



# HEATPROOFING SRI LANKA

**The challenges and  
opportunities for action**

# Acknowledgment

This report is the result of an awareness of an increasingly serious problem (overheating risk) and a desire to find ways and means to address it. It is made possible by the ‘Exploring pathways to impact of the hot-spot mapping work in urban Sri Lanka’ project funded by the Global Challenges and Sustainable Development Unit of the Glasgow Caledonian University, utilizing pump-priming funding provided by the Global Challenges Research Fund (GCRF) of the Scottish Funding Council. We wish to acknowledge the financial support of the GCRF and acknowledge in-country partners for the following assistance: Department of Meteorology for providing historic climate data; University of Moratuwa (Departments of Town and Country Planning; Architecture) for facilitating access to experts and maps. We wish to convey our special gratitude to all those experts

and urban professionals who agreed to be interviewed for the project and gave their time and shared their experiences freely. While acknowledging the inputs by our partners and interviewees, we wish to state that the opinions expressed in this report and the synthesis of findings are our own.

# Contents

<b>Setting the Scene</b>	<b>02</b>
<b>Methodology</b>	<b>04</b>
<b>Themes</b>	<b>06</b>
<b>Barriers</b>	<b>18</b>
<b>Opportunities</b>	<b>20</b>
<b>Actors</b>	<b>22</b>
<b>Implications</b>	<b>24</b>

# Glossary

AR	-	Aspect ratio
CDP	-	Colombo Development Plan
EW	-	East West
EEA	-	European Environment Agency
FAR	-	Floor Area Ration
HAP	-	Heat Action Plan
HW	-	Heatwave
LCZ	-	Local Climate Zones
NS	-	North South
RH	-	Relative Humidity
Sc	-	Scenario
UC	-	Urban Climate
UDA	-	Urban Development Authority
UHI	-	Urban Heat Island
UTCI	-	Universal Thermal Climate Index
UW	-	Urban Warming

# Summary

Climate is warming, and cities experience double jeopardy – global and urban warming. In tropical countries such as Sri Lanka, this leads to excessive heat stress and the heat risk is exacerbated by the warming (Hazard); exposure (increasing urban population) and vulnerability (increasing share of the elderly in the population). In recent years, heat stress in Sri Lanka has reached the threshold of extreme heat danger in the hottest months and the heat stress in even the coldest months are rapidly deteriorating.

Although it is not possible to eliminate this increasing heat stress, there are opportunities to reduce and manage its adverse effects and urban planning and building design options could help. Where such possibilities exist, what the barriers to their implementations are and the scale of the possibilities to mitigate heat stress in Sri Lanka remain unanswered. Political,

economic, social and other broader barriers (in terms of policy, resources and organisational) are highlighted. We identify five broad opportunities for greater integration of heat proofing actions with the urban planning process: insights, specify, exhort, commit, continuity and integrate. We identify actors involved in urban planning, urban infrastructure and building and construction sectors that should come together to heatproof Sri Lanka.

“Urban warming is an imminent threat in Sri Lanka but is also a catalyst to re-think the way we plan and an opportunity to build healthy and resilient cities.”



# Setting the scene

Sri Lanka has attracted the attention of investors throughout the world since the aftermath of civil war and Colombo, the capital city, has undergone unprecedented development which could permanently alter its land cover and thus contribute to urban overheating. Left unchecked, this could have severe consequences on human health and the environment.

According to the 6th Assessment report (AR6) of the Intergovernmental Panel on Climate Change (IPCC) <sup>1</sup>, Heatwaves and humid heat stress in South Asia will be more intense and frequent during the 21st century. The relative share of urban warming is one of the highest in the South Asian region, accounting for more than 60% of the total warming.

## key facts

- Sri Lanka faces significant threat from extreme heat, with the number of days surpassing 35°C, potentially rising from a baseline of 20 days to more than 100 days by the 2090s, under emissions pathway RCP8.5.
- Rises in minimum temperatures are projected to be faster than rises in average temperatures.
- Extreme heat threatens human health and living standards, particularly for outdoor laborers in urban areas without adequate cooling systems; this will particularly impact communities in Sri Lanka's northern region.<sup>2</sup>



Figures 1 & 2 below show trends in human comfort during the last 25 years across Sri Lanka. This is expressed in a thermal comfort index called Universal Thermal Climate Index (UTCI), where the values between +9 to +26 can be categorized as comfortable / no thermal stress. +38 to +46 categorized for very strong heat stress and above +46 known as extreme heat stress

From the upper image, we can discern a clear warming trend across the whole island. Colombo experiences more hotter days throughout the years. The hottest month (April) is getting hotter, and even the coolest (January) months depicts a reducing number of cooler days. In other words, the

entire year is shifting towards a discomfort range for the whole country, except the hillside.

When compared with other Asian cities, Colombo has made little or no effort to mitigate this overheating threat at a planning level. Cities such as Singapore, Ahmedabad etc. have successfully integrated climate sensitive planning strategies and implemented action plans to mitigate issues related to overheating.

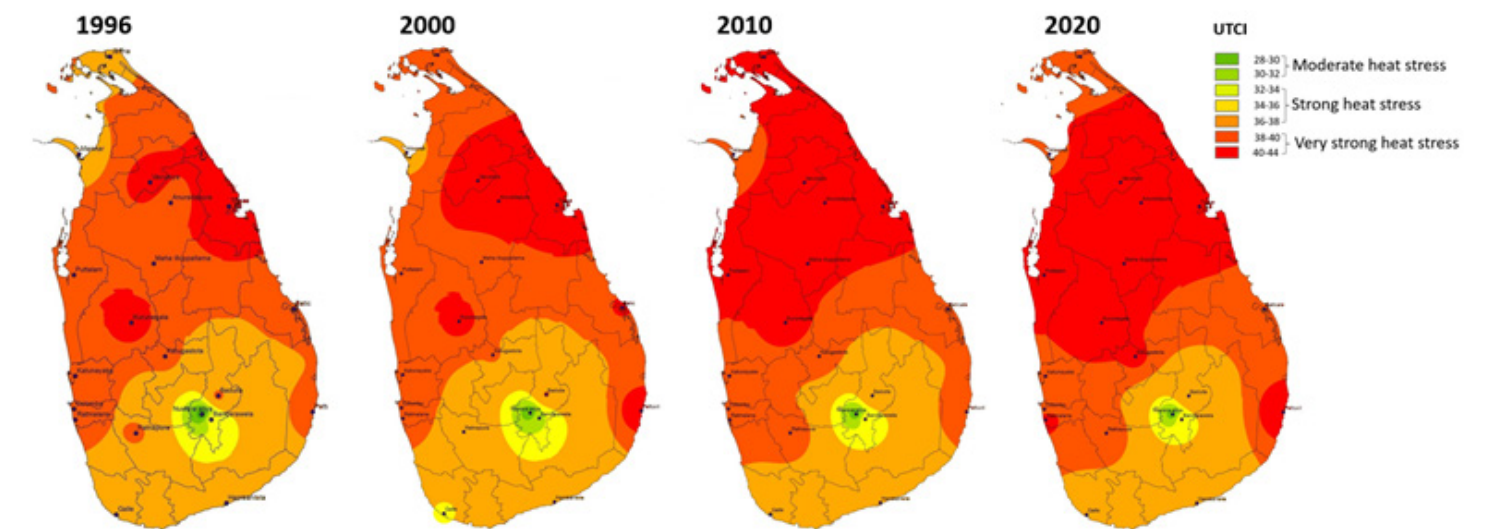


Figure 1: Thermal comfort trend for the hottest month

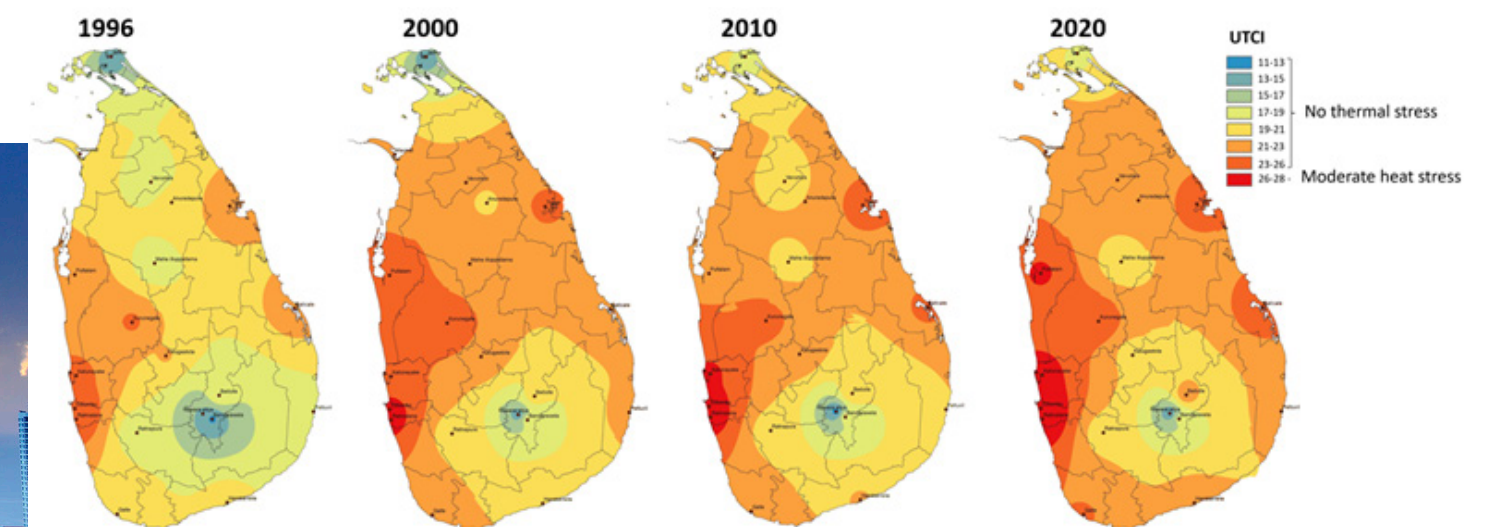


Figure 2: Thermal comfort trend for the coldest month

1. IPCC (2021). Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. <https://www.ipcc.ch/report/ar6/wg1/#FullReport>
2. Climate Risk Country Profile: Sri Lanka (2020): The World Bank Group and the Asian Development Bank.





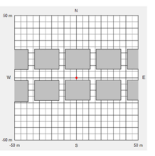
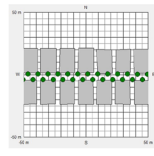
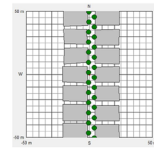
	Base case	Scenario 1& 3 EW street	Scenario 2& 4 NS street
Section	AR: 0.5	AR: 3	AR: 3
RayMan model			
Sky view factor	SVF=0.87	SVF=0.201	SVF=0.199

Table 1a: RayMan simulation for different cases

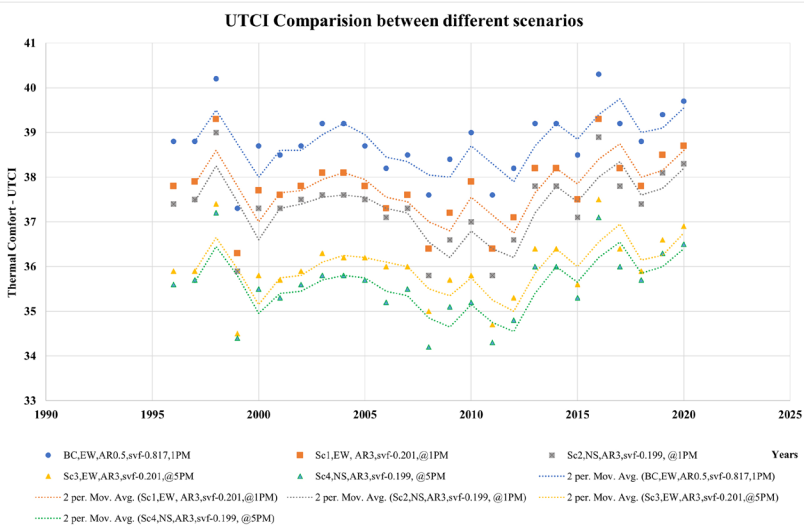


Table 1b: Simulation results for different scenarios

The available scientific literature illustrates four proven climate-sensitive design strategies - urban form to achieve shading, increasing vegetation, promoting wind flow and use of thermal reflective materials - to mitigate overheating in the tropics. We explored the likely effects of some of these planning approaches on the local thermal comfort at street level. What is apparent from the results is that only a modest improvement in local conditions are possible when simulated under various urban settings promoted by the existing planning conditions.

The above tables (1a, 1b) imply that an increase in the height to width ratio, decrease in the range of UTCI was observed. NS orientation shows a slightly better performance than EW street.

We have thus highlighted the significant threat of overheating in Colombo and shown that the available climate knowledge on mitigation techniques has a modest improvement in thermal comfort. Having done that, we will now focus on ‘How’ we can address this in the current planning environment.

## Methodology

It is in this light that the present report aims to understand the existing barriers and opportunities in translating the available urban climate knowledge to planning practice. For this, expert opinion was considered as the best data and a qualitative approach was undertaken. Semi-structured interviews were conducted as an in-depth inquiry into meaningful experiences and exploring subjective viewpoints.

Six well-experienced professionals who have contributed to shaping the planning landscape in Sri Lanka were selected for interviews – two each from the academia, practitioner, and administrative communities. The interviewees chosen are as follows:

- AC1 = Academic planner with climate change adaptation experience
- AC2 = Academic with social science background
- PR1 = Practitioner - Planner
- PR2 = Practitioner - Urban designer
- AD1 = Regulatory personnel
- AD2 = Regulatory personnel

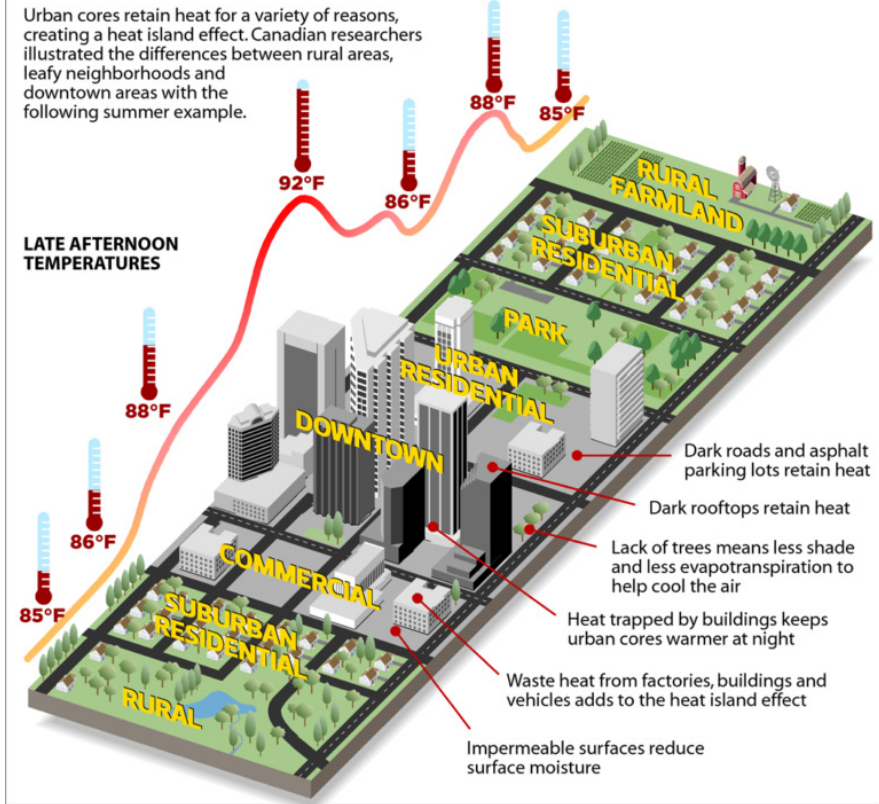
We conducted one-to-one online interviews and each interview was around 60-90 minutes. Open-ended questions were asked mainly to focus on the existing planning context and urban climate in Colombo.

The interviews were then analysed through thematic analysis. Thematic analysis is a popular method of qualitative analysis that explores insights through patterns of meaning (themes) that occur around a data set, by systematically grouping and organizing it.<sup>3</sup>



### Urban Heat Island Effect

Urban cores retain heat for a variety of reasons, creating a heat island effect. Canadian researchers illustrated the differences between rural areas, leafy neighborhoods and downtown areas with the following summer example.



SOURCE: D.S. Lemmen and F.J. Warren, Climate Change Impacts and Adaptation

PAUL HORN / InsideClimate News

Figure 3: Urban Heat Islands - illustration

“The entire country is shifting towards thermal discomfort except for the hillside. The available climate knowledge on mitigation techniques illustrates a modest improvement in thermal comfort. However, there hasn’t been any initiatives in integrating these in the planning landscape”

3. Braun, V. & Clarke, V., (2012). Thematic Analysis. In: H. Cooper, ed. APA Handbook of Research Methods in Psychology. s.l.:American Psychological Association., pp. 57-71.



# Themes - An approach to implementation

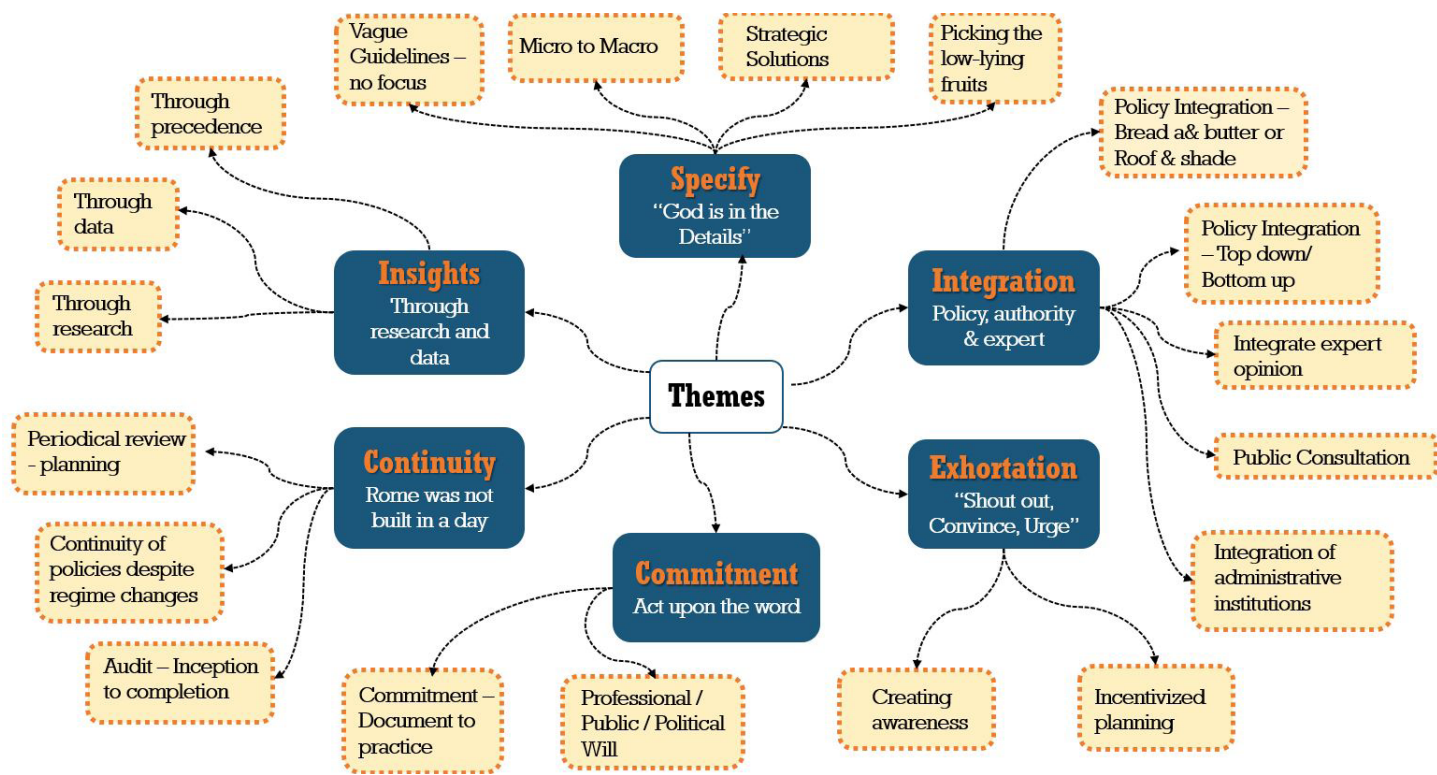


Figure 4: Themes and Sub-themes derived from thematic analysis

## 1. Insights – through research and data

### a. Through research:

One of the questions we asked during the interview was regarding the existing climate knowledge in Sri Lanka, for which we obtained mixed answers from the participants. Two of the participants clearly identify the need for contextualized local research -

*"most of the studies are very general studies, where we can't make any decisions".*

Since the importance of context can never be undermined in climate studies and strategies,<sup>4</sup> it is important that the academia encourages more specific studies

that contribute to practical applications.

Similarly, the quality of research is important. One of the practitioners - PR1, identified that there was fewer research on local Urban climate research and the quality of research seems to be less focused and ineffective when formulating ground-level solution and attributes.

Further the need for qualitative research was stressed by AC2, claiming that quantitative research can be sometimes isolated, assumption-based and be obtained with erroneous or manipulated data.

*"We need to have our own system of determining these things – our comfort level is completely different for a person in Europe. Their comfort level may be cold for us. Thus, we need contextualized modification of urban climate parameters, rather than borrowing it from the West."*

## 2. Integration – policy, authorities, and expert opinion

### a. Policy Integration - Bread and butter OR roof and shade?

When we discussed the opportunity of prioritizing urban climate decisions in the planning environment, most of the participants resonated that *"we need climate actions, but there are other priorities - we face many social and economical issues..."*,

Thus, we improvised this theme in the integration of Urban climate policies as a 'second-order planning decision'. The key challenges that govern the planning landscape, as vouched by the participants, were social housing, transport, and waste management.

AC1 stated,

*"... there is more than 50% of undeserved settlement in Colombo. There has been a long-term agenda in addressing this, but still we have failed to find a successful*

### c. Through data

Organized data is knowledge. We can gain a lot of insights through data.

Both the practitioners asserted the importance of having data recorded and available and a centralized place for future use. This could be past climate disasters, surveys, reports, any modeling, or simulations done etc. They also stressed the importance of coordinated data and having previous models/ simulations available for the use of designers.

PR2 contended that the data sought by the Meteorological department stands in isolation and is not utilized by the UDA. Mills et al. (2010)<sup>5</sup> also calls for integration of meteorological data in the planning system for useful UC actions.

*solution..."*

Echoing the same idea and adding depth to it, DR1 stated, "Colombo is a wetland-based city – we need to plan based on the ecological strength of the city, these wetlands act as ecosystem services, but encroachment into wetlands and marshes has posed a serious threat."

*"Colombo being the primate city has attracted a lot of demand pressure over the years. Infrastructure development, transport, waste management have been unresolved issues for decades, and the high demand for development will only make it more challenging in addressing these."* - DR1

However, we need to cater for this demand. Commenting on the existing regulations as "restrictive in nature", AC1 stated that planning regulations must consider market forces and allow for optimum built form, thereby encouraging developments.

4. Rode, P., (2016). The Integrated Ideal in Urban Governance- Compact city strategies and the case of integrating urban planning, city design and transport policy in London and Berlin. London: PhD thesis, London School of Economics and Political Science.  
5. Mills, G. et al., (2010). Climate Information for Improved Planning and Management of Mega Cities (Needs Perspective). Procedia Environmental Sciences, Volume 1, pp. 228-246.



***This leads to a debate whether climate mitigation strategies should be considered as a second-order strategy or rather a first-order strategy, especially in a developing country like Sri Lanka, due to the fact that neglecting climate risks have led to severe climate disasters in the recent past.***

AC2 acknowledged that urban warming mitigation should be a priority in planning but must be integrated with other policies. There should be a balance, as correctly stated words by PR1-

*"...ultimately it all boils down to the bread and butter of common man..."(PR1).*

Connelly et al.<sup>6</sup> discusses the key concepts within sustainable development and recognize that social and economic practices are inseparable from sustainable development. It needs to be integrated within socio-economic policies. This is also advocated by the New Urban Planning – Vancouver declaration<sup>7</sup>. However, these interviews also understand that by prioritizing climate mitigation strategies, countries can minimize the unnecessary economic burden associated with post-disaster recovery and establish a healthy workforce.

#### **b. Policy Integration – Top-down / Bottom-up**

PR1, DR1 and AC2 stated that urban climate actions can be governed from a top-down approach due to the structure of Sri Lanka's governance. It is relatively easy to impose regulations that will trickle down to ground level.<sup>sd</sup>

On the contrary, AC1 and PR2 stated that urban climate actions should be governed through a bottom-up approach. Even though policies are imposed, they could be easily manipulated by the "middle management" i.e. regulatory agencies, which have the power of implementation. Due to corruption and malpractices, this might not be implemented effectively, or rather end up only in documents. However, if the public is aware of the adverse climate effects and there is a strong urge to uphold climatic action within the people, the mid-

***With the growing importance of sustainable urban planning, policymakers and planners are responsible for identifying thermally vulnerable areas in the city and plan accordingly, which requires knowledge and expert input (Agathangelidis et al., 2019)<sup>8</sup>***

dle management will feel pressure from the bottom too.

#### **c. Integrate Expert Opinion:**

The interviews confirmed that integrating professional inputs at the beginning of the planning process and tying them up throughout the implementation process has a positive reinforcement in UW mitigation strategies.

PR1 said that a simulation done for the downtown of Colombo (Slave Island) by experts revealed that high risers could actually improve the wind flow of a city. These sought of revelations can help in creating a thermally comfortable environment while encouraging developments, and thereby attracting investments too.

A town planner assessment that consists of all necessary checkpoints – climate, environmental, material, UW, waste management etc. can be integrated at the beginning of the planning process to accommodate this.

Apart from this, professionals too have a responsibility in voicing out their opinions. We categorized these suggestions from the interview under the theme "Exhortation".

#### **d. Public Consultation.**

Public consultation is a part of sustainable planning. AC1 states that involving the public during the planning process will not only allow indigenous knowledge to integrate with planning but also allow the public to be informed regarding the benefits of climate-sensitive planning

and design. They further pointed out that there is no existing system in the planning process that informs the public regarding any neighbourhood development and that if the locals are informed and involved accordingly in the planning process itself, there could be more control over developments.

DR1 and AC2 both imply the need of regulating public consultation as a mandatory requirement in the planning system for effective climate strategies.

#### **e. Integration of administrative Institutions**

One of the significant barriers that we identified in implementing climate sensitive planning is the fragmentation of institutions. This was brought up by all participants and thus led to a straightforward sub-theme.

*"Although we have a considerable climate knowledge this is not being effectively implemented mainly due to the existence of several planning agencies with overlapping responsibilities." - PR1*

PR2 indicated that the implementation of development plans is "not even 50% efficient" and said the fragmentation of institutions is a key reason for this. PR1 also indicated we have a separate Climate change secretariat, and environmental ministry are not synchronized in an effective way to provide solutions. Further, they indicated that this can lead to finding a loophole to get through this rather than consciously responding to the situation.

***"To get a development permit, you are sent to all these various places to get clearances. So, in the end of the day one is lost amidst this complex procedures and wants to find a loophole to get through this rather than consciously responding to the situation. I think we need to have a central integrated mechanism to overcome this."***

8. Agathangelidis, I., Cartalis, C. & Santamouris, M., (2019). Integrating Urban Form, Function, and Energy Fluxes in a Heat Exposure Indicator in View of Intra-Urban Heat Island Assessment and Climate Change Adaptation. *Climate*, 7(75), p. 28.





### 3. Specify – “God is in the details”

This is the most referenced theme with 61 references throughout the five interviews and is constructed with ideas revolving around “lack of detail” and “the need for conscious specified regulations”.

#### a. Vague guidelines – no focus

All the participants explicitly implied that the existing regulations are very vague and not detailed enough. AC1 and PR2 suggested that the development plans are not focused on urban climate issues, PR2 further elaborates –

*“...the existing development plan is not adequate to address climate issues, let alone other issues such as transport, waste management etc...”, “... the CDP is very generic and not specific, I would say that CDP is more a regulatory plan rather than a development plan...”.*

Local authorities and the UDA control most developments in Sri Lanka. The CDP is the ground level guidance for any development in Colombo and specifying this in detail will allow more control over the developments.

#### b. Macro to micro

The existing development plans are identified as a mere zoning approach, which must be detailed:

*“The current plan is limited to only zoning and building heights, and since there are no specific guidelines, one can easily manipulate the regulations, especially investors and politicians”*

PR1 and PR2 also acknowledge that existing zoning-based guidelines could be easily manipulated. DR1 states that zoning is a good initiative but must be detailed.

AC1, PR1 and PR2 discussed moving to the ‘next level’ of zoning – developing regulations for districts, neighbourhoods, streets etc. PR1 and AC1 said that we need to consider detailed design guides for clusters or

*“...our building regulations are single entity focused – the concerns are only the plot. Spaces in between the buildings are not covered. Wind flow within neighbourhoods, shading effect from adjacent buildings etc. are not considered...”*

neighbourhoods while developing regulations addressing UHI/ UW issues.

PR2 further stressed the need to consider smaller districts in planning while drawing examples of Singapore planning, where guidelines are based on smaller areas and lead to more sensible plans.

Through the interviews, we understood that classifying building typologies is an effective method in developing regulations. PR1 indicated that we should change the paradigm of how we look at our building regulations to implement effective detailed guides,

“our regulations are more land oriented – land-use base. If we are concerned about these heat island and urban warming issues, we need to focus more on building typologies rather than land uses. We need to address these issues at a policy level.”

#### c. Picking the low-hanging fruits:

When discussing the urgency of climate -sensitive planning, we understood that the preparation of detailed guidelines will take time. Thus, PR2 and PR1 suggested implementing a hassle-free planning process for smaller developments. This can be detailed to encourage UW mitigation, such as retrofitting existing buildings to encourage shade, greenery etc., converting impermeable material to permeable/ thermally reflective materials etc.

Integrating climate checkpoints can also be attributed as immediate measures to tackle the incorporation of urban climate actions and will also create awareness amongst the professionals and the general public. AC1 suggested that incorporating town planner’s assessment and accepting it as a requirement by donor agencies as an immediate measure.

#### d. Design strategies:

We constructed this sub-theme as a summary of all design strategies discussed during the in-depth discussions. Firstly, we discussed the four design strategies to mitigate UW with participants and inquired regarding the current degree of implementation of each as tabulated in Table 2.

Secondly, we tabulated all design strategies discussed in the interview as regional, local, and building-level strategies and compared with literature review and the CDP. (Table 3)

We realized that most of the above design strategies which were obtained from interviews were also reflected in literature. However, these weren’t captured in the CDP, which is deemed to be a huge gap in the existing planning regime.

	Urban form	Vegetation	Wind flow	Albedo
DR1	0 Somewhat through Plot coverage, FAR	+1 - ‘Garden city’ concept - Regulated through plot coverage	-1 No consideration	-1 No mention
PR1	0 Somewhat through Plot coverage, FAR No conscious effort	+1 “Colombo is still green”, through plot coverage and reservations	-1 Planning guidelines are single entity focused. Wind is not considered.	-1 “No materials specifications at all”
PR2	-1 Plot cover, FAR does not imply positive climate action. We need to specify.	-1 Might/might not grow green in their premises. If the plot coverage is 65%, you cannot expect other 35% to be green.	-1 Sea front developments enjoy the wind flow. But it is not penetrated to the city. No mention in documents.	-1 No mention in documents
AC1	-1 development plan/ building regulations do not regulate the urban form climate responsiveness.	+1 maintain garden city character.	-1 Not considered n planning	-1 No mention in documents
AC2	-1 Possible unfavorable condition due to unregulated building height, streets, zone issues etc.	-1 Very first plan promoted green. Current plan does not mention about green.	0 Low densities allow more air circulation, sometimes indirectly help wind flow.	-1 No mention in documents

Table 2: Incorporation of design strategies in Colombo Development plan



	Design Strategies	Discussions	Literature	Planning Docs
Regional/ City Level	Revisiting the notion of urbanization - regional or satellite towns rather than concentrating in Colombo	x		
	Consider cooling potential of river (Kelani river), canals around Colombo, large green areas when designing the street networks. Likewise, cities like Anuradhapura, Polonnaruwa could be designed considering large water bodies- lakes, reservoirs, and forest.	x		
	Design streets and plots to be allow sea breeze and monsoonal wind.	x	x	
	Develop a blue-green network in Colombo. Impose as requirements for newer larger developments	x		
	Sea front developments with low heigh profiles and low density - promotes the wind flow into the city.	x	x	
	Buildings around the water bodies and open/green spaces (Galle face green, Beira Lake) could be designed low-rise allowing the air movement/cool breeze to the adjacent neighbourhood.	x	x	x
Local / street	Detailed area/street specific guidelines. (Building height, street width, position of trees etc)	x		
	Incorporate wind direction & patterns when developing zoning plans, designing street.		x	
	Determine the plots size, and orientation at different zones - to maximize the air flow and green cover.	x	x	
	Promote green network within the streets-green corridors and tree lines along the pedestrian access and vehicular routes to enhance shading that will promote walkability.		x	
	Provide green pockets at every neighbourhood	x	x	
	Incorporate Green factor calculations in development projects.		x	
	Placement & selection of trees (height, canopy size, type of trees & tree intervals) to provide shading, thermal comfort, and pollution filtering while minimal hindrance to wind flow.	x	x	
	Provide waterbodies at communal spaces for evaporative cooling.	x	x	
	Determine the aspect ratio to increase shading by the building itself (some part of Colombo, Pettah, Slave Island realizing this aspect) at the same time not leading the air pollution.	x	x	
	New streets could be designed NS orientation as they perform better than EW. Existing streets can be modified with aid of shading devices.	x	x	
	Avoid concrete paving for walkways. Increase permeable areas – grass paving for parking etc.	x		
	Promote community level garden (urban farming) it accomplishes dual purposes.	x		
Micro level/ Building	Create a balance between site coverage, building plot and open spaces to maximize the green cover.	x		
	Define building setback, rear spaces with vegetation cover	x		x
	Provide site specific details (landscape details, green percentage etc.) at planning clearances	x		
	Building position and orientation to cut solar radiation and promote air flow around the building.		x	
	Terraced podium/building form design to allow air flow. Design porous (gaps, openings) buildings.	x		
	Provide arcades, awnings, and other shading devices at the ground level for pedestrian comfort.	x	x	
	Introduce Energy performance certificate (EPC) for buildings, impose this as a mandatory requirement for new buildings and provide retrofitting solutions for old building stocks.	x	x	
	Introduce national building codes (NBC)– specify thermal reflective materials, colours, paints which enhance reflectivity.		x	
	Advertisement boards, sign boards to be placed not to block the wind flow in commercial areas		x	
	Educate people on outdoor working time. Avoid workers at afternoon hours where solar angle is high and continue at evening.	x		

Table 3: Design strategies - regional, local, micro level

4. Exhortation – Shout out, Convince, Urge



Exhortation means to strongly encourage/ urge someone to do something. Urban climate action is a collective measure, and thus, will not be effective unless a strong persuasion is involved – especially in the global south where the primary concern of the majority is their “bread and butter”.

a. Creating Awareness:

All participants implied that awareness is a requirement for successful Urban climate action. AC2 stated that “making people aware and convincing politicians” is essential to practically incorporate checkpoints, if not, they might end up as mere checkpoints to gain a tick in the documents.

AC1 reflected on the above idea, further stressing that communication strategies should be tailored according to the target groups, i.e. public, professionals and investors accordingly, rather than mass communication strategies. The same message can be delivered in various content to different groups. They further implied that it is the responsibility of the professionals to voice out their inputs and opinions in bringing a change to the system.

When discussing the possibility of a change in the planning system with a

focus on UC actions, DR1 says, “We can’t bring change overnight. But we can educate the future generation. I strongly believe if there is a programme to integrate this to our education system, we can make a big change in 5-10 years”.

b. Incentivized planning:

PR1 stressed at several instances during the conversation that climate-sensitive design approaches should be tied up with benefits – specifically financial benefits – to encourage people. These could be incentives, subsidies, loans, tax concessions etc. They also addressed the lack of motivation in implementing other good practices in the current development plan. This way, a developer can give something to the city while benefiting from it too.

Owing to the vague guidelines in the CDP, investors can easily find loopholes, and this has led to a common practice of challenging the existing guidelines (as per ideas from AC1, DR1 etc.) to gain more buildable areas. Regulating these and offering incentives encourage more people and provide strong guidance.

*“... regulations alone aren’t sufficient for a resilient climate change plan - financing, good governance, people awareness are all essential components of it. Urging people and lobbying politicians can create a huge impact on the success of planned climate actions ...”*



## 5. Commitment – Act upon the word

*All participants strongly suggested that a political will is one of the most important factors for successful UC action. PR2 stresses that it is again the professionals' responsibility to convey the benefits in terms of financial benefits, and advocated benefits of urban climate actions.*

This theme revolves around ideas of lack of commitments in the existing system to achieve a goal, which poses a threat in pursuing sustainable UC actions.

### a. Commitments – Documents to practice

Sri Lanka is a party to many international commitments to tackle climate change, such as the Kyoto Protocol, UNFCCC- 4th conference etc. AC1 indicated that no effort is made to meet these commitments – “we have many sets of documents, but nothing is visible in practice”.

Further, PR2 and AC2 also indicated that checkpoints and assessments tend to exist only in documents and not in practice. PR2 said that - “the existing green building council rating focuses only on a rating system which has a minimum requirement, and once achieved, performance is not checked at the end”.

While it is the responsibility of relevant authorities to ensure all commitments are met, PR2 advocated that it is also the responsibility of policymakers to consider global fairness prior to undertaking such

commitments, considering the country's economic and social conditions.

### b. Professional/ public / Political will

A layman's first point of contact in expert opinion is the professionals – planners, architects, designers etc. AC1 stated that “if planners and architects consider their job at a more responsible and ethical angle, definitely these strategies be incorporated, can be seen as an effective bottom-up approach. He also stated that professionals have the ultimate responsibility in advocating UC action to the general public, investors and politicians.

“Similarly, the public should also act responsibly”, said PR2. “When a fine imposed for littering the roads, the public obeyed; and once the implementation was stopped, they went back to their old habits”, providing an insight of the public mentality.

## 6. Continuity – “Rome was not built in a day”

*“... the society advances very fast, plans are for people - the plans should suite the up-grading society...”*

This theme indulges with the notion of continuous improvement and review of planning, policy, audit and data in urban planning and governance.

### a. Periodical review – planning:

Participants said that the development plans should be reviewed once in a while. There were repeated suggestions saying, “we have an outdated plan” and “we need a development plan that fits our context” a couple of times throughout the interview. As a planner and an administrator, AD1 insisted that the plans must be reviewed every 5 – 10 years and adapted accordingly to the context. Instead, the current development plans and regulations still cater to the “last decade”.

### b. Continuity of Policies despite regime changes

We constructed this subordinate theme with explicit notions indicating political interference influences on genuine planning attempts. One participant noted that “There are government agencies such as Climate change secretariat, sustainable development authority etc. to maintain climate commitments and actions. But their actions are discontinued with government changes and regime changes.”

Similarly, others also reflected that all genuine efforts of planners and policymakers go astray due to political interference and regime changes.

### c. Audit – Inception to completion and during use

When indicating effective means of regulating the built environment, AC1 said – “We can add climate checkpoints to enforce climate sensitive planning, but this again becomes only a permit - it will end up only in documents and not in practice. Hence, there must be an independent assessment, even during construction”. PR1 also resonated with this, saying – “There has to be a continuous audit system which monitors the construction from planning to completion.” He further indicated that the planning bodies lack resources for undertaking a successful audit.

*Monitoring, Evaluation and Reporting (MER) is a process that has been stressed for fruitful outcomes of policy, plan, or project<sup>9</sup> and has been proved as an essential practice to ensure that the project objectives while enabling flexibility.<sup>10</sup>*

9. Murieta, E. S. d., Galarraga, I. & Olazabal, M., (2021). How Well Do Climate Adaptation Policies Align with Risk-Based Approaches? An Assessment Framework for Cities. Cities, Volume 109, p. 10.
10. Klostermann, J. et al., (2018). Towards a Framework to Assess, Compare and Develop Monitoring and Evaluation of Climate Change Adaptation in Europe. Mitigation and Adaptation Strategies for Global Change, 23(2), pp. 187-209.





# Summary

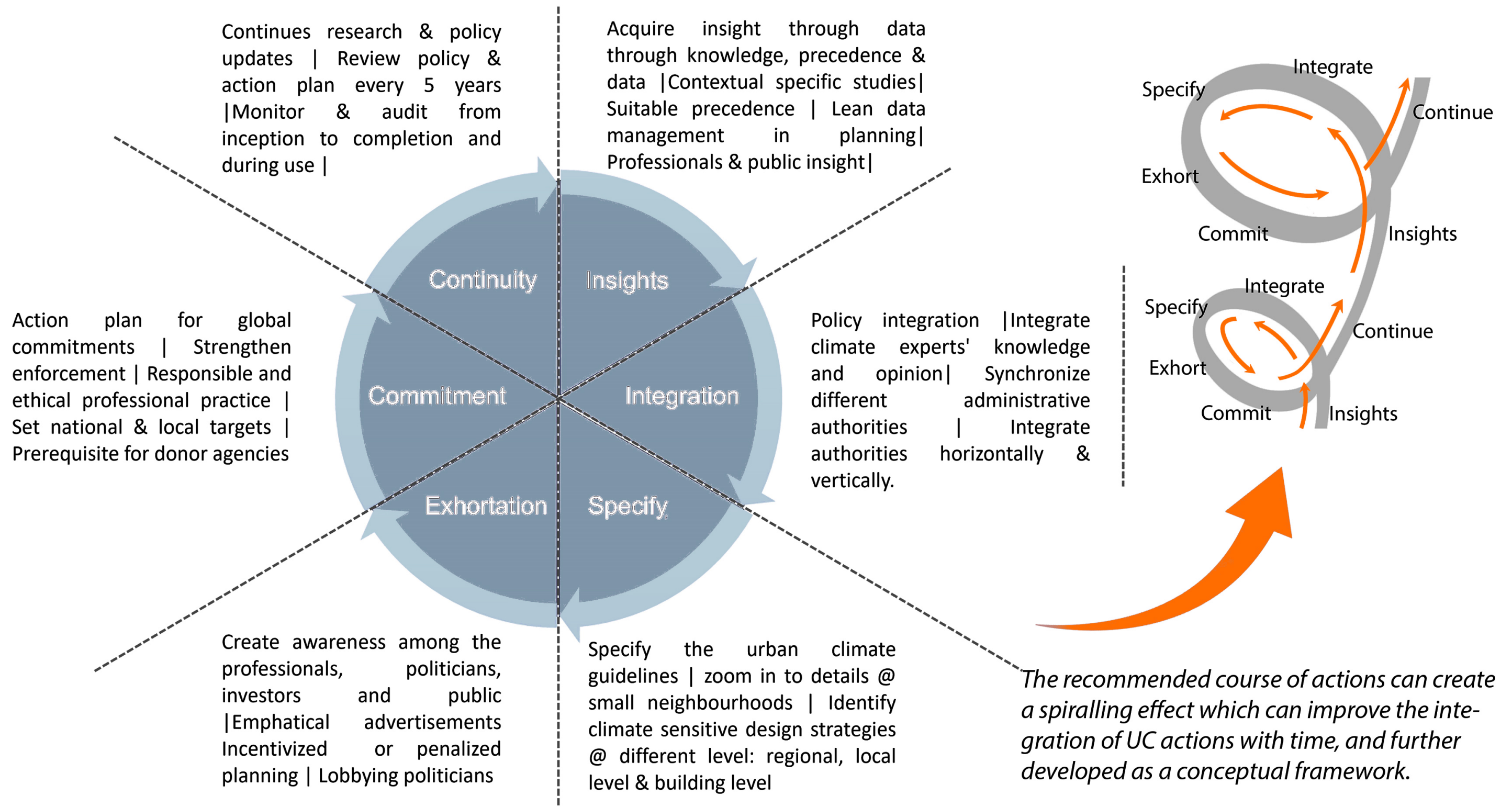


Figure 5: Thematic Analysis - Summary







# Opportunities

## Insights

- Incorporation of Knowledge informed by research data, mapping, modelling, etc. in planning and design decisions. (AC2, PR2)
- Develop cross-border relationship - lessons from other countries. (DR1) (PR2)
- Meteorological data incorporation within planning authorities (PR2)

## Specify

- Detailed plans at neighborhood level (PR1, PR2, AC1, AC2, DR1)
- Town planners' assessment certificate (climate sensitive assessment). (DR1)
- Initially – small interventions and

make a flexible planning system to implement them. (PR1)

- Retrofit old building stocks responding to urban overheating. (DR1)
- Energy performance certificate for the buildings. (PR1)

## Exhort

- Develop awareness.
- Increase sense of urgency on urban climate - proper communication system. (AC2, DR1)
- Incentivized planning system - financial incentives. (PR1, PR2)
- Environmental solutions designed to attract the investors and politicians. (PR2)

- Strengthen the enforcement. (PR1)
- Initiate with public buildings – as a showcase. (AC1)
- Exploring low-cost solutions for short lifespan -urban regeneration. (AC1)

## Commitment

- Climate assessment as a requirement at donors funding agencies-banks, finance agencies etc. (AC1)
- Introduce climate checkpoints system in design and construction (AC1)
- Committed to Green building rating system (PR1) (DR1)
- Advocating for an effective bottom-up approach for UC governance (AC1)

## Continuity

- Periodical review and update the plans every 10 years at least. (5 years recommended) (DR1)
- Make plans to be continued despite the political regime change. (DR1)
- Monitoring, Evaluation and Reporting (MER) of the plan. (PR1) (DR1)

## Integrate

- Urban climate related policies integrated with other socio-economic and environmental policies (AC1, PR1, PR2, DR1)
- Climate sensitive plan should be embedded in National Physical Plan and finance plan. (PR1) (PR2)

- Public participation. (DR1) (AC2)
- Relevant authorities should be integrated and involved planning designing and decision-making process. (PR1) (PR2) (DR1)
- Meteorology department should be linked with other authorities including universities, because now met data is in isolation. (PR2)
- Lean governance of data in planning. (AC1) (PR2)
- Need collaboration among climate research and urban designers. (PR2)
- Climate studies should be incorporated in the curriculum- educational system (DR1) (PR1) (PR2)





# Actors - Who should be involved?

Urban warming is an issue that cannot be viewed in isolation but needs a holistic approach. Apart from the efforts of the episodic community, a practical approach requires integrating all socio-political actors and institutions. The need for a proper network amongst stakeholders related

to planning, infrastructure and building construction were emphasized during interviews.

While professionals play a guiding role proactively guiding the public and exhorting the government, the public and politicians

should also support their efforts. We could also investigate resolving the fragmentation of institutions as a primary objective, while looking into encouraging policy initiatives gradually. Financial institutions and banks can also play an important role in regulating the built environment by stip-

ulating financing conditions.

The actors and institutions connected with these three nodes (planning, infrastructure and building construction) concerning Colombo identified are described in the diagram below.

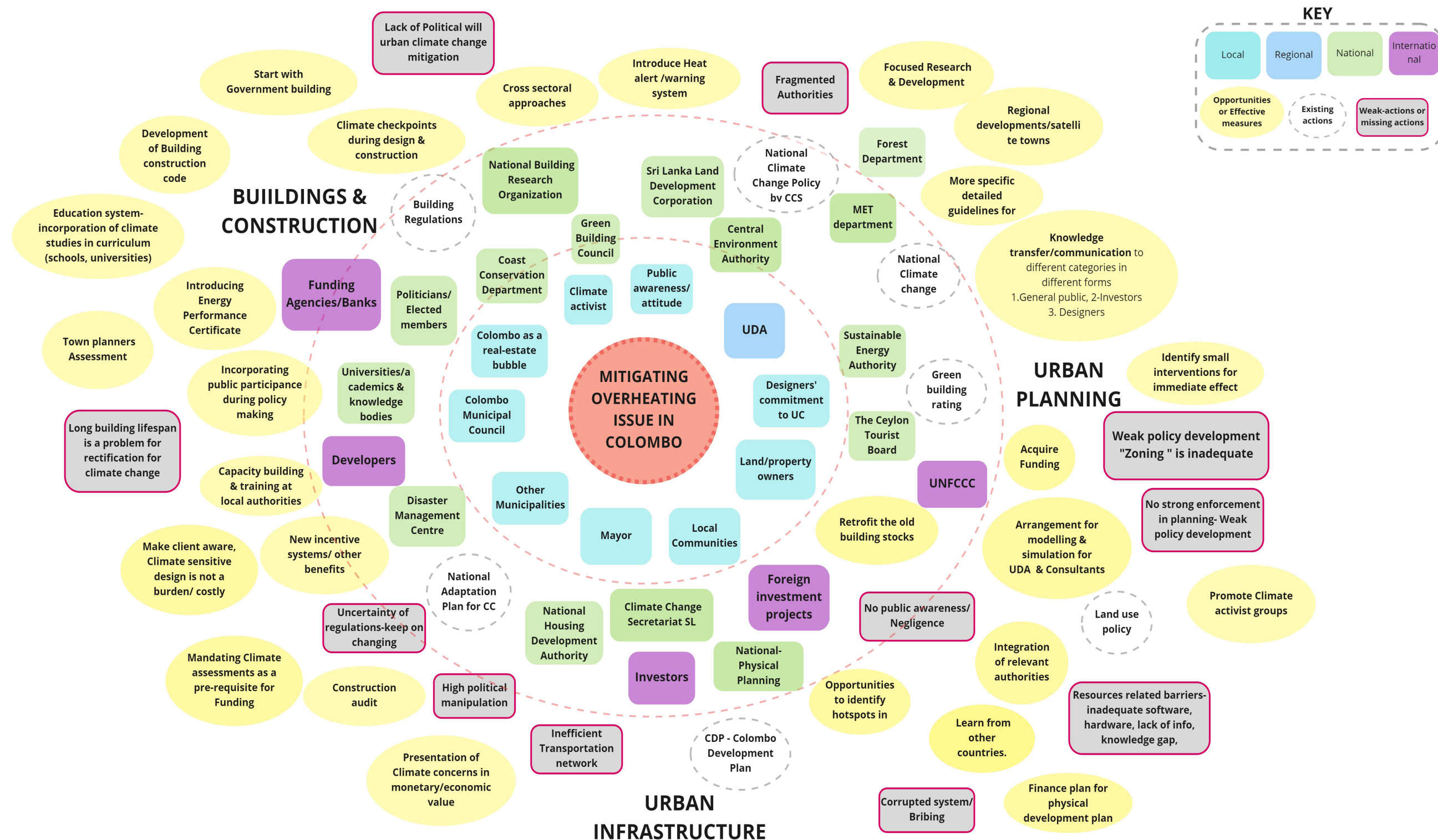


Figure 7: Mind map- integration and collaboration of different actors and strategies



# Implications

*Urban overheating is an imminent threat in Sri Lanka that can have severe health consequences and an unnecessary economic burden. Urban climate design strategies can result in an improved microclimate, but this should be integrated with the socio-economic enhancement of urban dwellers (through actions such as under settlement, poverty alleviation, urban regeneration, etc.) and incorporating socio-political actors (planners, professionals, politicians, general public etc.). 'How' to do this, needs more intense scrutiny, but it needs to be mindful of context-specific scientific and sociological data. Urgent action is needed to arrest the worsening heat stress in the country. Local monitoring of climate change in an urban context is needed to inform new planning solutions that consider local climate as a performance indicator for a better quality of life.*





Funded by the *Global Challenges and Sustainable Development Unit* of the Glasgow Caledonian University, utilizing pump-priming funding provided by the **Global Challenges Research Fund (GCRF)** of the Scottish Funding Council.

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ISBN 978-1-7398476-1-6

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Published online on December 2021, Glasgow, Scotland, UK

