

# Urban Planning and Adaptation to Climate Change in El Salvador

Aley Ramos Velasco<sup>a</sup>, Han-Hsiang Wang<sup>b,\*</sup>

<sup>a</sup>International Graduate Program for Environment Sustainable Development, National Central University, Taiwan

<sup>b</sup>Graduate Institute of Construction Engineering and Management, National Central University, Taiwan

*Abstract: Cities are hubs of social development, economical opportunity and productivity. Fifty-four percent of the world population is living in cities and the number is projected to keep growing along with the demand of housing and services. The Intergovernmental Panel on Climate Change released its Fifth Assessment Report (AR5) in 2014 affirming that the main cause of climate change is anthropogenic. Increasing surface temperature carries negative impacts such as warmer weather, poles melting, sea level rising, coastal submergence and erosion, frequent precipitation and flooding. In developing countries the impacts are expected to be more significant. In 2015 the United Nation Framework Convention of Climate Change (UNFCCC) released the Sustainable Development Goals to reduce Green House Gas emissions in a long term, underlining the important role of cities to accomplish sustainability through mitigation and adaptation actions. El Salvador in spite of being a developing country and having no obligation to contribute to the climate negotiation is showing intentions in supporting the environmental targets to be resilient by 2025. However, cities in El Salvador are still attached to inefficient and unsustainable practices, and housing adaptation is not being considered in governmental policies. Climate change impacts demand a switch to new paradigms for urban development, and thus El Salvador needs to establish the path to achieve sustainability and focus on the important element of dwelling. Therefore, this study aims at discussing practical urban planning strategies for El Salvador to adapt to climate changes with focuses on housing.*

*The authors expect the identified strategies together can become a blueprint for central and local governments in El Salvador to embark on addressing climate change adaption from the aspect of housing.*

**Keywords:** urban planning, climate change, sustainability, cities, adaptation model.

## I. INTRODUCTION: URBAN GROWTH IMPLICATIONS AND CLIMATE NEGOTIATIONS

Cities are rapidly increasing demographically and economically, demanding more services and infrastructure for dwelling. Although city footprint occupies only 3% of world land, their uncontrollable actions against the environment have contributed inevitably to climate change; they emit more than 50% of global Green House Gases (GHGs) bringing remarkable negative impacts, such as floods, heavy rains and heat stress (United Nations, 2014).

The General Assembly of the United Nations (2015) summated the 2030 Agenda for Sustainable Development highlighting the need to include adaptation actions for sustainability as part of the Sustainable Development Goals (SDGs). If the capacity of the cities to adapt is not developed, the impacts are expected to increase intensity over time. Therefore, the role of cities is crucial to acquire sustainability and combat climate change. (IPCC, 2014; Jacob et al., 2014; Revi et al., 2014; Collins et al. 2013).

The Intergovernmental Panel on Climate Change (IPCC) (IPCC, 2014) defines adaptation as “the process of adjustment to actual or expected climate and its effects” while “reducing risks and vulnerability”. Sustainability in cities is integrated by the equilibrium of the social, environmental and economic sectors to boost a holistic development, including adaptation to climate variability.

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The most sustainable cities in the world impulse actions involving these three sectors and housing is part of their priorities. (ARCADIS, 2016). Berrang-Ford et al. (2011) and Carter (2011) pointed that adaptation is a complex process and the Fifth Assessment Report (AR5) states the major barrier is to reduce the gap between theory and practice. Cities worldwide have encountered this barrier to develop their adaptation action plans and analyzing them is part of the learning process to identify the adequate path for sustainability. (Cortekar, J., et al., 2016).

El Salvador has shown willingness to contribute to the climate agenda and is projecting to reach the climate agenda goals formulating a sustainable urban development plan. However, the country still does not establish a national action plan to fulfill the climate agenda and its targets so far. Therefore this study aims to identify the path the country is evolving through a sustainable development and designs a conceptual model of strategies to support sustainability in cities within the AMSS, a significant study area for the country. At the same time, identify their relation to housing adaptation to climate change.

The Metropolitan Area of San Salvador (AMSS for its acronym in Spanish) is a conglomerate of fourteen municipalities; it gathers the highest national economic development prosperity, and the politic and administrative power of the country. Although the AMSS covers only 3% of the national territory land and 29.71% of its total land is urban area, it has a significant number of inhabitants: around one third of the total population of the country are living in the AMSS, highlighting the significance of the area (DIGESTYC, 2007; Argumedo, P., et al. 2018).

## II. METHODOLOGY

Understanding what other major cities in the world have been implementing towards climate change adaptation is an appropriate step even though successful solutions in one city are not necessarily suitable in another. There is not one universal solution inasmuch as cities are different, complex and encompassing several unique aspects such as geography, climate, population, politics, society, and

finance. The overview of urban practices on adaptation explains specific actions taken and helps understand how the adaptation actions are acquired (Cortekar et al., 2016). In addition, this study also conducted expert interviews with actors related to urban development in the AMSS.

### A. *Adaptation Strategies in Urban Areas*

The urban cases analyzed in the study were selected in such a way that they represent geographical diversity. Hence cities from Asia, Europe and America satisfy this criterion; leading cities from these continents that have been working on adaptation methods, mitigation and sustainability were selected for study and analysis.

The different urban actions taken by cities have shown that urban areas are highly involved in promoting climate change adaptation and have strong concerns for closing the gap between theory and practice towards sustainability and adaptation. In addition, urban development frameworks vary in each location; the needs of cities are specific and corresponding local regulations are developed to respond to local requirements of establishing suitable actions.

The common barriers presented in the cases are related to institutional responsibility and conflict of interests. On the other hand, investing in housing is a common goal that the most sustainable cities have considered and executed in their urban plans; it is perceived as a demanding sector that keeps growing altogether with the city.

The results of analyzing all the cases support future initiatives of encouraging innovative approaches to support cities in the process towards mitigation and adaptation. The leading governmental role in the establishment of urban development frameworks and management of strategies to face climate change is presented in all the cases. Similarly, the participation of all the actors involved such as stakeholder, private institutions and civil society has been equally important to establish legal frameworks for sustainability.

**B. Interviews: identifying the pathway toward sustainability for the AMSS**

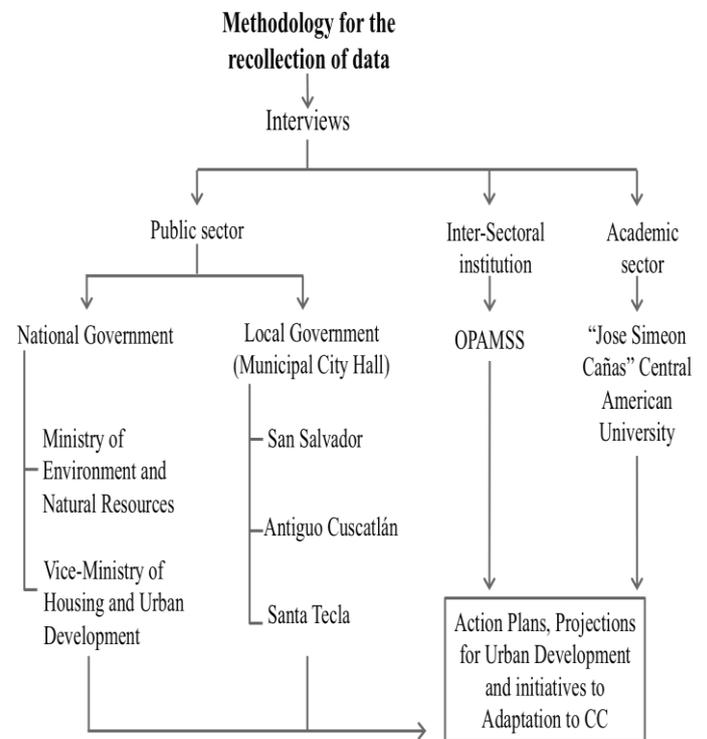
The national projections for 2025 in El Salvador indeed consider adaptation and mitigation intentions; therefore, interviews with actors involved in the urban development of the AMSS are necessary to identify their specific action plans. To the best knowledge of the authors, there are not local action plans for adaptation in the AMSS in spite of the existent national projections for sustainability.

The challenge for adaptation is to identify an appropriate pathway toward sustainability since there is no general route to follow. Therefore, to determine a general adaptation framework for cities requires a study to confirm their needs, which implies that the implementation plans and their priorities to combat climate variability need to be identified.

Since the AMSS has no action plans targeting the goals in the Agenda for Sustainable Development, working out a guideline for mitigation and adaptation actions for the area is necessary. According to the urban cases and their adaptation strategies to climate change, it is important that governments take an active role to provide a guideline for adaptation to urban actors to propose strategies encouraging the creation of legal frameworks for policymakers and stakeholders. It is acknowledged that the lack of political priority has been responsible for irregular urban practices that increased vulnerability to the impact of climate change (Shabecoff, P. 1988). However, El Salvador seems to be in a governmental conjuncture that environmental goals are still not considered as high priority.

The methodology to identify a pathway toward sustainability for the AMSS is to retrieve qualitative data through interviews in person and by e-mail with urban actors in governmental and private institutions related to urban planning in the AMSS. Interview questions covered topics including their action plans, projections related to urban planning and the initiatives to adaptation to climate change. Interviewees included the Deputy Director of Territorial Development from Vice-Ministry of Housing

and Urban Development, Soil Technician and Unit of Water Programs from Ministry of Environment and Natural Resources, Urban Planning Technician from Municipal City Hall of San Salvador, Head of the Urban Development Department from Municipal City Hall of Antiguo Cuscatlán, Head of the Department of Climate Change from Municipal City Hall of Santa Tecla, Head of Planning and Research Unit from Planning Office of the AMSS (OPAMSS) and Professor in the College of Architecture from “Jose Simeon Cañas” Central American University. Figure 1 demonstrates the structure of interviewing the actors.



**Fig 1. Methodology to collect qualitative data in the AMSS**

**III. RESULTS**

According to the interviews, the governmental institutions and private sector are performing adaptation actions to face the phenomenon of climate change in El Salvador. These actions include prioritizing the protection of coastal zones and water resources, revitalization of historic centers, risk management plan to decrease vulnerabilities along a river, ongoing researches on thermal behavior of roofs and the elaboration of a guideline for zero-net energy for buildings. Some general highlights

were gathered in a Manual for Urban Design and future projections for high-rise buildings construction and urban revitalization.

In most of the cases, the actions are simply responses to negative impacts that have already been affecting the communities, and there are no current plans addressing the specific topics of housing in the AMSS. However, it is expected that dwelling can be considered and benefited when the adaptation actions are developed, as a consequence of the positive impacts expected for the interventions.

Although the national government has considered the AMSS as a priority area for urban development to achieve sustainability, the initiatives proposed by these institutions did not meet entirely the requirements for an integral sustainable model and were thus insufficient for climate change adaptation; the cities still require an action plan to fulfill the target.

Therefore, there is a need to develop a strategic model to support urban sustainable development actions in the AMSS, which at the same time benefits housing adaptation

to climate change.

**A. Model of Urban Strategies for Sustainability in the AMSS and its Relation to Housing Adaptation to Climate Change**

An urban strategic model is established in this study; the model consists of adaptation strategies (listed in Table 1) for climate change, which were effectively implemented in urban areas of major cities in the world. To validate the applicability and suitability of these strategies to the AMSS, they are presented to the actors who are related to urban planning in the AMSS and were interviewed in this study. They evaluate the urgency level of the strategies (i.e., high, medium and medium-conditional) and the strategies are ranked into three categories, i.e., A, B, C, respectively corresponding to high, medium, and medium-conditional urgency levels according to the criteria shown in Table 2.

**Table 1. Results of the urban strategies classification in the AMSS**

Strategic model of strategies for sustainability approach in the AMSS			
Category	No	Strategy	General urgency level
A	1	Generate cross-sectoral coordination to plan urban development supported by governmental arrangements	High
	2	Intensify public spaces for recreation	
	3	Invest in public facilities	
	4	Support additional factors encouraging city prosperity and sustainability as child support, decrease criminal rates and increase job opportunity.	
B	5	Increase natural areas in cities while planting trees and growing vegetation	Medium
	6	Decentralize commercial centers	
	7	Implement a pedestrian safety action plan	
	8	Integrate policies for adaptation to climate change	
	9	Create conceptual frameworks for urban planning with adaptation and mitigation strategies	
	10	Grant energy efficient technologies	
	11	Improve drainage areas	
	12	Propel a program for solid waste reduction	
	13	Motivate recycling initiatives	
C	14	Improve public mobility resources	Medium
	15	Create policies to meet mobility and transportation convenience	
	16	Impulse an engagement program to create environmental businesses	
	17	Foment an educative program on sustainability for the general population	
	18	Promote water efficiency standards in dwelling	

Category	No	Strategy	General urgency level
	19	Develop an electric vehicle strategy	Conditional
	20	Build diverse housing options for different family incomes	
	21	Investing on low-carbon emission energy projects	
	22	Subsidize reforms on cost effective options like energy efficiency and renewable energy.	
	23	Introduce and support urban agriculture business	

Table 2. Classification of urgency level for urban strategies in the AMSS

Classification for the strategies in the AMSS		
Category	Description	General Urgency Level
A	All the institutions classify the strategy urgency as high and require immediate action.	High
B	The strategy has been catalogued with different level of urgency as high and medium and can be addressed in medium-term.	Medium
C	At least 1 institution classify the strategy urgency as low or not applicable	Medium conditional. Needs to increase governmental capacity before to be developed

After the actors' evaluation, all the strategies are considered important for the development of the environmental model (see Table 1 and Table 2). The strategies in category A receive consensus of high urgency from the actors and thus, require immediate action. The strategies in category B receive a diverse assessment result: some actors evaluate them as high urgency while the others assess the same strategies as medium. Therefore, this uneven result means these strategies in category B might be accomplished in medium-term lapse of time. The category C gathers the strategies which local government evaluates as less urgent or not applicable in their action plans; that is, according to their input, the strategy is out of their capacity.

The findings show that the most urgent priorities involve the encouragement of cross-sectoral coordination to plan urban development supported by governmental arrangements. This strategy highlights the vital importance of both the national and local government leading roles to propose a sustainable urban framework, likewise it underlines the prominence of communication between the different actors, policymakers and stakeholders involved along the process. This action has also being recognized in the AR5 as a barrier to achieve the mitigation and adaptation to climate change goals, confirming a gap from

theory to practice, since its implementation depend on each city projections and action plans.

Additionally, other strategy catalogued as urgent by all the institutions consulted was the intensification of public spaces for recreation, to ensure satisfaction of residents, and investment in public facilities to improve its quality and the city convenience. Supporting additional factors to encourage city prosperity crowns the list of the most urgent strategies for sustainability, comprising initiatives for child support, decreasing criminal rates and increasing job opportunities. The strategy implies a strong concern on the city's safety and a need to decrease poverty level by improving affordability, decreasing marginalization and increasing economic income sources as well as to reduce and prevent criminal acts and create a healthy social environment.

There were some cases where the local government evaluates strategies as not applicable, alleging that they are out of its reach and responsibilities. This issue can be overcome by augmenting capacity for local governments to implement independent projects. In addition, to support the adaptation and mitigation in cities within the AMSS, the governmental sectors need to align and equilibrate its power level to encourage communication and mutual

support between different governments to facilitate resources to address all the strategies hand in hand.

To increase capacity, the local government might require a legal framework that validates its ability to act in the achievement of these urban actions. Although housing is not classified as a top prioritized strategy because the governments need to consider more critical factors in the cities, it is still an important component for the urban development. This fact, therefore, indicates that the action plans addressed by the cities might first appoint the elements that make the cities sustainable to fulfill the targets set up in the climate agenda. These action plans consequently will form a suitable base to support the housing adaptation in the future.

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