessing support resources from external sources of financing and knowledge, which increases vulnerability to changes in national or international policies and delays the implementation of local projects.(United Nations Climate Change, 2025b).

Technology transfer and technical cooperation are essential for developing countries to increase their tools and knowledge to adapt to and mitigate the consequences of climate change and thus address environmental problems. In the city of Cuenca, climate governance is a fundamental pillar, as its strength determines the ability to access international financing, as well as technology transfer and research programs that support mitigation and adaptation to environmental problems. This is because international cooperation agencies and climate funds often require, as a condition, the existence of clear institutional frameworks, with local action plans, transparency mechanisms, and citizen participation. In this sense, strengthened governance allows Cuenca not only to manage available resources more efficiently but also to maintain open possibilities for obtaining external support for environmental projects (United) . Nations Climate Change, 2025).

This involves the intervention of external financing, both public and private, as well as the exchange of best environmental practices , efficient use of resources, and energy efficiency, which benefits the city by enabling it to better implement sustainable practices, thus promoting environmental protection and generating long-term sustainable development.(Banco de Desarrollo de América Latina y el Caribe, 2022).

Analysis of the topic shows that local climate finance is a crucial element for cities to face the challenges posed by climate change, not a minor issue. For Cuenca, this type of financing represents both a challenge and an opportunity, since without a solid economic base it is difficult to carry out environmental projects sustainably.(Programa de las Naciones Unidas para el Desarrollo, 2025b).

The lack of coordination between available resources, the municipality's technical skills, and access to sustainable technologies is one of the most significant problems. This creates obstacles that hinder the implementation of climate-responsible policies and projects. The city is particularly vulnerable because it relies heavily on external sources of funding and expertise, as changes in national or international priorities can affect the implementation of local initiatives.(Naciones Unidas, 2025d).

In this context, technical cooperation and technology transfer become fundamental tools. These not only allow municipalities to acquire infrastructure and equipment, but also enable them to train their staff and strengthen their internal capacities to ensure the sustainability of projects. At the same time, collaboration with research centers, universities, and international organizations provides access to specialized research and

best practices that contribute to better planning and implementation of climate policies. This combination is essential in Cuenca, as it ensures access to technologies, funding, and expertise that strengthen the city's capacity to recover from the effects of climate change.(UNFCCC, 2025).

It is also important to note the incorporation of different financing methods. The combination of public, private, and international resources not only ensures the viability of the projects but also promotes the sharing of experiences and sustainable practices. In this way, available resources are maximized, energy efficiency is improved, and environmental protection efforts are intensified. (GEF, 2024).

In summary, a strategic and comprehensive perspective is needed to strengthen climate finance at the local level. If Cuenca can more effectively coordinate its technological, technical, and financial resources while reducing its high reliance on external funding for its projects, it has the potential to become a benchmark for climate management. Fostering global collaboration and technology transfer will not only increase its mitigation and adaptation capacity but will also ensure that the measures taken have a real and lasting impact. Efficient long-term financial management will enable a city to become stronger, more sustainable, and ready to face both existing and future environmental challenges.

CHAPTER 2.
STATE OF THE ART

2.1 The Role of Local Government in Climate Governance

Three-quarters of global energy consumption and approximately 80% of greenhouse gas emissions are linked to cities. (Objetivos de Desarrollo Sostenible, 2024).These are not only industrial and transportation hubs, but also the primary destination for food and raw materials produced in rural areas, which ultimately would not have been generated without urban demand. In this way, cities become strategic axes of the global economic and environmental system, concentrating population, infrastructure, technological innovation, and services, while simultaneously placing pressure on natural resources and generating waste. This dual role bestows upon them an enormous responsibility: on the one hand, as engines of development, and on the other, as key players in the transition to more sustainable and climate-resilient models.(Paula de Castro, 2018).

The role of local governments in environmental management is fundamental, as they are responsible for coordinating public policies within their territories and implementing programs that complement national guidelines. They also exercise control and monitoring functions to ensure compliance with environmental permits, and monitor mitigation plans to verify and apply sanctions or corrective measures when necessary. Through ordinances, development plans, and community projects, they seek to promote climate change mitigation and adaptation, as well as encourage citizen participation in environmental education and collective action. In this way, municipalities are expected to act as a bridge between national policies and the specific needs of each community.(Instructivo de Delegación de La Competencia Ambiental Otorgado a Los Gobiernos Autónomos Descentralizados (GAD), 2016)

In the specific case of the Cuenca Municipal Government, various plans focused on environmental sustainability have been formulated, such as the Cuenca Canton Environmental Plan 2014-2030. However, these plans still face challenges in their full implementation and long-term continuity, highlighting the need to strengthen implementation and monitoring mechanisms. This situation stems from both institutional limitations and inadequate management of allocated financial resources, which has

hindered the development of consistent climate change mitigation and adaptation initiatives.(Lechón Sánchez, 2020).

Climate governance can be understood as the set of rules, processes, actors, and coordination mechanisms that aim to guide collective action toward mitigation and adaptation to climate change. It involves collaborative efforts across different levels of government, including the private sector, civil society, and citizens, to address in a coordinated manner the risks and challenges directly related to climate change (Freddy Fabián Fuertes Moreno, 2020).

In this context, local governments play a fundamental role, as they are the level of government closest to the population and the territory, allowing them to more directly identify the vulnerabilities and needs of each community. Their role within climate governance includes designing and implementing local climate action plans, ensuring citizen participation in decision-making, managing resources from national and international funds, and coordinating with social and private actors for the development of sustainable projects. In accordance with the Organic Code of Territorial Organization, Autonomy and Decentralization (COOTAD) and the 2008 Constitution of Ecuador, Decentralized Autonomous Governments have exclusive powers in environmental and climate matters, specifically in Article 55, section e) of COOTAD, which establishes environmental management as a municipal responsibility. (Código Orgánico de Organización Territorial, Autonomía y Descentralización (COOTAD), 2010)Furthermore, Articles 267 and 274 of the Constitution of Ecuador stipulate that Decentralized Autonomous Governments must promote sustainable development and formulate and implement environmental policies within the framework of their powers (Constitución de La República Del Ecuador, 2008).

The experience of cities like Cuenca demonstrates that, although environmental proposals and projects have been generated, a lack of technical and financial capacity limits their reach, forcing municipalities to seek funding from international bodies. Effective climate governance, therefore, requires not only the collaboration of key actors such as private companies, universities, social groups, and communities, but also the institutional strengthening of local governments to ensure the implementation of sound and sustainable public policies. Likewise, it is essential that these governments promote public information and awareness campaigns so that the population understands climate

risks and can adopt appropriate and effective adaptation and mitigation strategies.(Freddy Fabián Fuertes Moreno, 2020).

Similarly, in recent years new financing options have emerged, such as Green Bonds or payments for environmental services, which are proving to be useful and innovative alternatives. (Banco de Desarrollo de América Latina y el Caribe, 2024a).All of this requires the joint collaboration of communities, private companies and public institutions, because it is teamwork that makes it possible for projects to have a real positive effect (Banco de Desarrollo de América Latina y el Caribe, 2024b).

Measurement, reporting, and verification are fundamental to ensuring transparency, effectiveness, and accountability in climate investments. This process helps us track indicators of both progress and results and evaluate the real impact of climate action and adaptation measures. Furthermore, it facilitates the measurement of financial flows and project progress, guaranteeing clear information on methodologies and reporting. This reduces organizational problems and prioritizes the country's climate needs.(Ministerio del Ambiente, 2017).

Furthermore, it is argued that local governments have evolved from simply implementing environmental policies to becoming strategic actors in climate governance, particularly in Latin America. Their importance is evident in cities, which concentrate the majority of greenhouse gas emissions but are also the places where the impacts of climate change are felt most acutely. In this context, local governments maintain a remarkable connection with the population, managing key services such as transportation and waste management, and thus fulfilling international commitments through concrete and visible actions.(Nahuel Pugliese, 2021).

It is important to understand that local climate action cannot be implemented individually, but rather takes place within a multi-level governance structure involving various actors, such as national government, international networks, private sectors, and civil society.(Nahuel Pugliese, 2021).

From this perspective, the role of local government is not limited to implementing projects; it must also lead processes of institutional and social transformation that make climate action sustainable over time. Municipalities become one of the most important links between international commitments and the daily realities of cities . This can be achieved by strengthening the institutional capacities of local governments, integrating

climate management into territorial planning instruments, and promoting citizen participation. Climate governance becomes more effective when local governments coordinate efforts with other levels of government to strengthen citizen participation and integrate into international networks that allow them to share experiences, access financing, and increase technical capacity.(Nahuel Pugliese, 2021).

Furthermore, several studies on multilevel climate governance, particularly those from Spain, have shown that the main challenge to effective climate action is the lack of coordination between different levels of government. Although most countries have national plans and strategies that recognize the need for cooperation, these often lack clear, permanent, and effective institutional mechanisms to coordinate planning and implementation between national and regional governments. This leads to fragmented policies, which reduces the effectiveness of climate change actions.(Laura Presicce, 2020).

2.2Sustainable Mobility and Waste

The Decentralized Autonomous Government of Cuenca has proposed numerous projects directly related to the Sustainable Development Goals (SDGs), focusing on areas that impact citizens' daily lives. These include projects related to waste management. These initiatives aim to provide a high-quality service, supported by technology and management protocols that have proven effective, as well as sustainable mobility projects that seek to improve mobility in a more environmentally friendly way. These actions cannot remain merely theoretical; they must be transformed into effective and far-reaching public services.(Pérez-Morales et al., 2022a)

The Integrated Recycling System of Cuenca is a specific example within this area, which has been strengthened as a proposal with numerous benefits. With the aim of extending the lifespan of the landfill and improving resource utilization, it generates electricity, thus contributing to the system's financial stability. It is particularly important that the Pichacay Landfill project not only focuses on technical aspects but also considers working conditions. Activities are organized with the Ministry of Public Health to safeguard workers' health, and workshops and training sessions are conducted to improve their quality of life and promote social inclusion. In this sense, recycling in Cuenca is not only an environmental issue but also a social and human one.

Another key focus in the city is sustainable transportation. Cuenca has an Ordinance for the Promotion and Strengthening of Active Mobility (2020), which aims to improve and organize pedestrian traffic. It also encourages the use of non-motorized vehicles, such as bicycles. This measure may seem simple, but it is actually crucial because it enables a decrease in polluting emissions, reduces urban congestion, and decreases the use of private vehicles. Furthermore, it requires coordination between the areas of road planning, urban development, and transportation. Road safety education campaigns and training programs have also been promoted to help citizens become accustomed to new ways of getting around the city. These measures not only optimize mobility but also change the way citizens interact with public space.

In this same area of sustainable mobility, Cuenca has also committed to larger-scale projects. A clear example is the Cuatro Ríos Tramway, which was established between 2018 and 2024 as a benchmark for clean and efficient transportation. Although its construction began in previous years, during this phase it was supported by municipal policies that even linked it to climate finance schemes.(León & Godoy, 2017). The tram not only represents a less polluting mode of transport, but also a cultural shift: it reduces traffic, improves traffic flow, and demonstrates that a more modern system, less dependent on private cars, is possible. In addition, the city has incorporated electric buses into the Integrated Transport System (SIT), a technological advancement that helps lower emissions and makes public transport more attractive.(León & Godoy, 2017). In addition, there is a network of permanent bike lanes that connect with public transportation, allowing more and more citizens to choose bicycles as their daily mode of transport. Even cultural activities like the Recreational Bike Paths or the events of Mobility Week reinforce this vision: they may seem like small activities, but they are actually key to encouraging people to change their habits.(Ordenanza Para La Promoción y Fortalecimiento de La Movilidad Activa En El Cantón Cuenca, 2025).

Climate action in the city of Cuenca also reflects progress in waste management, which has become a key contributor to reducing local greenhouse gas emissions. At the Pichacay Sanitary Landfill , a biogas capture and combustion system was implemented, funded by the French Development Agency. This system transforms methane, one of the gases with the greatest global warming potential, into electricity, turning a source of pollution into an energy and environmental opportunity for the city.(Paúl Galarza, 2021).

Taken together, separate waste collection, public awareness campaigns, and community composting projects demonstrate a logical approach to the circular economy, where recyclable waste is reintroduced into new production cycles and waste is used as fertilizer for local agriculture. These actions become part of waste management within a framework of sustainable production and contribute to the environmental resilience of the Cuenca canton.(Paúl Galarza, 2021).

At the same time, in the urban sphere, a global perspective on how cities address environmental challenges is being emphasized, such as reducing emissions and directing projects toward sustainable development models. Sustainable mobility is improving in the transportation sector, as it describes a structured transformation in how people relate to urban space, thus integrating dimensions of territorial planning, environmental education, technology, and social equity, all of which are important for making cities cleaner and more sustainable (Pérez-Morales et al., 2022b).

Taking into account the progress in sustainable mobility and waste management, both areas are linked by a common purpose: reducing emissions through local policies that promote responsible urban planning. In this respect, local governments, as those responsible for public services and territorial planning, become key players in promoting projects that integrate clean and efficient mobility with proper waste management (Pérez-Morales et al., 2022b).

In this work, the authors frame the idea that achieving a sustainable transport model involves promoting a change in societal habits, increasing accessibility, and prioritizing clean technologies, so that these principles can be applied in parallel to urban waste management (Pérez-Morales et al., 2022b). Therefore, it can be said that sustainable mobility and waste management constitute fundamental pillars for local climate action, since experiences show that cities with technological innovation, coherent urban planning, and environmental policies can generate a positive and sustainable impact on reducing emissions and improving the quality of life for their citizens (Pérez-Morales et al., 2022b).

CHAPTER 3.
Methodology

The methodology of this work is based on the research question: How has climate finance been channeled and implemented at the local level, and what challenges have been faced in its implementation? To address this question, a methodology based on data triangulation has been chosen, with the aim of obtaining an adequate understanding.

Triangulation allows for the combination of different sources and methods of information gathering, strengthening the validity and depth of the analysis (Colin Robson, 2015). First, a literature review was conducted, including academic documents, institutional reports, and materials related to climate finance and its application in the Cuenca context. Subsequently, a case study will be developed, focusing on analyzing the experience of the Cuenca Municipal Government (GAD) in the management and execution of the Pichacay Sanitary Landfill project and the Integrated Transportation System (SIT). Finally, semi-structured interviews will be conducted with key stakeholders involved in the process to gather perceptions, challenges, and lessons learned from practice.

This methodological approach seeks to integrate different perspectives and levels of analysis to offer a comprehensive view of the topic, combining theoretical reflection with expert perspectives. In this way, it aims to provide a clearer understanding of the dynamics, limitations, and opportunities of climate finance in project management at the Cuenca GAD (Decentralized Autonomous Government).

3.1 Literature Review

A literature review is necessary to understand the origins of the issue and how other authors have addressed it. This phase allows for the acquisition of knowledge from previous research related to international cooperation, local environmental governance, and climate finance, both globally and within the context of Ecuador. Analyzing the literature involves not only compiling data or citing theories, but also examining existing research to identify gaps and thus argue for the relevance of the study (Earl Babbie, 2013).

In accordance with the above , most of the research on climate finance is identified, which analyzes institutional reports and environmental initiatives, as well as the role of local government and climate finance.

On the other hand, there is little analysis at the local level, especially in intermediate cities like Cuenca, with voluntary reports where SDG 12, which refers to responsible production and consumption, is linked to the Pichacay Sanitary Landfill due to its perspective on the circular economy, which includes the search for and combustion of biogas to generate energy and inclusive recycling. SDG 13 also has an indirect relationship with the reduction of greenhouse gases and the preservation of ecosystems, which is in line with global commitments. SDG 11, which reduces the impact of waste on the environment, has a collection coverage of 96.5% and promotes the creation of green jobs (CEPAL (Comisión Económica para América Latina y el Caribe) / Naciones Unidas, 2025). This reinforced the idea of focusing on how local governments implement policies and manage resources in this area. A proper literature review also makes it possible to organize concepts and give meaning to the research by establishing connections between theories and ideas. On this occasion, the review process supported the development of key concepts, bringing together perspectives from environmental governance, public management, and sustainable development. The review was also an essential tool for determining the categories of analysis and selecting the most relevant information for the research (Colin Robson, 2016).

Throughout this stage, the main sources were academic articles, institutional documents, reports from the Ministry of the Environment and publications from international organizations such as the United Nations Development Programme (UNDP).

The literature review identified that the theoretical framework is based on key international agreements on climate change, such as the UNFCCC, the Kyoto Protocol, and the Paris Agreement, as well as national instruments like the National Climate Change Strategy (ENCC), the Nationally Determined Contribution (NDC), and the National Climate Impact Assessment (EFIC). These documents help us understand how climate action is structured. The state of the art highlighted the role of local governments in local governance and their respective actions and responsibilities. The review also identified key areas such as sustainable mobility and waste management.

3.2 Case Study

This study employs the case study technique, understood as a research method that seeks to analyze a phenomenon within its real-world context and from a holistic

perspective. This methodology allows for the collection and comparison of information from various sources, facilitating an understanding of how climate finance has been managed and implemented at the local level, taking into account the specific characteristics of the territory and the actors involved in the process (Colin Robson, 2016).

The case study is not limited to a single approach, but rather integrates diverse sources of information, such as documents and data, to achieve a broader understanding of the topic. In this way, this technique will allow us to understand not only how climate finance is managed at the local level, but also the challenges and dynamics that affect its implementation (Colin Robson, 2015).

The case study results include the Integrated Transportation System (SIT) project, which aims to reduce congestion and emissions in the city of Cuenca. Funded by CAF and KfW, this project reduces CO2 emissions by approximately 4,296 tons per year, with a total projected reduction of 350,000 tons. One of the advantages of this case study is the modernization of transportation, improved accessibility, and better air quality. Challenges include the need for external support, administrative hurdles, and a lack of comprehensive planning, which hinders the long-term development of the projects.

Furthermore, the Pichacay Sanitary Landfill utilizes the biogas present in its waste to produce energy. This project, which began in the northern phase in 2001 and is scheduled to run until 2026, and is planned for implementation in the southern phase in 2027. Funded through the French Development Agency and a public-private partnership between EMAC EP, the project reduces CO2 emissions by approximately 30,000 tons annually, generates electricity, and promotes a circular economy. The positive aspects of this initiative include environmentally friendly practices, environmental education, and an extended lifespan for the landfill.

3.3Interviews

Semi-structured interviews will be conducted with various stakeholders involved in environmental management and climate finance in Cuenca to supplement the documentary data. These interviews are ideal for capturing opinions, perceptions, and personal experiences, as they offer flexibility and allow for exploration of issues that arise spontaneously during the conversation (Earl Babbie, 2013).

The themes identified in the literature review will be used as the basis for developing the interview guide. Municipal government officials, academics with expertise in climate finance and urban sustainability, and representatives from environmental institutions were the interviewees.

This method generates diverse information, allowing us to understand reality from the perspective of those who experience it daily. Therefore, the interviews will provide us with the opportunity to understand not only the challenges faced by local institutions and perceptions of international cooperation, but also the strategies that could improve the city's environmental management.(Colin Robson, 2015).

Based on the transcripts, the responses will be analyzed by categorizing them thematically: the Pichacay Sanitary Landfill and the Integrated Transportation System. In this way, the interviews will not only be a source of information but also a tool for reflecting on the role of local government in the fight against climate change.

The results of the interviews revealed common patterns with the institutional perception of climate projects in Cuenca. First, the interviewees agreed that there is political and technical will to advance sustainable mobility and waste management. They highlighted that the projects analyzed represent significant progress in emissions reduction and urban efficiency; however, they also noted that the projects are not being developed in an optimal environment, as inter-institutional coordination problems persist, along with the lack of comprehensive environmental management planning.

Another point highlighted was the insufficient environmental education and awareness, which translates into low use of sustainable transportation and public infrastructure. While acknowledging the efforts of institutions like the Cuenca Municipal Public Cleaning Company (EMAC EP) in recycling campaigns, it was felt that these initiatives are not uniformly implemented in other sectors. Finally, those interviewed presented a critical yet realistic view, recognizing that Cuenca has made significant progress compared to other cities in the country in achieving effective urban management.

CHAPTER 4.
Results

Analysis of Projects Implemented with Climate Finance. The analysis of projects implemented with climate finance reveals how international and national resources have been directed toward initiatives that seek to reduce emissions in order to promote sustainability and urban resilience. The Integrated Transportation System (SIT) and the Pichacay Sanitary Landfill project represent concrete examples of how climate finance can transform urban management by integrating clean technology, international cooperation, and socio-environmental benefits. The study of these projects identifies institutional progress and lessons learned that reflect the degree of coordination of local action by the Cuenca Municipal Government.

Official E01 explains that Ecuador's environmental policy is structured around the National Climate Change Strategy (ENCC) and implemented at the territorial level through the Territorial Development Plans (PDOTs) of the municipalities. According to an interviewed official (E01), these regulations allow national objectives to be translated to the municipal scale, enabling public policies to address the specific environmental realities of each territory. In this case, the city of Cuenca states that the integration of sustainability criteria, risk management, and emissions reduction is part of its urban planning. Therefore, it is important to consider that what is established as national policy translates into concrete local actions aimed at sustainable development and climate governance.

4.1Integrated Transportation System (ITS)

The Integrated Transportation System (SIT) emerged as a response to the need to plan, improve, and optimize the urban mobility system in light of the city's growth, characterized by traffic congestion, uncontrolled growth of the automotive sector, and a public transportation system with room for improvement. This led to the adoption of new transportation methods. Given this context, the Decentralized Autonomous Municipal Government of Cuenca (GAD) promoted the modernization of the urban transportation system to improve connectivity, reduce polluting emissions, and strengthen urban sustainability.

The Integrated Transportation System (SIT) of the city of Cuenca is a unified urban mobility model that links various modes of transport, including the Cuatro Ríos Tram, electric buses, recreational bike paths, pedestrian walkways, and recreational bike lanes, within a connected structure that emphasizes optimizing the bus route network. All of this aims to feed into the tram system and thus improve service quality, reducing travel times, minimizing congestion, and promoting competitive, sustainable mobility. This includes fare integration to unify payments between buses and the tram, making the system more accessible and efficient for users.

When discussing the case of the Integrated Transportation System of the city of Cuenca, we can say that the Cuatro Ríos Tram, despite its construction taking place in past years, has become a clear example of clean and efficient transportation, which was supported by municipal policies that were linked to climate financing schemes during the period of 2018-2024.

Meanwhile, E02 (an official from the Municipality of Cuenca) explicitly supports the idea that climate finance is a key tool for sustaining local projects in the long term. Furthermore, he also mentions that electric buses and other modes of transportation could be expanded through low-interest loans, which directly aligns with Article 9 of the Paris Agreement.

This case is a clear example of projects supported by international cooperation and funding. The local government relies on international sources to implement, sustain, diversify, and innovate projects. The international organizations involved include CAF (Development Bank of Latin America and the Caribbean) and KfW (German Development Bank), among other international financing mechanisms such as the Adaptation Fund and the Green Climate Fund, created under the Paris Agreement and the Kyoto Protocol. These mechanisms enable the Cuenca Municipal Government to access resources for implementing mitigation and adaptation projects in the city.

However, E02 mentions that there is a lack of comprehensive urban mobility planning, which prevents taking advantage of the full potential of sustainable transport and is directly related to the analysis of the (SIT), and mentions that there are still administrative and technical barriers that should be applied from education and environmental culture.

Consequently, the Integrated Transportation System has sought to address the challenges facing the city of Cuenca, namely reducing greenhouse gas emissions and creating sustainable and resilient mobility within the city. Therefore, the Cuenca Four Rivers tram project was designed with the goal and capacity to reduce 4,296 tons of CO2 annually, and it is expected to reduce approximately 350,000 tons of carbon dioxide over its lifespan. The project's effectiveness has allowed Cuenca to benefit from its initiatives, resulting in both direct and indirect beneficiaries. The direct beneficiaries are the citizens of Cuenca, as the tram and the incorporation of electric buses provide clean and efficient transportation, thus modernizing the city, reducing emissions, and making public transportation much more attractive .

4.2 Pichacay Sanitary Landfill

The Pichacay Sanitary Landfill arose in response to the growing environmental problems caused primarily by the accumulation of waste in the city of Cuenca, Ecuador. During the 1980s and 1990s, the city used various open dumps, such as Totoracocha , which generated significant environmental and health impacts. Faced with this problem, the Decentralized Autonomous Municipal Government of Cuenca (GAD), through the Cuenca Municipal Cleaning Company (EMAC EP), began creating a technical and controlled system for the final disposal of waste.

Pichacay Sanitary Landfill is responsible for receiving, processing, and safely disposing of all waste generated by the city. Its main objective is to prevent the environmental pollution caused by the old open-air dumps, ensuring proper waste management.

Its operation is as follows: collection trucks arrive at the site and dump the waste in areas called disposal cells. There, the waste is compacted and covered with soil daily, preventing the presence of insects, animals, and unpleasant odors, and improving the visual impact. In addition, the landfill uses the gases produced, especially methane, to generate electricity through a system of pipes that capture the biogas, preventing its release into the atmosphere and mitigating climate impact.

The Pichacay Sanitary Landfill represents one of the most robust examples of sustainable environmental management in the Cuenca canton, combining the technical disposal of waste with the energy recovery of biogas. According to the data analyzed, this project has been developed in phases: the Northern Phase, operational since 2001, is projected to

close in 2026; while the Southern Phase, currently in the design phase with completed studies, is expected to operate for 11 years starting in 2027. This progress demonstrates long-term planning in the integrated management of solid waste.

This coincides with the opinion of E03 (EMAC EP Final Disposal Technician) who highlighted that environmental sustainability in Cuenca is mainly implemented through municipal public companies, articulating each stage of the process from collection to final disposal.

Regarding energy generation, the Pichacay biogas project represents a technical advancement in waste management. This advancement was implemented in phases: from the start of controlled methane combustion in 2015 to electricity generation from biogas in 2017, resulting in a reduction of approximately 30,000 tons of CO2 equivalent per year. In an interview, the technician confirmed that this initiative is operated through a joint venture, with EMAC EP holding a 51% stake and the Dutch company Energy Engineering also participating. Solutions (BGP) holds 49% of the stake and is responsible for operating the energy system. This model demonstrates the practical application of local climate finance, combining political resources and international technological partnerships.

Furthermore, the analysis indicates that the French Development Agency is participating in the Southern Phase of the landfill. E03 (Final Disposal Technician at EMAC EP) confirms that an international loan of $26,726,500 has been secured from this agency, which underscores Cuenca's transition to environmental management with a global co-responsibility approach, combining foreign investment with local resources to sustain environmental infrastructure. However, E03 states that financial sustainability is facing some budgetary constraints due to changes in the tariff structure, which again highlights the importance of international cooperation in waste management projects.

4.3 Project Matrix

Table 1*Project Matrix*

Axis	Project Name	Project Description	Temporality	Entity Cooperator	Type of Financing	Partner countries	Granularity of Climate Action	Relevance to the SDGs	Receiving Entity	Implementing Entity	Climate Action	Project Impact	Social and Economic Co-Benefits
Sustainable Mobility	Integrated Transportation System (ITS)	It includes the 4 Rivers tram and electric buses as part of the transition to sustainable mobility and is partially financed by national and international cooperation.	It began on December 5, 2016 and ended in November 2017	The project was financed by CAF and KfW, with an initial amount of **$107,940.00** , a supplementary contract of **$40,000.00** and a total executed amount of **$147,940.00** .	Non-refundable financing	Germany Bilateral, Countries of the Inter-American Development Bank (CAF) Multilateral.	Beneficiaries of the Cuenca Canton	The **Integrated Transport System** is linked to **SDGs 3, 9, 11 and 13** , by promoting sustainable, safe and low-carbon mobility.	Decentralized Autonomous Municipal Government of the Canton of Cuenca (GAD) Municipal Public Company of Mobility, Transit and Transport of Cuenca (EMOV EP).	León & Godoy Consultants	Mitigation	Capacity to reduce 4,296 tons of CO2 per year and around 350,000 tons of CO2 throughout its useful life	Institutional Innovation Better quality of life and better transport units. Cost savings
Waste management	Pichacay Sanitary Landfill	Capture and utilization of biogas aimed at reducing methane emissions and improving the comprehensive management of waste in the Cuenca canton.	**Northern phase:** Under construction since 2021, projected to 2026. **Southern phase:** Under construction since 2027. Burning since 2015. Generation since 2017. License until 2029.	The French Development Agency financed approximately **$26,726,500** . **$9,000,000** for the southern phase from the GAD	The French Development Agency loan of a repayable type The financial incentives were non-refundable.	France	The beneficiaries are all residents of the Cuenca canton.	**Waste management** is primarily related to **SDGs 6, 11, 12 and 13** , by promoting proper waste management, the circular economy and emissions reduction.	Cuenca Municipal Cleaning Company (EMAC EP)	Emac EP, BGP Engineers	Mitigation	It manages 544 tons of waste daily, produces energy with two 1 MW biogas units, reduces more than 30,000 tons of CO_2 per year, treats 2,500 kg of sanitary waste and generates 22 direct jobs.	Jobs Created. Local technological innovation and institutional strengthening.

Matrix analysis

The matrix shows the connection between sustainable mobility and waste management as climate action initiatives in Cuenca. The integrated transportation system, financed by the Development Bank of Latin America and the Caribbean (CAF) and the KfW Development Bank (KfW) with non- reimbursable resources, represents a transition to low-carbon mobility, reducing approximately 350,000 tons of CO2 and improving urban quality of life through institutional innovation and efficient transportation. Furthermore, the Pichacay Sanitary Landfill , supported by the French Development Agency with a reimbursable loan, reflects a circular economy approach that harnesses biogas to generate 2 MW of energy, reduce over 30,000 tons of CO2 annually, and manage 544 tons of waste daily, while also generating employment and direct social benefits. Both projects, aligned with SDGs 3, 9, 11, 12, and 13, demonstrate how climate finance, both repayable and non-repayable, promotes mitigation and strengthens the local government's institutional capacity for urban sustainability. Another key factor to consider is the cross-cutting nature of cooperation in both projects, expressed through international financial cooperation and specialized technical cooperation. This type of cooperation combines financial resources with technical support for project implementation.

DISCUSSION

Analysis of projects implemented with climate finance demonstrates that these resources have been directly allocated to local mitigation actions, aligning with the commitments of the Paris Agreement and the National Climate Change Strategy. The cases of the Integrated Transportation System (SIT) and the Pichacay landfill illustrate how international financing not only provides economic resources but also helps drive transformations within the Municipal Government.

The SIT, supported by CAF and the German Development Bank KfW, reflects climate rationality principles by reducing emissions through sustainable transport, aligning with SDGs 11 and 13. This result coincides with authors such as Lechón Sánchez (2020) and Fuentes Moreno (2020), who highlight the role of local governments in climate governance. However, the challenges highlighted by Pugliese (2021)—limited institutional coordination and low citizen ownership—indicate the challenges he also points out regarding local climate action.

Furthermore, the Pichacay biogas project , funded by the French Development Agency, transforms waste into energy, resulting in a reduction of 30,000 tons of CO2 per year. This case demonstrates the impact of the Kyoto Protocol's mitigation mechanisms in consolidating more efficient and resilient waste management.

Both projects emphasize that climate finance functions as a tool for sustainable development, not merely as a financial resource. They also strengthen municipal institutions by fostering transparency, planning, and verifiable results, as outlined in Article 13 of the Paris Agreement. However, international support is crucial to sustaining these initiatives, as noted by EFIC (2021).

Consequently, the findings demonstrate that Cuenca has successfully translated global commitments into urban projects with a clear environmental and social impact. However, achieving self-sustaining climate management will require strengthening local governance, expanding funding sources, and consolidating a civic environmental culture that is environmentally conscious and takes long-term action to meet the goals.

CONCLUSIONS

Our work has shown that climate finance has become a key instrument for sustainable urban management, enabling Cuenca to link the international commitments of the Paris Agreement with practical, local measures. The results indicate that this type of financing not only provides economic resources but also serves as a tool for institutional transformation in infrastructure. It has the capacity to improve environmental management, foster inter-institutional cooperation, and simplify project implementation, resulting in a real impact on mitigating environmental problems. Regarding climate rationale, as the UNDP points out, this type of financing provides a technical and scientific foundation that justifies and guides projects, ensuring verifiable and sustainable results.(Programa de Naciones Unidas para el Desarrollo – PNUD Ecuador, 2021).

At the global and national levels, instruments such as the National Climate Change Strategy (ENCC), the Climate Finance Strategy (EFIC), and the GOGPACC classifier have enabled decentralized autonomous governments, such as that of the city of Cuenca, to incorporate climate action plans into their territorial planning. In light of this, the study affirms that international financing from institutions such as CAF and the German bank KfW has been crucial for implementing initiatives like the integrated transportation system (SIT) and the biogas capture and combustion project at the Pichacay landfill . These are successful examples of the practical application of the Paris Agreement principles at the local government level, as in the case of Cuenca.

Even so, there is still a long way to go in developing an internationalization strategy to generate international agreements and commitments that translate into action on climate issues, which have already received widespread recognition. However, this process also revealed a need to maximize the financial and technical autonomy of the Decentralized Autonomous Government of Cuenca; limited local capacity has restricted the sustainability of projects once external support ends, due to infrastructure maintenance requirements.

These projects demonstrate that climate action cannot be separated from citizen participation and environmental education. For example, electric transport and waste management not only benefit the city by reducing gas emissions, but also promote cultural and behavioral changes in urban areas, strengthening citizens' environmental awareness

and making it a cross-cutting element that can determine the effectiveness and legitimacy of local climate policy.(Naciones Unidas, 2023b).

Recommendations

Regarding the authorities, it will be necessary to strengthen a technical unit specializing in climate finance, which will coordinate municipal projects with national instruments (ENCC, EFIC, COGPACC), guaranteeing continuity, transparency and clear accountability in waste management in the future.

Regarding public and private institutions, cooperation strategies will be promoted, including partnerships with international cooperation agencies . These strategies will strengthen local capacities for the formulation, evaluation, and monitoring of mitigation and adaptation projects. Furthermore, universities will play a key role, promoting research and academic programs focused on climate management and sustainable development.

With regard to civil society, priority will be given to ongoing environmental education processes, with the aim of fostering citizen co-responsibility for sustainable mobility and waste management, thereby strengthening the social appropriation of the projects developed in the city of Cuenca.

In conclusion, international cooperation should maintain technical assistance in intermediate cities like Cuenca, prioritizing projects with co-financing and technology transfer that ensure the sustainability and permanence of the results in the long term.

Based on the results obtained, the possibility is opened to develop future research, aimed at deepening the evaluation of the environmental and social impact of the projects, within the Integrated Transportation System (SIT) and the Pichacay Sanitary Landfill , emphasizing the quantification of the effective reduction of greenhouse gases and the relationship between cost analysis and environmental benefit.

Similarly, the scope of the study will be expanded to include other decentralized autonomous cantonal governments in the province of Azuay. The aim is to identify patterns of access to, management of, and effectiveness of climate finance at the regional level. This comparative perspective will provide a more comprehensive view of the implementation of local climate policies.

Finally, research will be conducted to study how climate finance, climate governance, and citizen participation are interconnected. The goal is to improve resilient urban planning and ensure that climate projects are sustainable in the long term.

REFERENCES

Development Bank of Latin America and the Caribbean. (2022, February). *Cuenca, Guayaquil and Portoviejo promote new actions to mitigate climate change* . Development Bank of Latin America and the Caribbean. https://www.caf.com/es/actualidad/noticias/cuenca-guayaquil-y-portoviejo-promueven-nuevas-acciones-de-mitigacion-del-cambio-climatico/#:~:text=del%20cambio%20clim%C3%A1tico-,Cuenca%2C%20Guayaquil%20y%20Portoviejo%20promueven%20nuevas%20acciones%20de%20mitigaci%C3%B3n%20del,Desempe%C3%B1o%20de%20la%20Uni%C3%B3n%20Europea.&text=Con%20el%20auspicio%20de%20la,Ambiente%2C%20Agua%20y%20Transici%C3%B3n%20Ecol%C3%B3gica.

Development Bank of Latin America and the Caribbean. (2024a). *Annex 6: Environmental and Social Management Framework* . https://www.caf.com/media/2825870/programa-de-financiamiento-verde-para-instituciones-financieras-locales-en-america-latina-marco-de-gestio-n-ambiental-y-social.pdf

Development Bank of Latin America and the Caribbean. (2024b). *Annex 6: Environmental and Social Management Framework* . https://www.caf.com/media/2825870/programa-de-financiamiento-verde-para-instituciones-financieras-locales-en-america-latina-marco-de-gestio-n-ambiental-y-social.pdf

Botzen , WTL and BS (2025, March 14). Kahneman's Insights for Climate Risks: Lessons from Bounded Rationality, Heuristics and Biases. *Springer* , 1–26.

ECLAC, Bárcena, A., Samaniego, JL, Galindo, LM, Carbonell, JF, Alatorre, JE, Stockins , P., Reyes, O., Sánchez, L., & Mostacedo, J. (2009). The economics of climate change in Latin America and the Caribbean. *Review Literature and Arts Of The Americas* .

ECLAC (Economic Commission for Latin America and the Caribbean) / United Nations. (2025). *Voluntary National Reviews (VNRs)* . https://agenda2030lac.org/es/informes-nacionales-voluntarios-inv

Climate Change 2023 Synthesis Report, 1 (2023). https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_LongerReport.pdf

Climate Change 2023 Synthesis Report, 1 (2023). https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_LongerReport.pdf

Climate Funds Update . (2020, February). *The global architecture of climate finance* . 1–6. https://climatefundsupdate.org/wp-content/plugins/download-attachments/includes/download.php?id=5338

Organic Code of Territorial Organization, Autonomy and Decentralization (COOTAD), Official Registry Supplement No. [303] 29 (2010).

Colin Robson, K.M. (2015, December 18). Real World Research. *Wiley* . file:///C:/Users/59398/Downloads/Colin%20Robson,%20Kieran%20McCartan%20-%20Real%20World%20Research-Wiley%20(2016).pdf

Colin Robson, K.M. (2016, December 18). Real World Research. *Wiley* . file:///C:/Users/59398/Downloads/Colin%20Robson,%20Kieran%20McCartan%20-%20Real%20World%20Research-Wiley%20(2016).pdf

Constitution of the Republic of Ecuador, Official Registry No. [449] (2008).

Earl Babbie. (2013, January). The Basics of Social Research. *Wadsworth Cengage Learning* , 1–573. file:///C:/Users/59398/Downloads/Earl%20Babbie%20-%20The%20Basics%20of%20Social%20Research,%20Sixth%20Edition,%20International%20Edition-1.pdf

EFIC. (2021). *Climate Change* . https://www.bivica.org/files/5789_ESTRATEGIAFCECUADOR.pdf

Freddy Fabián Fuertes Moreno. (2020). *Thesis to obtain the specialization degree in Leadership, Climate Change and Cities* . https://repositorio.flacsoandes.edu.ec/bitstream/10469/16792/2/TFLACSO-2020FFFM.pdf

GEF. (2024). *GEF announces $20 million investment in climate adaptation innovators* . https://www.thegef.org/newsroom/press-releases/gef-announces-20-million-investment-climate-adaptation-innovators#:~:text=The%20FPMA%20has%20financed%20360,land%20para%20the%20resilience%20clim%C3%A1tica.&text=The%20Fund%20Special%20for%20the%20Change%20Clim%C3%A1tico%20(FECC)%2C%20managed,millions%20of%20hect%C3%A1areas%20of%20land.

Gerardo Ulises Otero Delgado. (2025, May 29). *Green investments: how to grow your money and take care of the planet from Colombia* . FinancieraMente .

Instructions for Delegation of Environmental Competence Granted to Decentralized Autonomous Governments (GAD), 1 (2016).

Jonattan Rodríguez Hernández. (2024). *Media narratives of the Conference of the Parties (COP) in TVE news broadcasts (2014-2024)* . 3-5. https://epsir.net/index.php/epsir/article/view/693/932

Laura Presicce . (2020). *Searching for Coordination Instruments for Multilevel Climate Governance in Spain* . file:///C:/Users/Usuario/Downloads/BUSCANDO%20INSTRUMENTOS%20DE%20COORDINACI%C3%93N%20PARA%20LA%20GOBERNANZA%20CLIM%C3%81TICA%20MULTINIVEL%20EN%20ESPA%C3%91A.pdf

Lechón Sánchez, LW (2020). *Climate Governance in Ecuador? Subnational Governments Facing the Challenge of Implementing the Nationally Determined Contributions (NDCs) Established in the Paris Agreement: The Case of the Provincial Decentralized Autonomous Governments of Ecuador* . https://repositorio.uasb.edu.ec/handle/10644/7481#:~:text=En%20la%20discusi%

C3%B3n%20se%20detalla,e%20implementaci%C3%B3n%20de%20pol%C3%ADticas%20clim%C3%A1ticas.

León, & Godoy. (2017, November). Design of the Intracantonal Public Transport Model , its Incorporation into Transit and Fare Integration: Final Report. *Cuenca City Hall, GAD Municipal de Cuenca* , 1–300.

MAATT. (2023). *ECUADOR'S NATIONAL CLIMATE CHANGE ADAPTATION PLAN (2023-2027)* . https://www.ambiente.gob.ec/wp-content/uploads/downloads/2023/02/PNA_Plan-Nacional-de-Adaptacion_2023_2027.pdf

Manual on Climate Finance: Mechanisms and Opportunities for Latin America and the Caribbean (2024). https://www.parlamericas.org/uploads/documents/Primer_on_Climate_Financing_spa.pdf

Mgs . Alexander Posso . (n.d.). National Strategic Plan 2021 - 2024. *Ministry of Environment and Water* , 1–126.

Ministry of Environment and Energy . (2024). National *Greenhouse Gas Inventory System* . Ministry of Environment and Energy . https://singei.ambiente.gob.ec/singei/?page_id=1309

Ministry of Economy and Finance. (2022). *Guide for the application of the spending guide classifier in environmental and climate change policies* .

Ministry of the Environment. (2017). *National Environmental Education Strategy for Sustainable Development 2017–2030* . 3–56. https://www.ambiente.gob.ec/wp-content/uploads/downloads/2018/07/ENEA-ESTRATEGIA.pdf

United Nations. (1992a). *UNFCCC* . https://unfccc.int/resource/docs/convkp/convsp.pdf

United Nations. (1992b). *UNFCCC* . https://unfccc.int/resource/docs/convkp/convsp.pdf

United Nations. (2015). Paris Agreement. *COP21* , *21930* .

United Nations. (2023a). *Sustainable Development Goals* . https://www.un.org/sustainabledevelopment/es/cities/?utm_source

United Nations. (2023b). *What is climate finance and why is it necessary to increase it?* https://climatepromise.undp.org/es/news-and-stories/que-es-la-financiacion-climatica-y-por-que-es-necesario-incrementarla

United Nations. (2024). *Paris Agreement* . https://unfccc.int/es/acerca-de-las-ndc/el-acuerdo-de-paris

United Nations. (2025a). *Introduction to climate finance* . https://unfccc.int/topics/introduction-to-climate-finance

United Nations. (2025b). What is *climate change* ? https://www.un.org/es/climatechange/what-is-climate-change

United Nations. (2025c). What is *climate change* ? https://www.un.org/es/climatechange/what-is-climate-change

United Nations. (2025d, July 3). *Faced with the challenges of financing for development, the countries of Latin America and the Caribbean need to strengthen their capacities to mobilize resources and forge renewed cooperation mechanisms* . ECLAC. https://www.cepal.org/es/comunicados/desafios-financiamiento-desarrollo-paises-america-latina-caribe-necesitan-fortalecer-sus

Nahuel Pugliese. (2021). *"Evolution of climate governance in large Latin American cities* ." file:///C:/Users/Usuario/Downloads/Evoluci%C3%B3n%20de%20la%20gobernanza%20climatica%20en%20grandes%20ciudades%20en%20Latinoamerica.pdf

Sustainable Development Goals. (2024). *Goal 11: Make cities more inclusive, safe, resilient and sustainable* . United Nations. https://www.un.org/sustainabledevelopment/es/cities/#:~:text=%C2%BFCu%C3%A1les%20son%20los%20retos%20m%C3%A1s,p%C3%A9rdidas%20humanas%2C%20sociales%20y%20econ%C3%B3micas.

Ordinance for the Promotion and Strengthening of Active Mobility in the Canton of Cuenca (2025). https://www.cuenca.gob.ec/content/ordenanza-para-la-promoci%C3%B3n-y-fortalecimiento-de-la-movilidad-activa-en-el-cant%C3%B3n-cuenca?utm_source

Paris Agreement, 13 (2015). https://unfccc.int/sites/default/files/english_paris_agreement.pdf?utm_source

Paúl Galarza, BPPV (2021, September 24). Financial incentives for CO2 reduction at the *Pichacay landfill in Cuenca* . Development Bank of Latin America. https://www.caf.com/es/actualidad/noticias/incentivos-financieros-por-la-reduccion-de-co2-en-el-relleno-sanitario-pichacay-en-cuenca-1/

Paula de Castro, Researcher, PCGC and EW Senior Researcher, PCGC (2018, January). *Local and Regional Governments: Partners in the Face of Climate Change. United Nations Climate Change Conference 2017 (COP23)* . CIDOB. https://www.cidob.org/publicaciones/gobiernos-locales-y-regionales-socios-frente-al-cambio-climatico-conferencia-de-las

Pérez-Morales, A., Gil-Guirado, S., & Maqueda-Belmonte, F. (2022a). Sustainable mobility: interdisciplinarity, conceptual articulation and research fronts. *Documents d'Anàlisi Geographic* , 393–422. https://doi.org/10.5565/rev/dag.704

Pérez-Morales, A., Gil-Guirado, S., & Maqueda-Belmonte, F. (2022b). Sustainable mobility: interdisciplinarity, conceptual articulation and research fronts. *Documents d'Anàlisi Geographic* , 393–422. https://doi.org/10.5565/rev/dag.704

UNEP. (2021). *Intergovernmental Panel on Climate Change* . https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WG1_SPM_Spanish.pdf

United Nations Development Programme. (2025a). *Climate Finance* . https://climatepromise.undp.org/es/news-and-stories/que-es-la-financiacion-climatica-y-por-que-es-necesario-incrementarla

United Nations Development Programme. (2025b, June 23). *What is results-based climate finance and how does it work?* United Nations Development Programme. https://climatepromise.undp.org/es/news-and-stories/que-es-el-financiamiento-climatico-basado-en-resultados-y-como-funciona

United Nations Development Programme – UNDP Ecuador, M. del A. – M. (2021). *Capacity building program in formulating proposals to access climate finance.*

Republic of Ecuador. (2025). *Second Nationally Determined Contribution* . file:///C:/Users/Usuario/Downloads/Segunda%20NDC%20de%20Ecuador%20(7).pdf

Republic of Ecuador, Ministry of the Environment. (2012, July). National Climate Change Strategy of Ecuador. *Ministry of the Environment (MAE)* , 1–153.

Republic of Ecuador. Ministry of the Environment. (2012). *Ecuador 's National Climate Change Strategy* .

Sixth Assessment Report of the IPCC. (2023). *Chapter 12: Climate Change Information for Regional Impact and Risk Assessment* .

UCLG. (2021). *What is the UCLG Intermediary Cities Forum?* https://intermediarycities.uclg.org/en/the-forum

UNFCCC. (2024). *Financing* . https://unfccc.int/topics/introduction-to-climate-finance

UNFCCC. (2025). *UN Climate Change Global Innovation Hub* . United Nations Climate Change. https://unfccc.int/topics/un-climate-change-global-innovation-hub

United Nations Climate Change. (2012). *What is the Kyoto Protocol ?*

United Nations Climate Change. (2025a). *Introduction to Climate Finance* . https://unfccc.int/topics/introduction-to-climate-finance#:~:text=%C2%BFQu%C3%A9%20es%20la%20financing%C3%B3n%20clim%C3%A1tica,que%20abordar%C3%A1n%20el%20cambio%20clim%C3%A1tico

United Nations Climate Change. (2025b). *Technology development and transfer* . United Nations Climate Change. https://unfccc.int/topics/adaptation-and-resilience/groups-committees/adaptation-committee/joint-ac-and-leg-mandates/nap-support/technology-development-and-transfer#:~:text=A%20trav%C3%A9s%20of%20su%20red,and%20the%20institutions%20of%20research%C3%B3n.

United Nations Framework Convention on Climate Change. (2015). *Transparency of support under the Paris Agreement* .

APPENDICES

Appendix 1. Table of Interviewees.

Code	Post	Date
E01	MAATE Official	21/10/2025
E02	Official of the Municipality of Cuenca	29/10/2025
E03	EMAC EP Final Disposal Technician	30/10/2025

Appendix 2. Transcripts

https://drive.google.com/file/d/1EkLCj83TI0bB_4Rk1yENwOi6rVMNHjIO/view?usp=sharing