



FINAL REPORT

**THE CITY AND CLIMATE CHANGE:
KNOWLEDGE, ATTITUDES, AND
PRACTICES FOR CLIMATE CHANGE
MANAGEMENT AND ADAPTATION IN
GREATER TEGUCIGALPA AND
SURROUNDING MUNICIPALITIES**

**2022-2023 Case Studies Cohort
Honduras**

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The City and Climate Change: Knowledge, Attitudes, and Practices for Climate Change Management and Adaptation in Greater Tegucigalpa and Surrounding Municipalities | Honduras Case Study

Summary

Honduras, is a nation located in Central America, composed of about 10 million inhabitants, it is considered that its greenhouse gas emissions are reduced by the low level of industrialization, however, the country has been intensely affected by climate change and variability, including erosion on its coasts, crop failures, disruption of roads and highways, flooding and landslides on urban hillsides.

In the late twentieth and early twenty-first century a greater awareness of the risks is acquired, this after the impact of tropical storm and hurricane Mitch (1998), tropical storms alpha, beta and gamma (2005-2006) and more recently the impact followed in less than a week by Hurricane Eta and tropical storm Iota, in 2020. The increase in preparedness and timely reaction processes has reduced the number of deaths, but not the economic and productive impacts.

The recognition of the problem has allowed to give way to a process of raising studies, such as inventories of greenhouse gases, impact of climate change on agriculture, legal regulations, development of public policies such as the Climate Agenda of Honduras, the Environmental Policy of Honduras, programs and projects, in all these legal initiatives, policies, Programmatic and budgetary, environmental education and communication components have been included.

Environmental education in Honduras has focused on mainstreaming basic education from first to ninth grade, with content on biodiversity and conservation of natural resources, risk management, including chemical risks, and intersectionally climate change. At the middle and higher levels, it has been decided that environmental education becomes a subject in itself, included in the humanistic scientific baccalaureate in preparation for university and as an optional in the natural sciences. Honduras does not yet have a master's program in environmental education.

Thus, after 25 years of socio-educational interventions, it has been proposed to develop a case study called "Study of Knowledge, attitudes and practices on management and adaptation to climate change in the conurbe of Tegucigalpa", carried out in 9 municipalities that make up the conurbe that surrounds the capital city, with two types of well-differentiated communities, Tegucigalpa and Comayagüela that form the Municipality of the Central District, hyperurbanized in much of its territory and the rest of the 8 municipalities of rural character and with an economy based on food production.

Mixed methods were used in this study, through quantitative surveys and through qualitative interviews and focus groups, surveying a representative sample and distributed in strata and substrata for the territory of the conurbe with 341 surveys and 11 in-depth interviews with public officials of the education sector.

Participatory methods, such as quantitative surveys and qualitative interviews and focus groups, involve active engagement of individuals in the research process, allowing for their perspectives and insights to directly contribute to the study's findings and conclusions. This approach fosters collaboration, inclusivity, and a richer understanding of the subject matter. These methods involved surveying a representative sample distributed across strata and substrata within the conure territory. A total of 341 surveys were conducted, alongside 11 in-depth interviews with public officials from the education sector.

As a result of the application of this study, between 70 and 85% of the population consulted considers that education in climate change is important, however, they are not sure that the school is developing it. From the perspective of teachers and educational authorities, this has begun to develop within schools, using environmental resources as community teaching materials for the generation of learning, with urban and micro-watershed reforestation, forest fire control and the reduction of greenhouse gas emissions being important activities.

Honduras has 4 methodological guides, 3 of them for application in environmental education at the basic level and one for the basic and middle levels, containing topics and activities related to climate management, however only one of them is known by 100% of the teachers surveyed, the rest are known by the pedagogical technical assistants and the district directorates of education, despite being resources that are democratically disposed in the Educatrachos platform.

Although there is knowledge that has been consolidated, these are still very basic, and are not enough to acquire an awareness that the citizen is co-responsible for the exercises of adaptation and mitigation of climate change, with actions to be carried out at home, such as in productive activities and services (workshops, industries, agriculture, and livestock).

Thus, the need is identified to deepen inter-institutional coordination processes between the different Secretariats that with their programs seek to insert themes, transversalize Curriculum and promote the application of methodological guides to generate changes in behaviors, learning and adoption of practices. In all this, it is necessary to professionalize teachers, including trainers of trainers with the creation of a master's degree in environmental education for sustainable development and at the level of the State of Honduras with the formulation and management of a public policy of environmental education and communication for sustainable development with emphasis on climate change and adaptation.

Report

The CCE Initiative

The casestudy, which describes the knowledge, attitudes and practices on management and adaptation to climate change in the conurbe of Tegucigalpa, carried out in 9 municipalities that make up the conurbe that surrounds the capital city, covers two large representative areas, a hyperurbanized community, composed of the cities of Tegucigalpa and Comayagüela, which make up the Municipality of the Central District and another that is made up of rural municipalities, mainly based on an economy of food production and ecotourism, composed of the municipalities of Lepaterique, Ojojona, Santa Ana, San Buena Ventura, Tatumbla, San Antonio de Oriente, Santa Lucia and Valle de Ángeles, which together make up the green belt of the city of Tegucigalpa, where food and other ecosystem services are produced.

The case study is framed in a context of 25 years of socio-educational intervention at the level of formal environmental education (30 years at the university level, 19 years at the level of basic education and 11 years at the middle level), at the level of informal education through the training actions developed by programs and projects implemented for the agricultural sectors, livestock, renewable energy, tourism, promotion of entrepreneurship, and informal environmental education through mass media, such as radio, television and the internet.

The main objective was to end the knowledge, attitudes and correct and incorrect practices possessed by 2023 adolescents, youth and adults on climate change at the level of causes, impacts, adaptation measures, mitigation or their synergies, product of having been direct and indirect beneficiaries of formal, non-formal and informal educational processes in which the subject was addressed.

The Case Study

The team who conducted the research is Honduran Association of Developing Communities (AHCODESS), in association with the Agency for Development and Sustainable Environmental Management (ADEGEM). *Central question of the research* What knowledge, attitudes and correct and incorrect practices do adolescents, young people and adults possess by 2023 about climate change at the level of causes, impacts, adaptation measures, mitigation or their synergies, product of having been direct and indirect beneficiaries of formal, non-formal and informal educational processes in which the issue was addressed?

And derived from this central question, some research subquestions, which we answer with the development of this study.

1. What are the knowledge, right and wrong attitudes and practices in the target population about climate change and risk management disaggregated by municipality, occupation, age, and gender?
2. How do institutional and human strengths and capacities influence and barriers to the adoption of knowledge, attitudes, and good practices in the target population on climate change and risk management disaggregated by municipality, occupation, age and gender?
3. What improvement actions are identified that can be adopted by the community of institutions linked to the promotion of a culture of adaptation to climate change, points on which to improve is in their socio-educational interventions?

Case study methods and participants

To answer the research questions, we used mixed quantitative and qualitative methods, through quantitatively structured surveys and through interviews and focus groups in a qualitative way, surveying a representative sample and distributed in strata and substrata for the territory of the conure with 341 surveys, calculated on the basis of the estimated population for the nine municipalities, according to projections by the National Institute of Statistics, with 95% confidence and 5% error, and distributed in subsamples by population weights, age group and gender. In addition, 11 in-depth interviews with public officials in the education sector were obtained.

Participated in this study, 341 people between 12 and more than 60 years of age, distributed in the 9 municipalities that made up the sample, which are part of the department of Francisco Morazán, in Honduras, Central America.

The municipality with the highest representation in the sample is Distrito Central, with a total of 73 people, followed by Tatumbula with 38 people and Valle de Ángeles with 41 people. Other municipalities such as San Antonio de Oriente, San Buenaventura, and Santa Lucia also have a significant presence in the sample, with 44, 32 and 34 people respectively. On the other hand, municipalities such as Lepaterique, Ojojona, Santa Ana and Santa Lucia have lower representation in the sample, with 31, 29, 28 and 32 people respectively.

Población (2018)



Most of the people surveyed are in the age range of 7 to 12 years, representing 30.57% of the sample. It is followed by the age group of 12 to 18 years, which represents 22.86% of the sample. The 18- 30 age group accounts for 21.71% of the sample, while the 31-60 age group accounts for 17.43%. Finally, the age group over 60 years represents 7.43% of the sample.

The most common occupation in the sample is that of student, representing 56.57% of the sample. It is followed by merchant occupation, which represents 24.57% of the sample. The occupation of food producer represents 11.71% of the sample, while the occupation of teacher represents 7.14%.

The most common educational level in the sample is basic education II cycle, with a total of 91 people, followed by secondary education with 83 people and basic education III cycle with 68 people. Other educational levels such as bachelor's degree and university technician also have a significant presence in the sample, with 41 and 34 people respectively. On the other hand, the educational levels of basic education I cycle and postgraduate have a lower representation in the sample, with 25 and 8 people respectively.

This study will guide the design and redesign of transversal education proposals on climate change in the national education system and in environmental socio-educational intervention projects.

We are based on a theory of change that assumes that, if citizen and State vulnerabilities to climate change are correctly identified and the responsibilities to be assumed by citizens, the State and the private sector are correctly identified, this must be gradually taught in climate education and communication, so that knowledge is developed, Attitudes and correct practices, on the phenomenon of climate change and variability, the causes, effects, impacts and consequences and solutions proposed from adaptation, climate mitigation.

This would mean that a climate citizenship culture could be created, based on responsible production and consumption with climate stability, all harmonized with the United Nations Sustainable Development Goals.

Advancing Quality CCE through this Case Study (findings)

The processes of environmental education or for sustainable development, have been developed under two schemes, introducing environmental education classes in the curricula of secondary or higher education, in a process that was first for the level of higher education from 1995, after the approval of the General Law of the Environment and then for secondary education. after the approval of the Fundamental Law of Education in 2012 and the Law of Education and Environmental Communication and Health in 2009. The other process that has occurred is through thematic insertion or curricular transversalization, where environmental issues are introduced, for example, in the contents of social sciences and natural sciences, to enrich the experience of students.

Other processes in which the population has benefited is through non-formal environmental education, through programs and projects executed by Secretariats of State such as the Ministry of Education (SEDUC), Ministry of Agriculture and Livestock (SAG), Ministry of Health (SESAL), Institute of Forest Conservation, Protected Areas and Wildlife (ICF). Secretariat of Natural Resources and Environment (Mi Ambiente) and state universities such as the National Autonomous University of Honduras (UNAH), the Francisco Morazán National Pedagogical University (UPNFM), National University of Agriculture (UNAG) and National University of Forest Sciences (UNACIFOR).

Finally, the mass media, through radio, television and the internet, also develop environmental communication actions, which is considered as informal environmental education.

One of the first tasks to overcome when services are being promoted to improve human and institutional capacities, including environmental education or for sustainable development, where attitudinal changes are promoted with respect to nature, in order to change the mental structure that man must conquer nature, dominate it, under the approach of imperial ecology proposed by Francis Bacon in the nineteenth century.

In general, between 70 and 85% of the citizens who were consulted, consider it very important to deepen environmental education schemes in the face of climate change and 5-20% consider it important, this allows us to visualize that there is a positive predisposition to the possibility that the Curriculum, and pedagogical mediations may contain these elements.

As for whether the issue of climate change is currently being addressed in schools, between 84-88% recognize that this issue is addressed in educational institutions, 11-15% of the citizens consulted consider that they are not sure if it is addressed or not, so this can give the certainty that the programs and projects of the Secretariats of State and NGOs are arriving with the message to children, young people and adults.

From the educational institutionality, the processes of environmental education or for sustainable development with focuses on climate change and adaptation are lived according to the conditions of the context where the teaching-learning process is developed, making use of community resources, as an open laboratory for the generation of significant learning.

This includes actions related to nature, such as afforestation and reforestation processes in parks, public gardens in urban areas (18-25%), and micro-watersheds in rural areas (12-25%), actions for the control of forest fires (6-16%), which not only emit greenhouse gases, but are a great danger to the water security of communities.

Educational campaigns are undoubtedly by great tradition one of the ways in which environmental educational knowledge is disseminated, harmonized with national celebrations such as Arbor Day, Earth Day and others, where campaigns are made for the rational use of resources such as water and energy but also campaigns focused on the collection of waste at the source, both common waste and hazardous waste (batteries, electrical and electronic equipment).

These are undoubtedly propaedeutic and initial elements in the development of an environmental and above all climate-responsible citizen culture, which in the future can be deepened and sophisticated, for example, through role plays, analysis of the local reality on responsible consumption and other participatory techniques that can promote changes that are necessary for the development of a collective environmental awareness.

The Honduran State, with the support of international cooperation, mainly OFDA, DIPECHO EU, USAID, UNDP and projects executed by INGO's and NGOs-L, which have been supporting the development of processes of environmental thematic mainstreaming, these resources that have been validated by small groups of teachers, are available as online resources on the Educatrachos platform <http://www.educatrachos.hn>, and that through digital democratization they are available to all citizens and for use especially by teachers and students, at the basic and secondary education levels.

When analyzing the data generated in Figure 4, it is identified that classroom teachers only recognize the existence of the methodological guide for risk management for basic education, which is aimed at teachers of the basic education level from 1 to 9 grade, and that has learning activities for both social sciences and natural sciences educational spaces.

A guide that, although not known by classroom teachers, is known by district leaders and their pedagogical technical assistants, is the methodological guide for the environmentally sound management of chemicals, which fluctuates between 28 and 38% recognition as an educational material intended for those who teach natural sciences at the basic and intermediate level. As a result of this finding, it is possible to identify the need to generate training of trainers and cascade training workshops. CAP studies on climate change and adaptation are scarce, in the study developed by Banegas et al, 2021, it is identified that 85% of those who are trainers of trainers in initial teacher education do not have knowledge about climate change, only 15% of university teachers have developed accurate knowledge about climate change, This product of the disciplinary adherence to careers of natural and social

sciences. Although the subject of environmental education is an elective of the natural sciences, the educational space is insufficient to guarantee that teachers in training at the Francisco Morazán National Pedagogical University, that is, university students and graduates have accurate knowledge of environmental education for sustainable development and therefore train children and youth in basic and secondary education centers. For this reason, the study proposed as improvement actions to incorporate optional classes in the area of natural sciences such as climate change and integral risk management and at the postgraduate level to create a Master's program in Environmental Education for Sustainable Development with orientation in education for climate change and education for integral risk management.

Other CAP studies in Risk Management carried out by Banegas et al in 2014 and 2017, show similar realities product of the scarce deepening of transversal education, in fact the Department of Education and Environmental Communication and Health (DECOAS) in the Ministry of Education (SEDUC) was created in 2009, product of the approval of the Law of Education and Environmental Communication and Health, The UDEAS, in the Departmental Directorates are created until 2015 and activated in 2016, so the arrival of the methodological guides, the learning strategies begin to be implemented only in 2017, although they were developed from 2006 to 2012. Both studies initially show the ignorance of climate risks as a confluence of socially constructed vulnerability, attributing instead the incidence of these phenomena to divine punishments (56%), which represents an important challenge in being able to develop knowledge, attitudes and correct practices in risk management and climate change, where it is necessary to promote greater efforts to appropriate the available resources and improve the already available on the phenomenon of climate change, the causes, effects and consequences, but also the solutions available and with the possibility of being adopted.

This is how it is identified that although efforts have been made that are constructions, which must have a vision of continuous improvement of processes in the light of new knowledge about climate science and technology, reality shows that efforts have been made to teach, communicate, sensitize and raise awareness about climate change. But progress has not been made towards the full, deep and accountability implementation by citizens of sustainable practices at home and in productive activities.

Future researchers in this field could address the differentiated effectiveness of the impacts of programs and projects on the generation of knowledge, attitudes and correct practices on climate change and sustainable practices adopted at home and in productive activities, including agriculture, industry and services.

The expansion of the CAP studies on climate change, will allow to recognize the gaps differentiated by territories, and thereby accumulate the information base to carry out evidence-based advocacy actions, to promote the creation, approval and implementation of a public policy in environmental education for sustainable development, with a focus on climate change and risk management, since sectoral policies contain elements of environmental education, but it has not been possible to implement them at the level of coordination mechanisms between the State institutions governing the sectoral (health, education, environment, forest conservation) and SEDUC, universities and non-formal alternative education centres.

Psychosocial dimension

The effects and consequences of climate change are identified mainly based on daily experience and comparison with the past, for example, in the increase in temperature, which is identified as one of the main effects, between 51-64%, the increase in the frequency and intensity of extreme weather events is identified by 2-8%, which, despite the meteorological evidence, is not internalized and compared by citizens or expressed in their perception.

Some of the sustainable practices, identified by citizens, are the prevention and control of forest fires between 17-19%, followed by selective waste collection, and the reduction of energy and water consumption. The use of sustainable transport, such as the use of bicycles between 12-14%, seems to be a consequence of campaigns developed within the framework of sustainable transport initiatives and by the substantial increase of people who practice eco sports, and mountain sports. In Tegucigalpa during 2023, the Mayor's Office has declared the temporary closure of Boulevard Morazán, for the practice of walking, use of bicycles, as a determined promotion for the generation of healthy lifestyle habits, based on physical activation.

"Waste collection and separation became an initiative at home, driven by my son who learned about it at school. Initially, it was challenging and tedious to separate plastic, bottles, and paper, but later, we realized that our garbage bags fit better as bottles took up a lot of space. Now, we've embraced it as a positive action and a way to save money."

Focus Group

"I'm not from Tegucigalpa; I'm from Ceiba, so I'm used to using a bicycle as my mode of transportation. When I moved to the neighborhood, I brought my bike with me, and many kids would watch me ride it to work. Over time, I noticed that they started asking their parents to buy them one, and many parents actually did."

Focus Group

"Burning for cultivation had always been a practice passed down through generations until one time we went too far, resulting in a serious wildfire. It was then that we learned not only about its harmful impact on the environment but also that there are alternative, less polluting ways of clearing land."

Focus Group

Action-learning dimension

Practices on climate change and adaptation: If knowledge precedes a positive attitude to change, so is attitude, as a precedent for the implementation and adoption of practices, in this case sustainable practices, as a consequence of education and training. These practices should be observed as routines continuously, at home, as in productive activities, including agriculture and livestock.

In the implementation of public policies, we move from a first moment in which the existence of the problems is denied, in a second moment the existence of the problems is assumed, and public policies are designed, but these are not concretized and in a third moment, public policies are concretized.

If it is considered that considerable progress has been made in increasing knowledge about climate change, and in improving the attitude of the citizen in training, this has not necessarily translated into the implementation of sustainable practices for example in the home, where it is a space for citizen decision, and where it is possible to adopt by own decision, Climate change adaptation measures at home.

Only between 19 and 33% of citizens consider that sustainable practices are being implemented at home and in productive activity, the rest are undecided or do not consider that such practices are being implemented within society, these practices include both adaptation and mitigation actions and the synergy of both.

In the case of agriculture, citizens consider as practices with greater effectiveness, the inclusion and use of varieties resistant to drought or excess moisture (34-41%), which demands greater efforts of plant genetic improvement by the SAG, other practices of less effectiveness, include the use of irrigation systems (26-31%) while the deepening of

sustainable agricultural practices (PAS), that should be intensified and where solution schemes can be diversified is only identified by 34-35% of citizens.

Climate justice

Regarding the implementation and perceived effectiveness of good sustainable livestock practices, the citizens consulted consider the action of implementing waste management systems on farms, as a preferential action (24-26%), this perhaps due to the influence of the actions promoted by the BIOGAS Program, a second action identified is the establishment of water reservoirs (16-19%) and the planting of trees scattered in the pasture (16-20%), This is a sample of many of the sustainable practices that are being promoted through the projects and that through informal environmental education is permeating different age groups.

I remember living in Choluteca, and those familiar with Choluteca know how hot it can get there. We faced serious issues because our crops were drying up due to the drought. One day, while going through the newspaper, I saw an advertisement about water reservoirs that explained their purpose and benefits. So, we took out a loan and purchased one. Since that day, we started filling it during the rainy season, and we never suffered from water scarcity again.

Farmer

I had my doubts about planting scattered trees in the pastures, as I had never heard of that before, and I tend to be quite conservative when it comes to trying unfamiliar things. I was concerned about the impact on the livestock and grazing patterns. However, I decided to give it a try based on the advice I received. I can tell you that when I began to see the improvement in the shade provided by the trees and the enhancement of soil quality, I wasn't just convinced, but several of my friends did the same thing.

Farmer

I am extremely pleased with my water reservoir. I don't face water problems anymore, and my animals don't go thirsty or die due to water shortages. Additionally, I can cultivate throughout the year without any issues.

Farmer

With regard to the scope of non-formal environmental education processes, through training on sustainable practices and adaptation to climate change, between 15-31% of having been trained, with the age group least benefiting from it being people over 60 years of age, while the age groups of young people and adults are important focuses of State programmes and projects and of international cooperation. Between 18 and 60 years old, 53% of those who consider that they have been trained.

Finally, and after examining some climate change adaptation measures that are implemented at home, such as in productive activities, and their adaptation-mitigation synergies, we proceeded to identify practices known, practiced and adopted by citizens to mitigate global climate change by reducing greenhouse gas emissions.

Included here, preferably the purchase of efficient appliances between 37-43%, which identifies that education for sustainable consumption begins to generate positive effects (See figure 13), in addition to having an accessible offer of eco-efficient products in shops, this is evidence of the necessary link between sustainable production and consumption.

The use of LED bulbs is between 38-41%, explained as part of the state actions initiated from 2008 to the present to change the luminaires in public lighting and in homes for more efficient systems, and less polluting.

The installation of solar panels is identified in 19-23%, this is explained by the increase in the electricity market for photoelectric installations, as well as by the announced electricity

supply crisis in 2023, product of the incidence of ENOAS El Niño, which has caused an increase in civil investments in photoelectric installations.

Sharing learnings across geographies

No intensive use has been made of the resources for thematic mainstreaming of climate change and that are available online, in the educational platform of the SEDUC, so that both DECOAS, at the central level and the UDEAS at the decentralized departmental level, must deepen instructions and a cascade training mechanism, aimed at teacher training, and with it that information can flow to children and youth.

La citizens exhibit a basic knowledge about climate change, not denying the existence of the problem, but ignoring several issues related to its causes, effects and consequences, including within it the lack of awareness of the increase in the frequency and intensity of extreme weather phenomena, temperature seems to be the most commonly warned by citizens, as one of the easily noticeable effect. It identifies that there is a high level of awareness, above 50% of carrying out actions of rational use of resources, responsible consumption, and involvement in the reduction of greenhouse gas emissions, for example, in the control of forest fires, control of backyard burns and in clandestine dumps, promoting better management of solid waste.

There are important weaknesses in the adoption of sustainable practices in the home, productive activities of extractive economy such as agriculture and livestock, the effectiveness of the actions is recognized, but there is a reduced commitment in their adoption, with the exception of mitigation actions especially energy efficiency, autonomous photoelectric generation.

So is necessary to consolidate the efforts developed by different institutions linked to the management and management of climate change, to coordinate with the education sector and its institutions through the management of a public policy in environmental education for sustainable development, with emphasis on climate change and adaptation.

Applicability and Scaling of the CCE Initiative

Honduras is a country, where politically it is divided into 9 departments and 298 municipalities, this study covered only one of the departments where the capital city is located (Tegucigalpa), in the Municipality of the Central District and 8 surrounding municipalities with which the capital city maintains links of supplies of goods and environmental services, including the production and supply of food, but also demographic dynamics of daily migration, these municipalities being small dormitory cities, in addition to a large economic exchange between the capital and the other territories of the conurbation.

This could be of great importance to guide other studies to be developed in other areas of Honduras, where methods and techniques of environmental education and communication have been tested and appropriated, for example, a second serious work zone in the city of San Pedro Sula, located in the department of Cortés that forms a conurbation in the so-called Metropolitan Area of the Sula Valley, which covers territories such as the municipalities of Omoa, Puerto Cortés, Choloma, La Lima, San Manuel, Villanueva, Pimienta, where a second conurbation is formed. In fact, Honduras is the only country in Central America that has two conurbation centers.

Honduras also has other intermediate cities with important population and socio-educational interventions, which could be monitored in education and communication for climate change such as Ocotepeque, Ocotepeque; Santa Rosa, La Entrada and San José, Copán; Thank you, Lempira; Santa Barbara, Macuelizo in Santa Barbara; Opatoro, La Esperanza in Intibucá; La Paz, Marcala in La Paz; El Progreso, Olanchito in Yoro; Tela and La Ceiba in Atlántida; Tocoa and Trujillo in Colón; Siguatepeque, Comayagua in Comayagua; San Esteban, Catacamas,

Juticalpa in Olancho; El Paraíso, Danlí en El Paraíso; Amapala, San Lorenzo and Nacaome in Valle; Choluteca, Pespire, San Marcos de Colon in Choluteca; Roatan and Utila in Bay Islands.

Additionally, due to the nature of the case study, it could be replicated in cities and territories in Mexico, Guatemala, El Salvador, Nicaragua, and Costa Rica, which make up an idiosyncrasy and share social, economic, Spanish-speaking conditions, with very similar problems and with fairly common tested solutions.

The greatest learnings, after the development of the case study "Knowledge, attitudes and practices on management and adaptation to climate change in the conurbe of Tegucigalpa", we can share the following:

1. To promote a process of education and communication on climate change, relevant to societies where socio-educational intervention is carried out, political will is needed both from the educational authorities, integrated by the Ministry of Education, Universities, Professional Technical Education Centers or Non-Formal Alternative, with NGOs, programs and projects of Ministries such as those of Natural Resources, Environment, Forest Conservation, Entrepreneurship, Public Finance, to promote the understanding of the partial contribution of the project and the need for complementarity of approaches to form a robust process of environmental education and communication for sustainable development with a focus on climate change and adaptation.
2. Although governments and the State are fully aware of the problems posed by climate change and variability, its causes, effects, impacts, and the need to improve human and institutional capacities to face climate change, from adaptation and mitigation, it is necessary to formulate public policies at the central and decentralized State level, on issues of environmental education and communication for sustainable development with a focus on climate change and adaptation, to promote greater coordination of efforts, avoid duplication of functions.
3. For citizens to adopt climate-sustainable practices, they must go through a process of awareness in assuming that the problem of climate change is part of the trinomial State (regulator and auditor), Economy (Private sector, producer and service provider) and citizenship (consumers and incidents in the State to make appropriate market regulation decisions) And in this way leave aside, the denial of the problem, or the transfer of responsibility exclusively to manufacturers and the regulatory body, assuming citizen responsibilities, at home, at work and above all orienting ourselves towards a climate sustainable citizen culture, through responsible consumption, which forces production towards more sustainable and climate-smart standards.
4. By moving from the denial of the climate problem, to the construction of actions related to climate management, a State like the Honduran must concretize, but also harmonize the legal framework, with the political and programmatic framework, avoiding contradictions, fruitless trials, therefore after having a Law on Climate Change, and also with a Law on education and environmental communication and health, We propose the creation and management of environmental education and communication for sustainable development with a focus on climate change and adaptation.
5. Having a public policy on education and environmental communication for sustainable development with a focus on climate change and adaptation, can activate mechanisms that allow the officialization and intensive use of different pedagogical mediations, and that adapt, create, design others and that includes the redesign of the existing one to adapt in content, to promote knowledge, attitudes and practices harmonized with the findings of climate science and technology and in this way it can be achieved

to constitute a glocal climate culture, which serves to guarantee the human security of the local population and their livelihoods but also in contribution towards the goal of humanity to have a more stable climate and non-threatening to our civilization.

6. Environmental education and communication for sustainable development with a focus on climate change and adaptation, should not only be a topic of teachers who teach natural sciences, it is a topic of current perspective that can be addressed, in different disciplines including social sciences, since it is a citizenship education in a subject of postmodernity, But it is also applicable in technical education in which the production and provision of services must be permeated from the design of new products, processes and services with sustainable and climate-smart production actions.
7. The use of spaces for community participation in the education sector or collaborative work between educational centers, seems to be a good way to disseminate learning and develop coaches of trainer processes (TOT), and facilitate that teachers can appropriate pedagogical mediations already available where the curricular insertion and the practice of a didactic based on community resources is facilitated, to generate significant learning about climate change and adaptability and thereby generate safer, more resilient communities and applying principles of production and service provision in a sustainable way.
8. Educational centers must begin to implement as part of educational management, which previously covered pedagogical, curricular, institutional, administrative and community management, add environmental management in educational centers, that is, make their own the principles that we teach should be practiced in society and its institutions in school, such as the rational use of resources such as water, electricity, chemicals, waste management and the protection of local biodiversity, including the planting of public and private spaces, where the campaigns that have been observed are strengthened, developed as part of an institutional agenda to make them sustainable.
9. The education sector must coordinate with sectors affected by climate change, but where cultural practices and construction of small infrastructure works for adaptation to climate change can be developed, so that in educational spaces we can talk about good climate smart practices that we can develop in homes, in productive sectors such as agriculture, livestock, food production and the provision of services such as tourism, with great potential for thematic insertion in secondary education, both in the Humanist Scientific Baccalaureate, as in the Professional Technical Baccalaureates, in their different specialties and in university education.
10. To provoke a change that is significant in the long term in the processes of education and environmental communication for sustainable development with a focus on climate change and adaptation, it is necessary to influence the initial training of teachers, therefore professionalizing and specializing teachers is important, both in teacher update courses, as in the creation of a postgraduate degree at the master's level or specialty in Environmental Education for Sustainable Development with orientations in education in climate change and variability and education in integral risk management.
11. The public budget of the State must be labeled, so that budget lines can be identified that are invested in mitigation processes such as adaptation to climate change, and within these which are the lines that correspond to environmental education and communication for sustainable development with a focus on climate change and adaptation., this will facilitate the decision-making that is taken in the public

management on this issue and verify how to comply with the public policy regarding the subject.

The development of this case study on "Knowledge, attitudes and practices on management and adaptation to climate change in the conurbe of Tegucigalpa", has allowed us to understand the logics on which environmental education and communication for sustainable development has been constituted with a focus on climate change and adaptation in Honduras, but above all to identify the advances, Challenges and challenges, including some dysfunctions that have not allowed citizens to develop and adopt climate-sustainable practices at home, such as at work in productive and service activities.

This learning, without a doubt, will be of great importance in the work done by NGOs and International Cooperation, considering the studies of knowledge, attitudes and practices, from the initial phase in the survey of baselines, technical studies of exantes projects, monitoring, follow-up and evaluation, especially in the support provided to the education sector at the decentralized and decentralized level as at the central level.

In our current goal, as an organization we intend to be able to promote the formulation and management of a public policy in environmental education and communication for sustainable development with a focus on climate change and adaptation, at the central and decentralized levels, to support better and more coordination efforts in order to achieve a more effective and sustainable climate education.

The main implications of the case study "Knowledge, attitudes and practices on management and adaptation to climate change in the conurbe of Tegucigalpa", will be developed in the medium and long term, but it is the base study on which evidence-based advocacy actions will be built, where we will seek to share the results of this work through thematic Congresses, publications in indexed journals, as well as dialogues with the State and with civil society organizations, to seek the joint construction and management of a public policy in education and environmental communication for sustainable development with a focus on climate change and adaptation, from which the following can be derived: 1) More coordinated efforts between institutions and their programs as their projects for example through the creation of an inter-institutional working table or committee on environmental education and communication; 2) Updating of the Curriculum at the levels of basic, secondary and higher education, guaranteeing the thematic insertion of climate change and adaptability as a cross cutting theme; 3) Design, updating and deepening the use of pedagogical mediations.

At the regional level, an action plan for advocacy should be established with the Departmental Directorate of Education of Francisco Morazán and the Departmental Unit of Education and Environmental Communication and Health, its Municipal Directorates and its district directorates, which are contemplated in the Municipality of the Central District, to recognize the strengths, capacities and advances, but also the challenges, limitations, challenges and weaknesses that need to be strengthened to have a more effective climate education process.

At the intergovernmental level, it is necessary to begin to venture as an institution into the Central American Commission on Environment and Development (CCAD) of the Central American Integration System (SICA), but also to begin working with intergovernmental organizations such as the United Nations Environment Program (UNEP), to recognize the leading role of climate education in the construction of a new society. but also in regional positions before the Conference of the Parties to the United Nations Conference on Climate Change.

We propose that the organizations that have been part of the conduct of the case studies by the Climate Monitoring and Evaluation Communication and Education Project (MECCE) of

the University of Saskatchewan in Canada, can consolidate ourselves in the form of a coalition of organizations for advocacy at the United Nations Conference on Climate Change and in a consortium for the mobilization of resources to continue developing and deepening on research, monitoring, learning actions on climate education.

These learnings developed with the conduction of the case study "Knowledge, attitudes and practices on management and adaptation to climate change in the conurbe of Tegucigalpa", allow us to recognize the possibilities and potentialities, as a technical management instrument for the environmental management of educational centers, and for the management of development projects that have in their goals and components the theme of education and communication for climate change.

In the environmental management of educational centers, which emerges as a new dimension of educational management, the use of CAP surveys is proposed in this case of the issue of climate change and adaptability, as a protocol for the development of baselines, monitoring, follow-up, evaluation and learning, which can be easily transferable to the Ministry of Education. Universities, NGOs, professional technical education centers and be used as a criterion for monitoring scalability processes in the reference territory, in other regions of the country, and be shared so that it can be used in the Mesoamerican region.

ANNEXURE 1 DIRECTORS' DISTRICT SURVEY

The purpose of this survey is to assess the climate change adaptation actions implemented in agriculture, livestock, and households, as well as the knowledge, attitudes, and practices regarding climate change among secondary school directors. The results of this survey will help identify the main adaptation actions implemented in these areas, as well as the most effective sustainable practices and climate change adaptation strategies.

I. GENERAL INFORMATION

1. Name: _____

2. Age:

- a. 18 to 30 years
- b. 31 to 60 years
- c. Over 60 years

3. Gender

- a. Female
- b. Male
- c. Prefer not to answer

4. Municipality:

- a. Lepaterique
- b. Ojojona
- c. Santa Ana
- d. San Buenaventura
- e. Tatumbra
- f. San Antonio de Oriente
- g. Valle de Ángeles
- h. Santa Lucia
- i. Central District

5. Education Level:

- a. Secondary Education
- b. Technical University
- c. Bachelor's Degree
- d. Postgraduate

- 6. Occupation
 - a. Teacher
 - b. Pedagogical Assistant
 - c. District Director

II. KNOWLEDGE, ATTITUDES, AND PRACTICES

- 7. Do you consider climate change to be a significant problem affecting our planet?
 - a) Yes
 - b) No
 - c) Not sure
- 8. Have you implemented any educational activities or programs in your district to raise awareness about climate change among students?
 - a) Yes
 - b) No
 - c) Not sure
- 9. What activities have you undertaken in your district to promote climate change education practices?
 - a) Reduction of energy and water consumption
 - b) Use of sustainable transportation (bicycle, public transport, etc.)
 - c) Reduction of meat and animal product consumption
 - d) All of the above
- 10. Do teachers in your district use the educational guides provided by SEDUC for environmental education?
 - a) Yes
 - b) No
- 11. Which environmental education guides do you know?
 - a) Use of climate-resistant crop varieties
 - b) Implementation of efficient irrigation systems
 - c) Adoption of sustainable agricultural practices
 - d) All of the above
- 12. Which of the following consequences of climate change do you find most concerning?
 - a) Methodological guide for risk management in basic education.
 - b) Environmental education guide for social sciences teachers in basic education.
 - c) Environmental education guide for natural sciences teachers in basic education.
 - d) Guide for environmentally rational management of chemical products for basic and middle school teachers.
 - e) None of the above.

13. Do you think students in your school have sufficient knowledge about climate change and its consequences?

- a) Yes
- b) No
- c) Not sure

14. Has your school implemented any educational activities or programs to promote sustainable practices and climate change adaptation among students?

- a) Yes
- b) No
- c) Not sure

15. Which of the following sustainable practices do you consider most important to promote among students?

- a) Reduction of energy and water consumption
- b) Use of sustainable transportation (bicycle, public transport, etc.)
- c) Reduction of meat and animal product consumption
- d) All of the above

16. Have you observed any changes in climate patterns in recent years in your region that have affected the school?

- a) Yes
- b) No
- c) Not sure

17. Has your school implemented any climate change adaptation actions on its premises?

- a) Yes
- b) No
- c) Not sure

III. CLIMATE CHANGE ADAPTATION IN AGRICULTURE

18. Do you believe that climate change has affected agricultural production in your region?

- a) Yes
- b) No
- c) Not sure

19. Have you implemented any climate change adaptation actions in agriculture in your district?

- a) Yes
- b) No
- c) Not sure

20. Which of the following climate change adaptation actions do you consider most effective in agriculture?

- a) Use of crop varieties resistant to climate change
- b) Implementation of efficient irrigation systems
- c) Use of sustainable agricultural practices
- d) All of the above

21. Do you consider the implementation of climate change adaptation actions in agriculture a priority in your district?

- a) Yes
- b) No
- c) Not sure

22. Have you noticed any changes in climate patterns in recent years in your region that have affected agricultural production?

- a) Yes
- b) No
- c) Not sure

23. Have any schools in your district experienced economic losses due to extreme weather events in agriculture?

- a) Yes
- b) No

24. Do you believe that implementing climate change adaptation actions in agriculture can improve food security in your region?

- a) Yes
- b) No
- c) Not sure

IV. CLIMATE CHANGE ADAPTATION IN LIVESTOCK

25. Do you believe that climate change has affected livestock production in your region?

- a) Yes
- b) No
- c) Not sure

26. Which of the following actions do you consider most effective for adapting to climate change in livestock farming?

- a) Implementing irrigation systems
- b) Using drought-resistant seeds
- c) Improving pasture management
- d) All of the above

27. What type of training do you consider most important for livestock producers regarding climate change?

- a) Pasture management
- b) Use of climate monitoring technologies
- c) Implementation of irrigation systems
- d) All of the above

28. What factors do you believe limit the implementation of climate change adaptation actions in livestock farming?

- a) Lack of economic resources
- b) Lack of technical knowledge
- c) Lack of interest from producers
- d) All of the above

29. What type of incentives do you think could motivate livestock producers to implement climate change adaptation actions?

- a) Economic subsidies
- b) Technical training
- c) Recognition and awards
- d) All of the above

30. What type of strategies do you consider most effective for disseminating information about climate change adaptation in livestock farming?

- a) Workshops and in-person training
- b) Publications in digital media
- c) Videos and online tutorials

V. HOME

31. Which of the following actions do you consider most effective for adapting to climate change at home?

- a) Reducing electricity consumption
- b) Using sustainable transportation (bicycles, public transport, etc.)
- c) Reducing water consumption
- d) Tree planting
- e) All of the above

32. What type of training do you consider most important for students regarding climate change at home?

- a) Energy saving
- b) Use of sustainable transportation

- c) Reduction of water consumption
- d) All of the above

33. What factors do you think limit the implementation of climate change adaptation actions at home?

- a) Lack of economic resources
- b) Lack of technical knowledge
- c) Lack of interest from students
- d) All of the above

34. What type of incentives do you think could motivate students to implement climate change adaptation actions at home?

- a) Recognition and awards
- b) Awareness campaigns
- c) Discounts on public services
- d) All of the above

ANNEXURE 2. SURVEY AIMED AT BENEFICIARIES OF CLIMATE ENVIRONMENTAL EDUCATION PROCESSES

The purpose of this survey is to assess the climate change adaptation actions implemented in agriculture, livestock farming, and households, as well as the knowledge, attitudes, and practices toward climate change among secondary school directors. The results of this survey will help identify the main adaptation actions implemented in these areas, as well as the most effective sustainable and climate change adaptation practices.

I. GENERAL INFORMATION

1. Name: _____

2. Age:

- a. 7-12 years
- b. 12 to 17 years
- c. 18 to 30 years
- d. 31 to 60 years
- e. Over 60 years

3. Gender:

- a. Female
- b. Male
- c. Prefer not to respond

4. Municipality:

- a. Lepaterique
- b. Ojojona
- c. Santa Ana
- d. San Buenaventura
- e. Tatumbla
- f. San Antonio de Oriente
- g. Valle de Ángeles
- h. Santa Lucia
- i. Central District

5. Education Level:

- a. No access to education

- b. Basic Education I Cycle
- c. Basic Education II Cycle
- d. Basic Education III Cycle
- e. High School
- f. University Technical
- g. Bachelor's Degree
- h. Postgraduate

6. Occupation:

- a. Student
- b. Teacher
- c. Businessperson
- d. Food Producer

II. KNOWLEDGE, ATTITUDES, AND PRACTICES

1. Which of the following consequences of climate change do you find most concerning?

- a) Global temperature increase
- b) Glacier melting and rising sea levels
- c) Increase in frequency and intensity of extreme weather events
- d) All of the above

2. Do you feel that you have sufficient knowledge about climate change and its consequences?

- a) Yes
- b) No
- c) Not sure

3. Have you implemented any sustainable practices at home or in your workplace?

- a) Yes
- b) No
- c) Not sure

4. Which of the following sustainable practices do you consider most important to implement at home or in your workplace?

- a) Reducing energy and water consumption
- b) Using sustainable transportation (bicycles, public transport, etc.)

- c) Reducing consumption of meat and animal products
- d) Reforestation in urban areas
- e) Reforestation in the watershed
- f) Selective waste collection
- g) Prevention and control of forest fires
- d) All of the above

5. Have you noticed any changes in climate patterns in recent years in your region that have affected your home or workplace?

- a) Yes
- b) No
- c) Not sure

6. Do you believe that implementing sustainable and climate change adaptation practices at home or in your workplace can have a positive impact on the community?

- a) Yes
- b) No
- c) Not sure

III. CLIMATE CHANGE ADAPTATION IN AGRICULTURE

7. Do you think climate change has affected agricultural production in your region?

- a) Yes
- b) No
- c) Not sure

8. Which of the following climate change adaptation actions do you consider most effective in agriculture?

- a) Use of climate-resistant crop varieties
- b) Implementation of efficient irrigation systems
- c) Use of sustainable agricultural practices
- d) All of the above

9. Have you received training on climate change adaptation actions in agriculture?

- a) Yes
- b) No
- c) Not sure

10. Is climate change and how to adapt to it taught or discussed at school?

- a) Yes
- b) No
- c) Not sure

11. Do you consider implementing climate change adaptation actions in agriculture a priority in your community?

- a) Yes
- b) No
- c) Not sure

12. Have you noticed any changes in climate patterns in recent years in your region that have affected agricultural production?

- a) Yes
- b) No
- c) Not sure

13. Have you experienced any economic losses due to extreme weather events in agriculture?

- a) Yes
- b) No
- c) Not sure

14. Have you received financial support to implement climate change adaptation actions in agriculture?

- a) Yes
- b) No
- c) Not sure

IV. CLIMATE CHANGE ADAPTATION IN LIVESTOCK FARMING

15. Have you observed any sustainable practices being implemented in livestock farming in the municipality?

- a) Yes
- b) No
- c) Not sure

16. Which of the following sustainable practices do you consider most important to implement in livestock farming?

- a) Reducing water and energy consumption
- b) Using sustainable feeding systems
- c) Establishment of watering points
- d) Scattered tree planting
- c) Implementation of waste management systems
- d) All of the above

16. Have you observed any action to reduce greenhouse gas emissions in livestock farming in your municipality?

- a) Yes
- b) No
- c) Not sure

17. Have you received training on sustainable and climate change adaptation practices in livestock farming?

- a) Yes
- b) No
- c) Not sure

18. Do you believe that implementing sustainable and climate change adaptation practices in livestock farming can improve product quality?

- a) Yes
- b) No
- c) Not sure

19. Have you noticed any changes in the demand for sustainably produced dairy and meat products in your municipality?

- a) Yes
- b) No
- c) Not sure

V. HOME

21. What measures have you taken at home to reduce the generation of greenhouse gas emissions, which contribute to climate change?

- a) Installation of solar panels

- b) Use of LED bulbs
- c) Purchase of energy-efficient appliances
- d) All of the above
- e) None of the above

22. How willing are you to pay a little more for environmentally friendly products?

- a) Completely willing
- b) Somewhat willing
- c) Slightly willing
- d) Not willing at all

23. What actions do you believe business owners should take to reduce their environmental impact?

- a) Reducing the use of plastics
- b) Using recyclable materials
- c) Promoting eco-friendly products
- d) All of the above
- e) None of the above

24. What measures do you believe food producers should take to reduce their environmental impact?

- a) Using sustainable agricultural techniques
- b) Reducing the use of pesticides and chemical fertilizers
- c) Promoting organic products
- d) All of the above
- e) None of the above

25. How important do you think it is for educational institutions to include environmental education in their curriculum?

- a) Very important
- b) Somewhat important
- c) Slightly important
- d) Not important



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