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Climate Action Planning

The Urban Unit

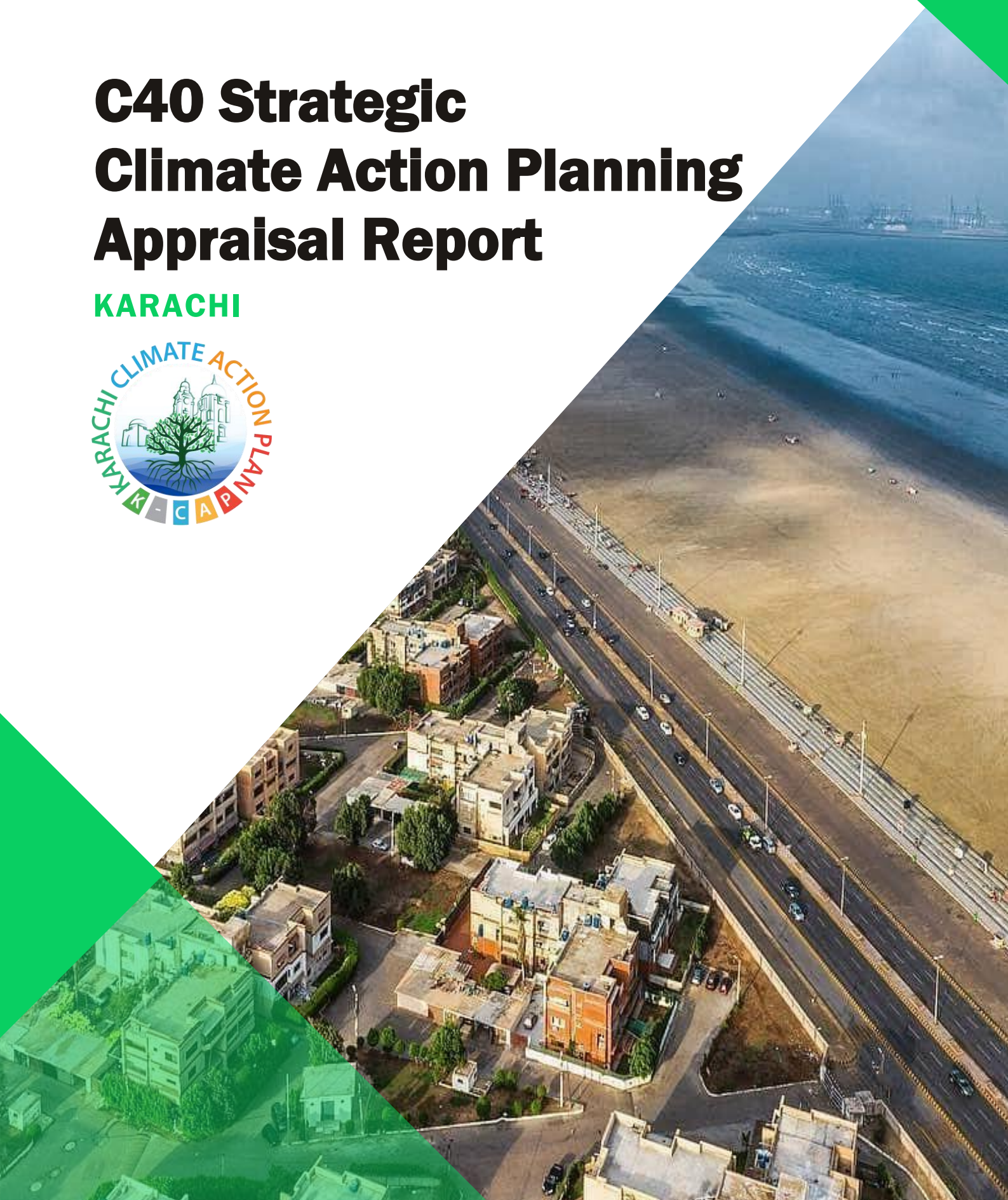
Urban Sector Planning & Management Services Unit (Pvt.) Ltd.

UNDP

C40 Strategic Climate Action Planning Appraisal Report

KARACHI

KARACHI CLIMATE ACTION PLAN K-CAP



Document Information

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Abbreviations

ABAD	Association of Builders and Developers
AEDB	Alternative Energy Development Board
AFOLU	Agriculture, Forestry and other Land Use
ARE	Alternative & Renewable Energy
BAU	Business As Usual
BoR	Board of Revenue
BRT	Bus Rapid Transit
CAC	Climate Action Center
CAP	Climate Action Planning
CBC	Cantonment Board Clifton
CBO	Community Based Organization
CDPC	Climate Data Processing Center
CLICK	Competitive and Livable City of Karachi Project
CSCC	Coalition for Climate Change
DHA	Defence Housing Authority
DoCC	Directorate of Climate Change
ECC&CDD	Environment, Climate Change & Coastal Development Department
EIU	Economist Intelligence Unit
EU	European Union
EV	Electric Vehicle
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Green-house Gases
ICT	Information and Communications Technology
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial Processes and Product Use
JICA	Japan International Cooperation Agency
KCCI	Karachi Chamber of Commerce and Industry
KDA	Karachi Development Authority
KE	Karachi Electric
KHWMP	Karachi Heatwave Management Plan
KMC	Karachi Metropolitan Corporation
KNIP	Karachi Neighbourhood Improvement Project
KPI	Key Performance Indicators
KPT	Karachi Port Trust
KSDP	Karachi Strategic Development Plan
KW&SC	Karachi Water & Sewerage Board
KWSB	Karachi Water and Sewerage Board
KWSC	Karachi Water and Sewerage Corporation
KWSSIP	Karachi Water and Sewerage Services Improvement Project
LDA	Lyari Development Authority
MDA	Malir Development Authority
MER	Monitoring, Evaluation, and Reporting
MoCC	Ministry of Climate Change
MRV	Measuring, Reporting, and Verification

NAO	Noth Atlantic Oscillation
NCAP	National Clean Air Policy
NCCP	National Climate Change Policy
NDCs	Nationally Determined Contributions
NEECA	National Energy Efficiency and Conservation Authority
NEPRA	National Electric Power Regulatory Authority
NGO	Non-Governmental Organisation
NIO	National Institute of Oceanography
NTDC	National Transmission and Despatch Company
OGRA	Oil and Gas Regulatory Authority
PDMA	Provincial Disaster Management Authority
PFC	Provincial Finance Commission
PMC	Regional Meteorological Center
PPIB	Private Power and Infrastructure Board
SBCA	Sindh Building Control Authority
SCDA	Sindh Coastal Development Authority
SEPA	Sindh Environment Protection Agency
SEPC	Sindh Environment Protection Council
SETP	Sindh Environment Protection Tribunal
SHDDB	Sindh High Density Development Board
SIDCL	Sindh Infrastructure Development Company Limited
SIDCL	Sindh Infrastructural Development Company Limited
SITE	Sindh Industrial Trading Estate
SKAA	Sindh Katchi Abadi Authority
SMTA	Sindh Mass Transit Authority
SMTA	Sindh Mass Transit Authority
SSGC	Sui Southern Gas Company
SSWMB	Sindh Solid Waste Management Board
SWOT	Strengths, Weaknesses, Opportunities and Threats
TOD	Transit Oriented Development
UNDP	United Nations Development Programme
URC	Urban Resource Center
WHO	World Health Organization

Table of Contents

Tables and Figures

Chapter 1: Introduction & Methodology

A. Introduction

This Strategic Climate Action Planning Appraisal (Strategic CAP Appraisal) has been undertaken to inform the development (or updating) of the Karachi's climate action plan (or series of plans) in order to meet the requirements of the C40 City Climate Action Planning Framework (CAP Framework). It aims to identify (a) which existing city climate targets, plans, policies, data, programmes and actions are already compatible with the CAP Framework; (b) gaps that need to be addressed; and (c) approaches to fill such gaps as efficiently and effectively as possible. The CAP Framework has been developed to assist cities to align their climate action plans with the objectives of the Paris Agreement. According to the CAP Framework, a climate action plan (or series of plans and documents that direct climate action) that demonstrates a city is contributing to the goals of the Paris Agreement will include four key components:

1. Develop a pathway to deliver an emissions neutral city by 2050 at the latest and set an ambitious[1] interim target and/or carbon budget.
2. Demonstrate how the city will adapt and improve its resilience to climate hazards that may impact the city now and in future climate change scenarios.
3. Outline the social, environmental and economic benefits expected from implementing the plan, and improve the equitable distribution of these benefits across the city's population.
4. Detail the city's governance, powers and the partners who need to be engaged to accelerate the delivery of the city's mitigation targets and resilience goals.

The climate action plan will do this by:

- Considering adaptation and mitigation in an integrated way, identifying interdependencies to maximise efficiencies and minimise investment risk.
- Setting an evidence-based, inclusive and deliverable plan for achieving transformational mitigation and adaptation centered on an understanding of the city's powers, influence and wider context.
- Establishing a transparent process to monitor delivery, communicate progress, and update climate action planning in line with governance and reporting systems.

The Strategic CAP Appraisal consists of eight components that have been structured to feed information into Karachi's climate action plan(s). In addition, the report contains a set of strategic recommendations for the city's climate action plan preparation or updating process and how this should be designed to meet stakeholder needs and fill information gaps to ensure that the plan/plans are/are developed in line with the Paris Agreement objectives. The eight components of the Strategic CAP Appraisal are outlined in Table 1.

[1] **steep/steady decline or early/late peak depending on a city's GHG per capita and GDP per capita**

Table 1: Strategic CAP Appraisal Components

Component		Purpose
A	Vision & Commitment, Governance & Powers Review	A check on whether the city has a long-term vision for and is politically committed to implementing ambitious, transformational climate action. To review city climate governance institutional structures, functions, capacity, and powers to implement transformational climate action.
B	Goals / Targets & Policy Context Review	A check on the alignment of the city climate goals/targets with the CAP Framework requirements, the Paris Agreement, and national climate goals/targets. A high-level review of internal and external policies setting out climate, environmental, social, and economic development objectives that may impact on or be important for the development/updating of the city climate action plan objectives.
C	City Context	A statement on available baseline city climate, environmental, social, and economic indicator data. Informs preparation of an evidence-based CAP that is tailored to the specific social, economic & environmental context of the city.
D	Emissions Baseline & Trajectories Status	A statement on the status of the city's GHG emissions inventory, emissions trajectories under the 'business as usual' scenario and any target trajectories under existing climate policies/plans. Informs whether additional work is needed as part of the CAP process.
E	Climate Hazards, Risks & Impacts Baseline Status	A statement on the status of climate risk, hazard and impact mapping / modelling. Informs whether additional work is needed as part of the CAP process.
F	Climate Actions Baseline	A statement on city climate actions in progress / committed that support emissions reductions or climate adaptation pathways. Actions at regional or national level that contribute to the city's goals should also be identified. Informs CAP action identification, implementation strategy, and monitoring & evaluation plan. It should also be used to inform Stakeholder Mapping.
G	Preliminary Stakeholder Mapping	Identification of city, business, NGO, civil society, and other government stakeholders that have been or are already involved with / by the city in climate action policies, programs or projects. Forms the basis for more detailed stakeholder mapping and development of a stakeholder engagement strategy as part of the CAP process.
H	SWOT Analysis	An identification of the strengths, weaknesses, opportunities, and threats associated with the city's socio-economic and environmental context, climate governance structures, capacity and policies, climate targets, and baseline information to inform CAP development. This should be undertaken collaboratively in a workshop and results in recommendations on how the city CAP should be developed.

B. Methodology

This Strategic CAP Appraisal report has been compiled using the methodology set out in the C40 Strategic CAP Appraisal User Guide. This has included the use of several data collection and analysis tools provided in the Guide.

The process of undertaking the Strategic CAP Appraisal has been as important as the outputs it has produced. The process has been deliberately consultative, facilitating an initial level of engagement with key city stakeholders across multiple sectors that can be built on when the climate action plan is being developed.

This process of engagement has been undertaken through a series of one-on-one conversations, meetings, and rapid strategic appraisal and visioning workshop; a summary is provided in Table 2 and relevant pictures are given in Annex 6 -A. These engagements were used to:

- Get direction on where to find the most up to date and relevant information for the appraisal;
- Gather the required data and perspectives, such as on climate governance structures and capacity, policy alignment, and climate actions being undertaken in different sectors; and
- Collaboratively develop recommendations for the climate action planning process, for example through a multi-sectoral SWOT and Barriers workshop.

Table 2: Summary of consultation / engagements undertaken during the Strategic CAP Appraisal process

Column 1: Meetings / workshops / interviews	Column 2: People / organizations consulted	Column 3: Which aspect of the Strategic CAP Appraisal this engagement provide data / inputs for
1. Kick-off Meeting – Virtual 24th October 2023	KCAP, UNDP and C40 Team	Introductory meeting Presentation by the KCAP team on the understanding of the TORs/scope of work and the way forward
2. Meeting with Environment Protection Entities – Sindh Coastal Development Authority (SCDA) and Directorate of Climate Change (DoCC), Environment, Climate Change and Coastal Development Department, Karachi 3rd November 2023	SEPA: Mr. Ahmed Sultan Khoso (Director General SCDA) and Mr. Ayhan Mustafa Bhutto, (Director General, DoCC)	KCAP Project Briefing Data Requirements Role of SCDA, DCC, and Sindh Environmental Protection Agency (SEPA) as key Stakeholders in climate action planning
3. Meeting with Sr. Director KMC at Mayor Office, Karachi 3rd November 2023	KMC: Ms. Sumaira (Senior Director Estate and Focal Person for KCAP from the Mayor's Office) and Team	Introductory meeting: Presentation / Briefing on the project by the KCAP team Role of KMC and Mayor Karachi in KCAP Overall Plan of Visioning and Need Assessment Workshop Issuance of Letters by KMC for the workshop
4. Meeting with Urban Resource Center (URC), Darya Lab Green Coalition Pakistan and Climate Action Center (CAC), Karachi	URC: M. Yunus (Director URC) Mr. Yasir Hussain, Founder of Darya Lab and Green Coalition Pakistan CAC: Mr. Hassan Rizvi (Manager CAC)	Introductory meeting: Presentation / Briefing on the project by the KCAP team Role of Civil Society Organization in KCAP Participation in KCAP Visioning and Need Assessment Workshop

Column 1: Meetings / workshops / interviews	Column 2: People / organizations consulted	Column 3: Which aspect of the Strategic CAP Appraisal this engagement provide data / inputs for
5. Meeting with WWF Regional Office, Karachi 4th November 2023	WWF: Project Team	Introductory meeting: Presentation / Briefing on the project by the KCAP team Potential Role of WWF in data sharing and mitigation and adaptation strategies and targets Participation in KCAP Visioning and Need Assessment Workshop
6. Meeting with the C40 Team – Virtual 15th November 2023	KCAP, UNDP and C40 Team	Overview of the C40 Climate Action Planning Framework Guide by the C40 Team KCAP Team presentation on the plan for the Visioning and Need Assessment Workshop; and an update on the data availability for the CIRIS Tool based on secondary sources and maps prepared so far. A request was made for sharing the Pathway tool; data requirements and training session.
7. Mayoral Briefing 22nd November 2023	Mayor Office: Mr. Murtaza Wahab (Mayor Karachi), Mr. Zaidi, Municipal Commissioner KMC, Ms. Sumaira (Sr. Director KMC); Project Director	Detailed presentation on the project, project team, and the upcoming workshop on Visioning and Need Assessment/Rapid Strategic Appraisal Discussion on political commitment/mayoral commitment and support as a key stakeholder/custodian of KCAP
8. Meeting with Sr. Director KMC at Mayor Office, Karachi 24th November 2023	KMC: Ms. Sumaira (Sr. Director KMC)	Discussion on the Data requirements and support from KMC / Mayor Office in the issuance of letters to all stakeholders Provision of draft letters and respective data sheets by the KCAP Team
9. Meetings Dec 19, 2023	Environment and Climate Change Dept	Data collection progress update; further follow-up required.
	Forest and Wildlife Dept	Introduction to the Project Need assessment and data sharing
	Sindh Energy Dept	Introduction to the Project Emission Inventory Data requirements: Energy Dept. referred to K-Electric
10. Meetings Dec 19, 2023	Bureau of Statistics	Introduction to the Project and data sets required for different deliverables of K-CAP
	Sindh Solid Waste Dept	Introduction to the Project Discussion on the different data sets available regarding solid waste
11. Meetings Dec 20, 2023	Environment and Climate Change Dept (Mr. Mujtaba, AD)	Discussion on the functions of the ECC&CD Department regarding climate change
	Forest and Wildlife Dept (Mr. Daniyal)	Follow-up meeting on the required data sets for K-CAP
	Sindh Energy Dept (Hassan Raza Abbasi, Consultant)	Discussion on energy data sets

Column 1: Meetings / workshops / interviews	Column 2: People / organizations consulted	Column 3: Which aspect of the Strategic CAP Appraisal this engagement provide data / inputs for
	Bureau of Statistics (Sajid, Statistical Officer)	Follow-up meeting on the required data sets for K-CAP
	Sindh Solid Waste Dept (Ghulam Nabi, AD)	Evaluation of relevant data sets
	Industries and Commerce Dept (Fazil Hanghro, Sector Officer)	Follow-up meeting on the required data sets for K-CAP
	Agriculture, Livestock, and Fisheries Dept (M. Idris Khorso, Additional Secretary)	Introduction to the Project and data sets required for different deliverables of K-CAP
	Mines and Mineral Department (Mr. Zahid Hussain, PS)	Status of the data acquisition letter
	LG, Housing, and Town Planning Dept (Usman Moazzam)	Introduction to the Project and data sets required for different deliverables of K-CAP
	Irrigation Department (Zahid Kareem Sehto, SO Planning)	Introduction to the Project and data sets required for different deliverables of K-CAP
12. Meetings Dec 21, 2023	PDMA (Provincial Disaster Management Authority)	Introduction to the Project and data sets required for different deliverables of K-CAP
	OGRA (Oil and Gas Regulatory Authority)	Introduction to the Project and data sets required for different deliverables of K-CAP
	KMC Office (Karachi Metropolitan Corporation)	Follow-up meeting on the required data sets for K-CAP
13. Meetings Dec 22, 2023	Karachi Water & Sewerage Board (Mr. Aftab Alam, CE)	Introduction to the Project and data sets required for different deliverables of K-CAP
14. Meetings Dec 22, 2023	Karachi Development Authority (DG PA Mr. Rashid Sahid)	Follow-up meeting on the required data sets for K-CAP
	Industries and Commerce Department	Follow-up meeting on the required data sets for K-CAP
	Karachi Master Plan Dept. (Ms. Sumera, KMC office)	Follow-up meeting on the required data sets for K-CAP
15. Meetings Dec 26, 2023	Solid Waste Management (Mr. Aftab Soomro, DD)	Follow-up meeting on the required data sets for K-CAP
	Climate Change and Coastal Development Dept	Follow-up meeting on the required data sets for K-CAP
	Transport and Mass Transit Dept (Mr. Naveed Shaikh)	Discussion on the available data sets
	Local Government, Housing, and Town Planning Dept (Mr. Mansoor)	Follow-up meeting on the required data sets for K-CAP
16. Meetings Dec 27, 2023	Energy and Utilities Department (Visit to K Electric)	Follow-up meeting on the required data sets for K-CAP
	OGRA (Oil & Gas Regulatory Authority) Regional Office (Mr. Shaheen)	Follow-up meeting on the required data sets for K-CAP
17. Meetings Dec 28, 2023	Water and Sewerage Board (Mr. Aftab Alam Chandio)	Follow-up meeting on the required data sets for K-CAP

Column 1: Meetings / workshops / interviews	Column 2: People / organizations consulted	Column 3: Which aspect of the Strategic CAP Appraisal this engagement provide data / inputs for
	Sindh Solid Waste Management Office (Aftab Soomro, DD Procurement)	Follow-up meeting on the required data sets for K-CAP
	Karachi Metropolitan Corporation (Ms. Sumera, Mr. Saleem)	Follow-up meeting on the required data sets for K-CAP
18. Meetings Dec 29, 2023	Civic Center	Introduction to the Project and data sets required for different deliverables of K-CAP
	KMC Office (Ms. Sumera, Sr. Director Estate)	Deliberation on a proposed vision statement Update on the project and data acquisition process
	Industries and Commerce Office	Follow-up meeting on the required data sets for K-CAP
	Forest and Wildlife Office	Follow-up meeting on the required data sets for K-CAP
19. Meetings Jan 1, 2024	SSWMB (Mr. Ghulam Nabi, AD)	Follow-up meeting on the required data sets for K-CAP
	Climate Change and Coastal Development Office (Mr. Kashif, Mr. Umar)	Follow-up meeting on the required data sets for K-CAP
	Sindh Energy Department (Dr. Hassan Raza Abbas)	Follow-up meeting on the required data sets for K-CAP; data sent to K Electric but pending.
	Karachi Metropolitan Corporation (Ms. Sumera, Sr. Director Estate)	Discussion on Final Vision Statement and feedback from KMC
20. Meetings Jan 2, 2024	City Railway Station Karachi (Mr. Farhan)	Collected available data sets for emission inventory
	Karachi Port Trust – KPT (Mr. Javaid Memon)	Discussion on available fuel consumption data sets; referred to Pakistan National Shipping Corporation
	Oil Companies Advisory Council (Faisal Khalil)	Follow-up meeting on the required data sets for K-CAP
21. Meetings Jan 3, 2024	Karachi Metropolitan Corporation (Ms. Sumera)	Progress on the data acquisition process and the project; collected responses / data sets received by KMC
	KMC Estate Department, Municipal Services Department (Mr. Irshad Sahib)	Follow-up meeting on the required data sets for K-CAP
	Oil Companies Advisory Council (Faisal Khalil)	Follow-up meeting on the required data sets for K-CAP – Data not available
	KMC Municipal Services Department	Follow-up meeting on the required data sets for K-CAP
	Industries and Commerce Office (Mr. Sharafat Ali)	Follow-up meeting on the required data sets for K-CAP
	Transport Department (Mr. Naveed Shaikh)	Follow-up meeting on the available data sets and missing information

Column 1: Meetings / workshops / interviews	Column 2: People / organizations consulted	Column 3: Which aspect of the Strategic CAP Appraisal this engagement provide data / inputs for
22. Meetings Jan 4, 2024	Karachi Metropolitan Corporation (Ms. Sumera)	Discussion on an updated vision statement for KMC consent
	Senior Director Municipal Services Office	Follow-up meeting on the required data sets for K-CAP – Data not available
23. Meetings Jan 5, 2024	Karachi Water and Sewerage Board (Mr. Aftab Alam)	Follow-up meeting on the required data sets for K-CAP
	Lyari Development Authority Office	Follow-up meeting on the required data sets for K-CAP
	Transport and Mass Transit Office (Mr. Naveed Shaikh)	Follow-up meeting on the required data sets for K-CAP – Update on the pending data sets
	Irrigation Department (Zahid Sehto)	Follow-up meeting on the required data sets for K-CAP
	Mines and Mineral Department (Zahid Hussain)	Follow-up meeting on the required data sets for K-CAP – Data not available
24. Meetings Jan 8, 2024	Oil Co Advisory Council (Mr. Faisal Khalil)	Follow-up meeting on the required data sets for K-CAP – Data received on fuel consumption d
	OGRA (Mr. Shamim, Executive Director)	Follow-up meeting on the required data sets for K-CAP – Coordination with Islamabad Office
	Lyari Development Authority – LDA (Mr. Shabayal Hussain)	Follow-up meeting on the required data sets for K-CAP
	Bureau of Statistics (Mr. Sajjid Hussain)	Follow-up meeting on the required data sets for K-CAP
	SSWMB (Mr. Ghulam Nabi AD)	Follow-up meeting on the required data sets for K-CAP

In addition to the process and tools outlined in the Strategic CAP Appraisal User Guide, the following additional methods were used in compiling this report:

- Correspondence through Official Letters: Letters were issued by Karachi Metropolitan Corporation (KMC) to all relevant stakeholders for sharing of necessary data sets and responses received accordingly.

Chapter 2: Strategic CAP Appraisal

C. City Climate Vision & Commitment, Governance & Powers

C.1 Long Term City Vision & Political Commitment to implementing Climate Action

Karachi is the largest city in Pakistan. Being the key coastal urban settlement and the primate city of the country, it faces many environmental challenges. An expanding urban sprawl along the eastern and north eastern corridors under the influence of real estate enterprises is one specific mention. The indigenous population, habitat, flora, fauna, livelihoods and social relations experience significant threats in this regime. Changing land uses across the city is another important process. It is causing enhanced pressure on city infrastructure and generates heat due to multiple urban activities. Limited capacity of urban management and regulation are other core problems that Karachi continues to experience for many years. Under the enhanced impacts of climate change upon the city, ordinary daily life activities in the city, the wellbeing of the city inhabitants and the sustained existence of animal and plant ecosystems merit a planned intervention at the short-, medium- and long-term levels.

Under the leadership of Mayor Karachi and in response to C40 CAP Framework, a Karachi Climate Action Plan exercise began in October 2023. Extensive outreach was carried out with concerned stakeholders to apprise them about the urgency and importance of this planning exercise and connected tasks. Officials of relevant government departments, professionals, academics, civil society activists and leaders, corporate executives, media personnel and concerned citizens were engaged through the KCAP team.

A workshop was convened on 23rd November 2023 led by Mayor Karachi and his team from Karachi Metropolitan Corporation in collaboration with UNDP and the Urban Unit. In the Workshop, the Mayor of Karachi recognized the role of the Mayor and KMC as custodians and proponents of implementing the KCAP and assured fullest cooperation/commitment through the signing of a mayoral commitment, that states;

> *"On behalf of the citizens of Karachi, I, the Mayor of Karachi would like to express my full commitment to prioritize and accelerate climate actions for a low-carbon and climate-resilient urban development in Karachi City through the Karachi Climate Action Plan (K-CAP). With this project, evidence-based action planning is expected to manage all facets of sustainable development, and provide climate actions that are fair, equitable, and beneficial for all, as well as meet the commitments made under the Paris Agreement and NDCs" (Barrister Murtaza Wahab, Mayor Karachi, 2023)*

To steer the process, input towards the formulation of the vision statement of this exercise was done. Background presentations, and consultative dialogues before and during the workshop augmented this initiative.

Mayor Karachi signing the Mayoral Commitment with the KCAP Project Team Lead

The Mayoral Commitment - KCAP

Handling over the Mayor's Commitment to the Mayor Karachi and Municipal Commissioner Karachi

The workshop participants enthusiastically contributed to this exercise and gave their input. The KCAP team diligently worked on the inputs and articulated options for further deliberations with the Mayor Karachi. After rigorous appraisal, the Mayor accorded approval to the following vision statement for the plan:

> *"To be a sustainable yet competitive city contributing positively towards the local and the global climate by diminishing carbon emissions by 2050, through a knowledge-based governance system transforming into a green technology-based economy, leading to a sustainable, healthy and safe city as per principles of the Paris Agreement."*

The pictures of the workshop are attached at Annex 6 – B.

Karachi's long-term vision statement(s) and political commitments to taking climate action as captured in key policy documents and / or official statements from the city Mayor are captured in the below table. These are reviewed against the requirements of the C40 CAP Framework, i.e. (i) does the vision statement respond effectively to the CAP Framework objectives of climate neutrality and a resilient city by 2050 (and / or an associated interim target), and (ii) is the city politically committed to taking transformational action in key sectors.

An overview of the findings of this review and whether any gaps need to be addressed in the city's climate action planning process are described below the Table.

Table 3: Evaluation of the city's long-term vision statement(s)

Column 1: Long-term Vision Statement / Commitment to Climate Action	Column 2: Plan / Policy / Document in which this is captured	Column 3: Does it respond effectively to the objectives of climate neutrality and a resilient city by 2050?	Column 4; Does it represent political commitment to the city taking transformational action in key sectors?
Member of C40	C40 Climate Action Plan	Yes	Yes
Mayoral Commitment	C40 Mayoral Commitment	Yes	Yes

Column 1: Long-term Vision Statement / Commitment to Climate Action	Column 2: Plan / Policy / Document in which this is captured	Column 3: Does it respond effectively to the objectives of climate neutrality and a resilient city by 2050?	Column 4; Does it represent political commitment to the city taking transformational action in key sectors?
A "world-class city and attractive economic center with a decent life for Karachites". (In four areas: Land use and Housing, Transport, Infrastructure Services, and Social Services)	Karachi Strategic Development Plan – KSDP 2020[2]	Only Partially and without quantified targets relevant to climate change. Provides few mitigative and adaptative measures e.g. polycentric development; provision of municipal infrastructure to manage urban flooding; construction of landfill sites to manage methane production and leachate; environmentally friendly buses to reduce GHG emissions, etc.	No
'A future when climate change will have minimum possible adverse impacts and consequences on natural resources of Sindh, its people and their livelihood and to ensure the sustainability of those resources for coming generations'	Vision of the Directorate of Climate Change (DoCC) established under the Environment, Climate Change & Coastal Development Department (ECC&CDD) Government of Sindh[3]	Yes. Departmental Vision. Focusing on Climate Resilience as a broader mandate.	Yes
'To create opportunities for the fishermen communities to enhance their livelihood and standard of living and to ensure long-term coastal resiliency through the protection of intact habitats and restoration of priority degraded habitats for the benefit of the communities and resources'	Sindh Coastal Development Authority (SCDA) of ECC&CDD[4]	Yes. Departmental Vision for long term climate resilience in coastal areas.	Yes

[2] https://www.shehri.org/2020.pdf
[3] https://docc.sindh.gov.pk/
[4] https://scda.sindh.gov.pk/

Column 1: Long-term Vision Statement / Commitment to Climate Action	Column 2: Plan / Policy / Document in which this is captured	Column 3: Does it respond effectively to the objectives of climate neutrality and a resilient city by 2050?	Column 4; Does it represent political commitment to the city taking transformational action in key sectors?
'A future when climate change will have minimum possible adverse impacts and consequences on natural resources of Sindh, its people, and their livelihood and to ensure the sustainability of those resources for coming generations'	Sindh Climate Change Policy 2022 – Provincial Scale* **No City-level plan/policy has been developed so far.*	Yes	Yes

Some discussion on the planning documents and references included in the table

A "world class city and attractive economic centre with a decent life for Karachites".
(In four areas: Land use and Housing, Transport, Infrastructure Services, and Social Services)

Over the period of time, professionals and international agencies have diagnosed that Karachi possesses enormous potential to perform better in terms of economic enterprises, social safeguards to its underprivileged residents and a peaceful urban context with expanding diversity as its core strength. The usual constraints outlined through studies include the disjointed governance mechanism, a complex relationship between the province and city level agencies, limited resource base available with the city level agencies, especially the KMC, and the institutional inability to safeguard the long-term social and environmental interests of the city. It is hoped that once the process for preparing Greater Karachi Region Plan 2047 shall gather steam, the long-standing reform in urban governance in the city shall be achieved.

'A future when climate change will have minimum possible adverse impacts and consequences on natural resources of Sindh, its people and their livelihood and to ensure sustainability of those resources for coming generations'

It is interesting to observe that provincial government departments generally comply with the various directives related to preparation of departmental plans and guidelines. Most of such assignments are done in collaboration with international agencies such as the Asian Development Bank, World Bank, and UN agencies. The process and outcomes are usually found as useful and in relevance to the scope and challenges addressed. However, often the absence of an effective coordination mechanism and disconnect with the budgetary allocations of public sector spending causes a hindrance in smooth implementation of such plans and initiatives.

'To create opportunities for the fishermen communities to enhance their livelihood and standard of living and to ensure long-term coastal resiliency through the protection of intact habitats and restoration of priority degraded habitats for the benefit of the communities and for resources'

One of Karachi's core strengths is its ocean and blue economy potential. It is now found that there are multiple challenges that are confronted by the indigenous communities connected to the ocean concerning livelihoods and habitat. The fishing communities are routinely challenged by the declining

ability to enhance fishing potential in an environment where deep sea fishing is highly contested (often dominated by better-equipped foreign trawlers that fish illegally), the inability to upgrade the technology and ability of local fishermen, routine threats of eviction of their settlements in the wake of expanding real estate ventures and denial of access to banking credit. Unless effective measures are not taken, the destiny of these important stakeholders of our vulnerable habitat shall not improve.

'A future when climate change will have minimum possible adverse impacts and consequences on natural resources of Sindh, its people, and their livelihood and to ensure the sustainability of those resources for coming generations.'

The policies and strategies to combat climate change are prepared with an objective to ensure the sustained survival of ecosystems and habitats that constitute our built and larger natural environment. But it is found that decision making, choices of programs and projects, procedures of execution, and consultation with the potential beneficiaries and Affectees are not in compliance with such plans. Many policy decisions such as the development of an effective waste to energy plant for Karachi, and safe and economically viable disposal of solid and liquid waste are being followed with limited follow up. It is expected that once the decision making becomes compliant with the larger climate agenda in an effective manner and consonance with the concerns of residents of the city, the real reform shall be achieved.

C.2 City Climate Governance & Powers

The capacity of Karachi City's government to deliver climate action is dependent on the structure, functions and powers of city government departments/agencies to control or influence assets or services. To help identify opportunities for accelerating efficient and effective delivery, the governance and administrative structures and functions of the city and the city's powers relevant to climate action delivery are mapped in this section of the report.

C.2.1 City Climate Governance

The Karachi City Climate Governance structures are mapped here in terms of their current form, functions and capacity. Table 13 contains the city governance questionnaire and associated structures, which are summarised and mapped out below in Table 5. The different structures are defined according to the following functions which are required to tackle climate change:

- **Authorising climate action:**
    - Setting priorities;
    - Demonstrating commitment; or
    - Mandating institutions with responsibilities.
- **Resourcing climate action:**
    - Making the case for resources for climate action;
    - Reallocating budgets towards climate action;
    - Accessing new sources of finance; or
    - Allocating skilled staff for delivery.
- **Delivering climate action:**
    - Convening and co-ordinating across sectors – including stakeholder engagement;
    - Mainstreaming climate action within sectors;

- Monitoring and reporting; and
- Accountability for meeting targets

C.2.1.1 Navigating Climate Functions in Karachi: A Complex Landscape

Karachi, a bustling metropolis, currently lacks a dedicated city unit or department exclusively responsible for handling climate functions. Instead, the climate portfolio predominantly resides within the ambit of the provincial Environment, Climate Change and Coastal Development Department (ECC&CDD). This department holds the mantle for implementing the provincial climate change policy and action plan, engaging in legislative reviews, adapting national policies, and crafting sector-specific operating procedures and guidelines. This department's Directorate of Climate Change also bears the mantle of responsibility for climate functions, encompassing both mitigation and adaptation strategies.

An intricate web of structures, functions, and capacities shapes the city's approach to climate action. The city's current climate governance landscape is scrutinized through various lenses, including the potential role of the City Council, the challenges faced by the KMC in wielding effective climate coordination, and the broader city functions primarily residing within the provincial environment department. The KMC, the primary local government body for the city, shoulders responsibilities for various urban services. However, its role in this context remains undefined, leaving a critical void in local-level climate governance.

This analysis encompasses key aspects such as resource mobilization, policy formulation, sustainable development integration, and public awareness enhancement.

Environment Climate Change and Coastal Development Department (ECC&CD): For the city of Karachi, the climate change governance structure persists at the provincial level. Environment Climate Change and Coastal Development Department is the main department directly responsible for Climate action and interventions.

The attached departments of ECC&CD are;

1. Sindh Environment Protection Agency (SEPA)
2. Sindh Coastal Development Authority (SCDA)
3. Directorate of Climate Change (DoCC)
4. Sindh Environment Protection Tribunal (SEPT)

Sindh Environmental Protection Agency (SEPA): SEPA is a regulatory and enforcement arm of the ECC&CCD and administers and implements the functions as per the Sindh Environmental Protection Act 2014[5]. The Act also confers powers to the **Sindh Environmental Protection Council** (SEPC) which plays a critical role in the formulation and implementation of regulatory instruments relating to environmental matters with an inter-provincial impact; and assists the federal Environment Protection Agency in the implementation of international agreements and protocols.

[5] https://www.sindhhighcourt.gov.pk/downloads/source_files/Sindh%20Environmental%20Protection%20Act,%202014-Final.pdf

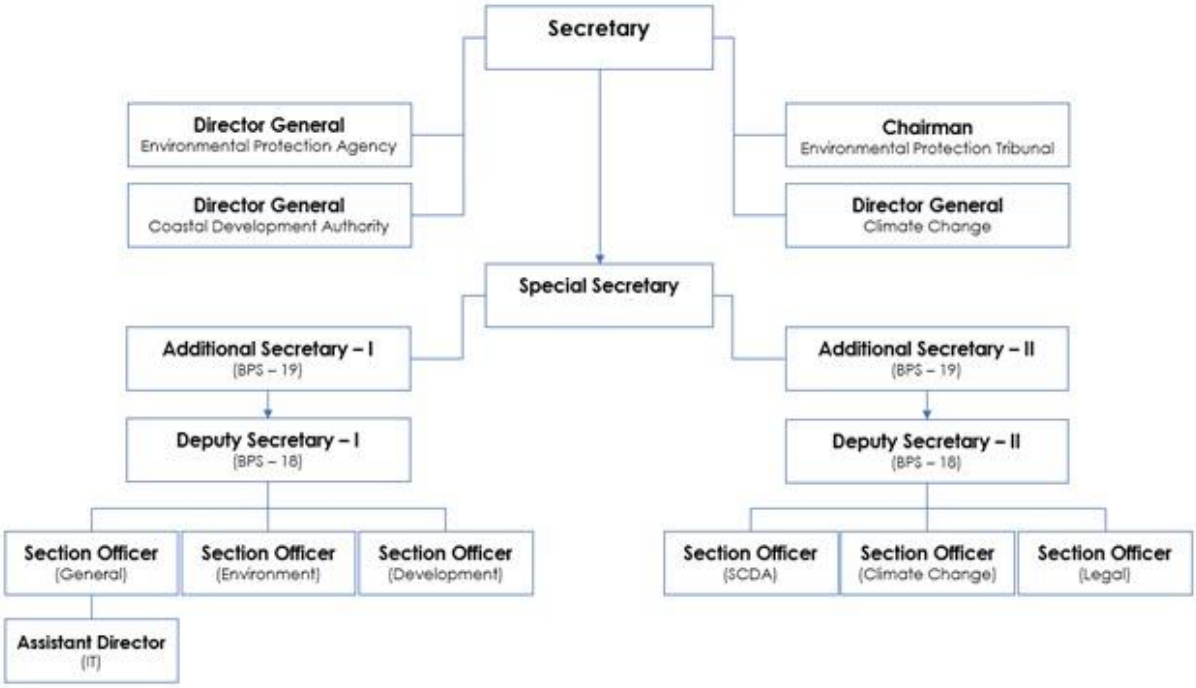

Figure 1: Organogram of Environment Climate Change & Coastal Development Department

Sindh Coastal Development Authority (SCDA): SCDA plays a significant role in the overall development and socio-economic growth of the inhabitants of coastal areas including Karachi. The Coastal Districts of Karachi are Malir, Korangi, Keamari, and district South. It also aims to ensure coastal resilience through conservation restoration and development efforts. The governing body of SCDA includes 23 Members whereas the organizational structure is smaller, mainly comprise of Directors/Deputy Directors in Agriculture, and Planning & Engineering fields. The composition of governing body is as follows;

Table 4: Composition of the Governing Body of SCDA

No.	Members	
1	Provincial Minister Environment, Climate Change and Coastal Development Department	Chairman
2	Secretary Environment, Climate Change and Coastal Development Department	Member / Convenor
3-11	Secretaries of the Government Departments (i) Planning & Development, (ii) Finance, (iii) Forest & Wildlife, (iv) Works & Services, (v) Livestock & Fisheries, (vi) Culture, Tourism, Sports, Youth Affairs, (vii) Local Government, Spatial Development, (viii) Irrigation & Power, (ix) Agriculture	Members
12	Director General, Sindh Coastal Development Authority	Member / Secretary
13-16	Members of the Provincial Assembly (MPAs of Sindh) MPA Karachi, Thatta, Sajwal, and Badin districts	Members
17	Two Eminent persons in the province	Members
18-23	Deputy Commissioners – West, South, Malir, Thatta, Sujwal and Badin	Members

Directorate of Climate Change (DoCC): The ECC&CDD's Climate Change Directorate, steering the provincial climate agenda, operates with a staff composition of 64 gazetted positions, including 17 positions above Grade 18. However, a significant challenge arises as these positions predominantly entail administrative roles, necessitating a specialized workforce equipped with technical skills and cross-sectoral expertise crucial for effective climate action.

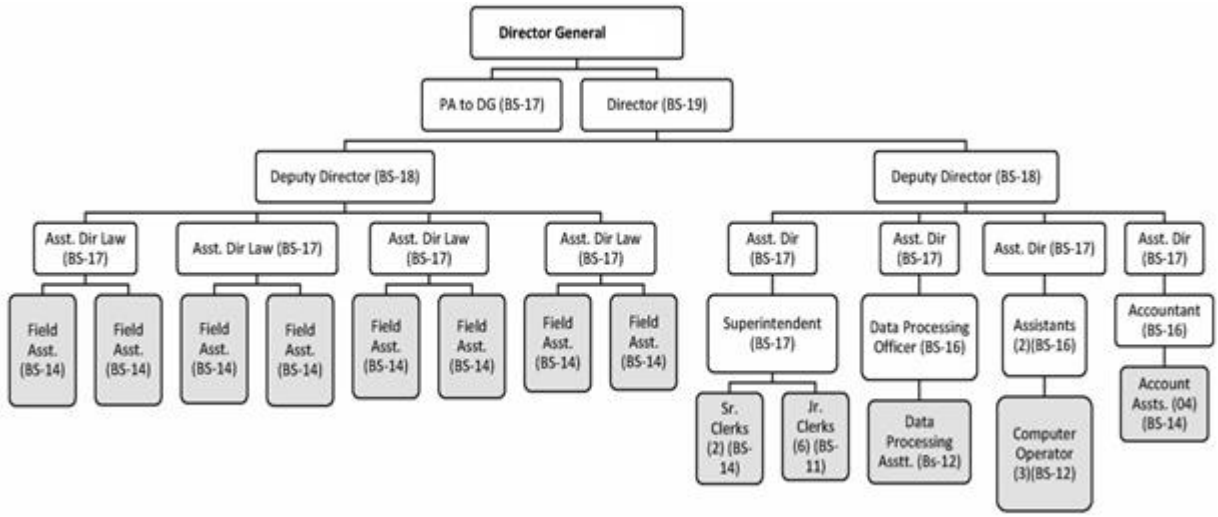

Figure 2: Organizational Chart of The Directorate of Climate Change

Sindh Environment Protection Tribunal (SEPT): SETP is established under section 25 of the Sindh Environmental Protection Act 2014. It consists of a Chairperson (High Court Judge) and two members including one technical person (environment qualification) and is responsible for managing all contraventions punishable as per the Act.

Karachi City Council: The potential for championing and coordinating climate action in Karachi lies within the City Council. Comprising 246 elected chairmen representing the Karachi Metropolitan Corporation, this political platform could serve as a linchpin for orchestrating robust climate initiatives within the city. The City Council's pivotal role is highlighted through its responsibilities, which encompass approving the budget and plans of the KMC, formulating rules and bylaws for municipal affairs, overseeing the performance and accountability of KMC departments and officers, and reviewing and approving policies and strategies for various urban sectors. Additionally, the Council represents the interests and grievances of the citizens and stakeholders of Karachi.

The Karachi City Council is supposed to be the main authority that should be responsible for climate action at the city level. However, due to the lack of a clear mandate of climate change in the local government functions, the city council is focusing more on cross-cutting themes i.e. municipal services at the city level. To elevate its stature as a catalyst for climate action, the City Council must actively engage in capacity-building initiatives, harness technological advancements for data-driven decision-making, and foster collaboration with diverse stakeholders. Strengthening its commitment to climate coordination is essential for the Council to play a central role in guiding Karachi towards a sustainable and resilient future.

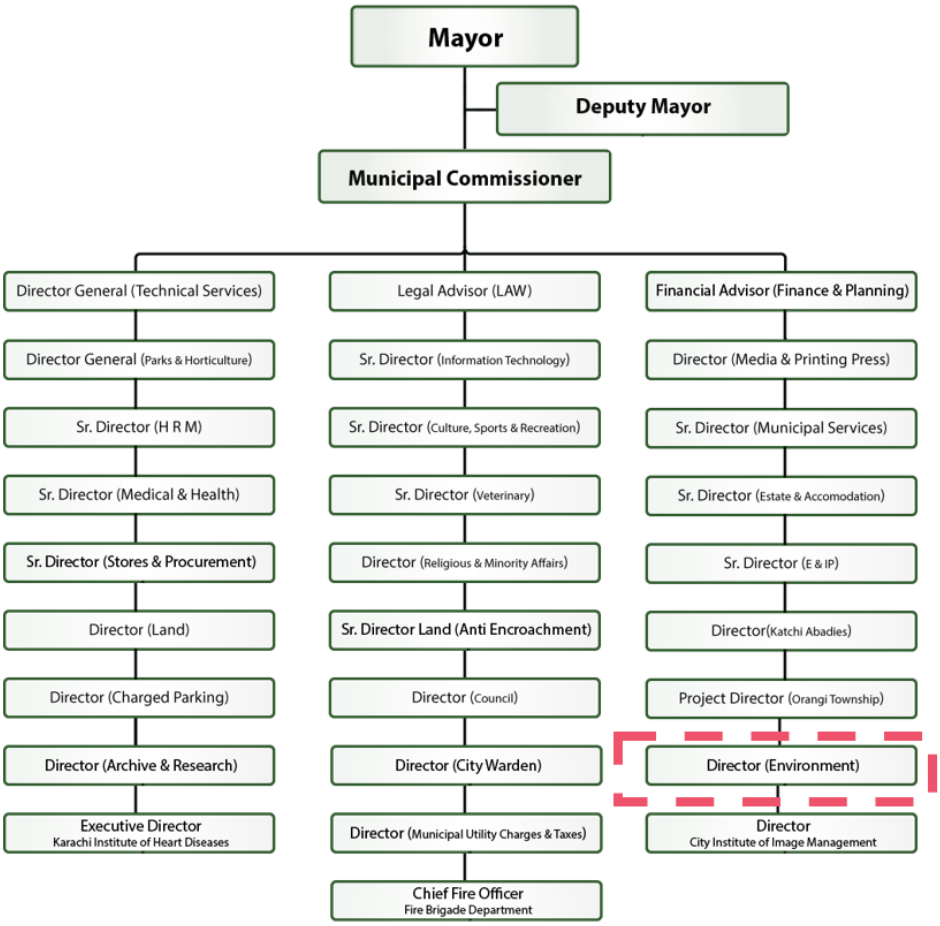

Figure 3: Organogram of Karachi Metropolitan Corporation (KMC)

KMC currently harbours only one designated position, Director (Environment), which remains vacant. The responsibilities tied to this role, primarily revolving around the environment and climate change, underscore a limited scope. To transform this position into a focal point for mainstreaming and implementing comprehensive climate action, substantial enhancements in terms of staff expertise, technological capabilities, and a broader mandate are indispensable.

Table 5: Summary of City Climate Governance Structures, Functions and Capacity[6]

Column 1 - City Climate Governance Structures		Column 2 - Capacity to drive or deliver climate mitigation and / or adaptation action, monitoring, evaluation and reporting
Structures/functions responsible for Authorising Climate Action	Currently, the Environment Climate Change and Coastal Development Department (ECC&CDD) is the main department that is operating through the Directorate of Climate Change (DoCC) and the Sindh Environmental	The city council lacks resources, data, coordination, participation, clear mandate on climate and accountability, which are essential for effective and stable climate action. The

[6] Anwar, F., 2012. *Karachi City Climate Change Adaptation Strategy: A Road Map,* Karachi: Shehri-Citizens for a Better Environment and Friedrich-Naumann-Stiftung für die Freiheit.

Column 1 - City Climate Governance Structures		Column 2 - Capacity to drive or deliver climate mitigation and / or adaptation action, monitoring, evaluation and reporting
	Protection Agency (SEPA). All these entities represent the main climate governance structure at the 'provincial level'. At the moment there is no governing body or institutional set-up/arrangements at the 'city level' that deals directly with Climate Change. In KMC, one position of the 'Director Environment' is available, however it has been vacant for a long time.	city council needs to improve its governance, institutional, and technological capacities, and collaborate and communicate better with other stakeholders, such as the provincial and national governments, international and local partners, and civil society organizations.
Structures/functions responsible for Resourcing Climate Action	Government of Sindh primarily through the Directorate of Climate Change (DoCC) at ECC&CD Department and from other relevant/ cross-cutting departments (i.e. energy, transport, agriculture and waste, etc.) for resourcing climate actions. Sindh Planning and Development Department is responsible for reviewing and approvals of provincial development schemes, projects/programs/Initiatives, and to seek foreign aid and technical assistance, when needed. Sindh Local Government; International Organizations like the UNDP, C40, World Bank[7], IUCN, UN-Habitat ADB etc.	Government Departments have limited technical & financial resources and an appetite at the political and governmental level to mainstream climate action with adequate resources.
Structures / functions responsible for Delivering Climate Action	Currently, the provincial department of ECC&CD through its Directorate of Climate Change (DoCC) and at national level Ministry of Climate Change (MoCC) are the main actors that handle the climate function, covering both mitigation and adaptation aspects. At the city level, KMC is responsible for various urban services but does not have a specific climate function or adequate resources, skills,	KMC has limited power, budget, and land ownership, which affects its ability to address the city's challenges. There is only one position Director (Environment) that can be the proposed focal person at the city level is vacant at the moment. The city's decentralization and fragmentation create obstacles to effective decision-making and coordination for climate action.

[7] Fact Sheet: World Bank's Engagement in Karachi

Column 1 - City Climate Governance Structures		Column 2 - Capacity to drive or deliver climate mitigation and / or adaptation action, monitoring, evaluation and reporting
	and expertise to drive climate action cross-sectorally.	
Structures / functions responsible for Monitoring and Reporting Climate Action (and progress in meeting goals/targets)	Karachi city does not have a notified Monitoring, Evaluation & Reporting System to assess climate change mitigation and adaptation. The city relies on the provincial and national scales' departments to monitor, evaluate and report on the climate change impacts and actions in the city. Sindh Climate Change Policy, 2022 proposes a robust monitoring and evaluation implementation framework at a provincial level to assess the adaptative and mitigative measures at the provincial level[8]. However, the framework is yet to develop. In 2019, Sindh EPA organized a stakeholder workshop in collaboration with Civil Society Coalition for Climate Change (CSCC) and the European Union (EU) to develop a Measuring, Reporting, and Verification (MRV) Framework[9] considering key sectors of climate change i.e. water, disaster, health, forestry & biodiversity, energy, food security, agriculture, and livestock. However, this MRV framework is not notified yet.	Institutional framework challenges, data generation investment, defining and prioritizing goals, targe & actions that are owned by City Council, and developing a proper framework for monitoring and reporting of Climate Action for Karachi City is need of the hour.
Processes, capacity, or structures used for external stakeholder engagement	Karachi city does not have any specified processes, capacity, or structures that it uses to communicate and engage regularly with non-city stakeholders around climate change. Stakeholder engagement was earlier done at the provincial level in the 2nd NDC implementation committee meeting held on 12th December 2023, under the chairmanship	Political, ethnic, and social conflicts, collaboration challenges. Capacity erosion, conflicts, willingness to assume roles. ECC&CD can play a significant role in developing new mechanism and structure for capacity building and stakeholders' engagement concerning

[8] Sindh Climate Change Policy 2022 Final.pdf Chapter 5.
[9] https://www.csccc.org.pk/attachments/news-bulletin/Sindh%20Implementation%20Framework.pdf

Column 1 - City Climate Governance Structures		Column 2 - Capacity to drive or deliver climate mitigation and / or adaptation action, monitoring, evaluation and reporting
	of a worthy Secretary ECC&D, Government of Sindh at the provincial level[10]. The main actors involved in climate change policy development, implementation, or data gathering in Karachi are the provincial department of ECC&CD, the national ministry of MoCC, and various international and local partners, such as the UNDP, C40, World Bank[11], IUCN, UN-Habitat, and civil society organizations. At the national level, Pak EPA has developed comprehensive Public Consultation Guidelines under Pakistan Environmental Protection Act 1997[12] which is the only available framework for stakeholder engagement.	to climate change; or adopting the national frameworks. Educating and empowering citizens for climate resilience is a shared responsibility among various entities like MoCC, ECC&CD, PDMA, Sindh Education Department, and others.

C.2.2 City Powers and Related Capacity

The Karachi City powers and capacity to implement climate action in key sectors have been reviewed in relation to whether the city owns/is responsible for key infrastructure and operational systems where such action could be focused, and whether it has the power and capacity to control, implement, influence or promote changes in this infrastructure / these operational systems.

Table 14 contains the Powers Assessment and associated scores, which are summarised and mapped out below.

Table 6: City Powers and Related Capacities for Karachi

Areas	City Power	Related Capacity
1. Decarbonising the electricity grid	2.3	1.5
2. Optimizing energy use in buildings	1.8	1
3. Enabling next-generation mobility	2.3	1.6
4. Improving solid waste management	2.5	2
5. Enhancing resilience of drinking water & wastewater/sanitation systems	3	2.5
6. Managing disasters, risks & impacts of extreme weather events & sea level rise	1.9	1.3
7. Enhancing the resilience of natural capital	0.8	0.5

[10] https://docc.sindh.gov.pk/
[11] Fact Sheet: World Bank's Engagement in Karachi
[12] https://www.commissiemer.nl/docs/mer/diversen/pakistan-eia-guidelines-public-consultation.pdf

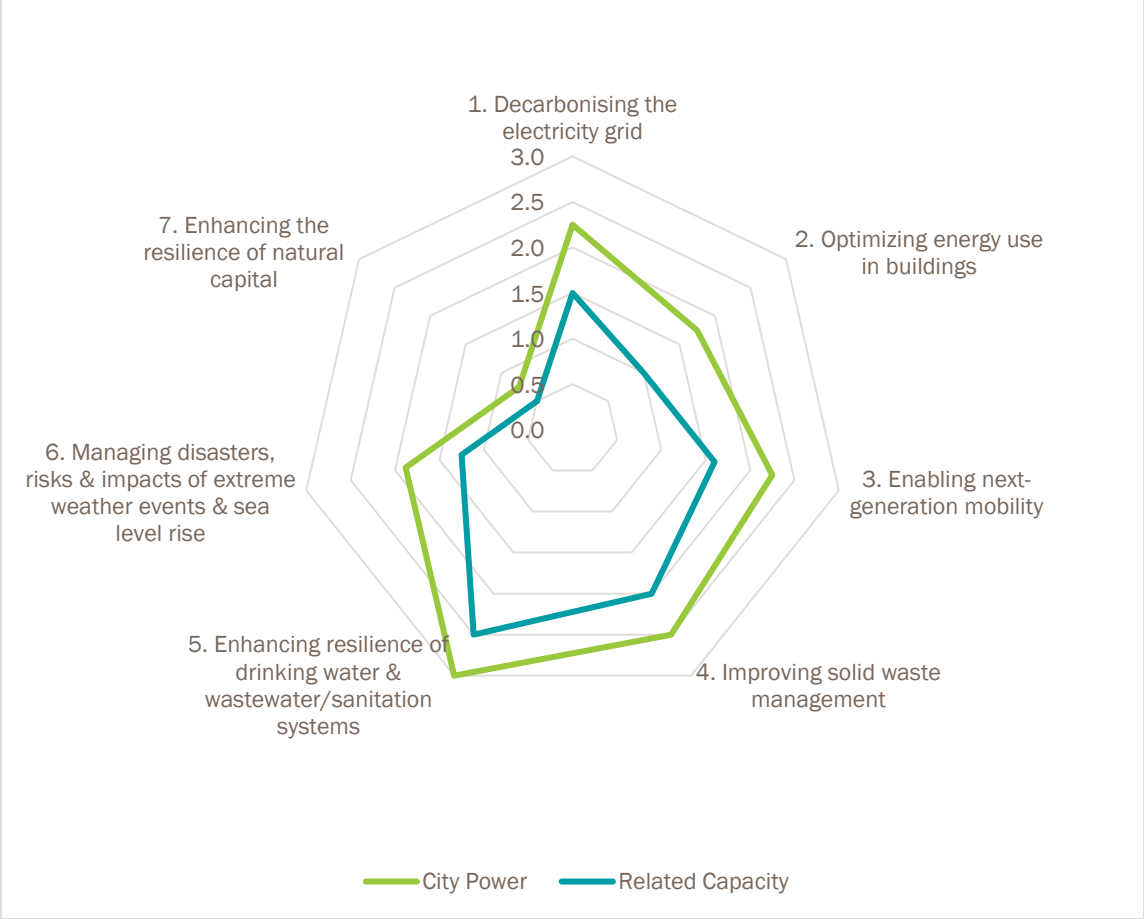

Figure 4: City Powers and Related Capacity Map

Based on the city powers and capacity assessment, all seven areas are elaborated below:

Decarbonizing the Electricity Grid: In terms of bulk power supply and generation, Karachi's landscape is divided between K-Electric (KE) and the National Transmission and Despatch Company (NTDC), supervised by National Electric Power Regulatory Authority (NEPRA). The city has outlined its long-term power acquisition plans from FY 2024 to FY 2030, focusing on a minimum-cost strategy for expanding power generation, including renewable sources. While Karachi does not currently possess the authority to dictate specific renewable energy initiatives at the household or business level, there are entities like the Private Power and Infrastructure Board (PPIB) and the Alternative Energy Development Board (AEDB) working towards facilitating private power projects, including renewable energy. Despite a competitive advantage in transitioning to renewable energy, Karachi acknowledges the need for more effective governance, capacity building, and strategic planning to address the energy crisis and promote renewables.

Optimizing Energy Use in Buildings:

Responsibility for promoting energy efficiency in new and existing buildings falls on entities like the provincial building control department such as the Sindh Building Control Authority (SBCA) and the National Energy Efficiency and Conservation Authority (NEECA). However, the city currently lacks a viable programmatic framework and a long-term strategy for transitioning to renewable energy in buildings. The absence of a

comprehensive approach hinders Karachi's capacity to perform a direct role in promoting or implementing renewable energy initiatives at the local level.

Enabling Next-Generation Mobility:

Public transport, regulated by the Department of Transport and Mass Transit, Karachi Traffic Police, and Sindh Mass Transit Authority (SMTA), with contributions from Sindh Infrastructure Development Company Limited (SIDCL) and TransKarachi. The city has made efforts to address transportation challenges through initiatives like the Bus Rapid Transit (BRT) corridors and the People's Bus Service. However, challenges such as overcrowding, route irregularities, and inadequate infrastructure persist. Karachi has the authority to implement low/zero-emission technologies in public transport, with plans to launch a zero-emission Red BRT network by 2030. Despite this commitment, challenges in funding, coordination, and political will pose obstacles to effectively transitioning to low/zero-emission technologies.

While Karachi has made strides in transport projects, challenges persist in providing effective and sustainable solutions, leaving a significant portion of the population dependent on less-efficient modes of transportation.

Spatial and development planning, critical for Transit-Oriented Development (TOD), falls under the purview of Sindh Mass Transit Authority and SIDCL. Karachi's capacity for TOD implementation requires comprehensive reforms, including strengthened institutional structures and improved urban planning.

Improving Solid Waste Management:

Solid waste management infrastructure is under the jurisdiction of the Sindh Solid Waste Management Board (SSWMB). The KMC has the responsibility to develop and manage sanitary land fill sites, which are essential for proper disposal of waste and prevention of environmental and health hazards. However, the present dumping sites at Jam Chakro and Govind Pass are poorly managed and need reform. Despite existing policies at the provincial level such as the Sindh Solid Waste Management Act 2021, Sindh Environmental Protection Act 2014, Sindh Climate Change Policy 2022, and Sindh Sanitation Policies 2017, challenges in implementation and coordination persist, highlighting issues in political will and governance in the city. The involvement of various stakeholders, including public, NGOs, and private firms, is not sufficient to overcome challenges such as inadequate facilities, outdated vehicles, and insufficient funds. The informal sector, represented by scavengers, adds complexity to Karachi's waste management landscape.

Enhancing Resilience of Drinking Water & Wastewater/Sanitation Systems:

Karachi's water challenges are managed by the Karachi Water and Sewerage Corporation (KWSC). Challenges in governance, financial constraints, outdated infrastructure, and delays in critical projects contribute to an ongoing and exacerbated water shortage. Despite the authority to influence water security policies and regulations, Karachi faces hurdles in effective implementation due to governance issues, funding constraints, and a lack of political will. Similar challenges confront wastewater and sanitation infrastructure, reflecting the city's struggle to effectively manage these essential services.

The Karachi Water & Sewerage Corporation Act, 2023, and the Greater Karachi Sewerage Plan (S-III) provide a framework, yet effective implementation remains a challenge. Karachi Water and Sewerage Services Improvement Project (KWSSIP) is a USD 1.2 billion programme led by the World Bank with other donors that is focusing on reforms and rehabilitation, along with a set of strategic interventions with infrastructure

investments. This project will help to reduce the impacts of climate extremes (specifically floods, salt intrusion and droughts) through better water and sanitation service quality.

Managing Disasters, Risks & Impacts of Extreme Weather Events & Sea Level Rise:

Disaster management in Karachi is the responsibility of the Provincial Disaster Management Authority, Sindh. Despite a comprehensive governance structure, challenges such as coordination issues, resource constraints, and climate-induced risks persist. Karachi has the authority to influence and control disaster response (i.e. Heatwave Management Plan prepared by KMC in 2016), but issues like political interference and bureaucratic inefficiency hinder effective disaster management. Coastal infrastructure and risk management involve the Environment, Climate Change and Coastal Development Department (ECC&CD) and the Sindh Coastal Development Authority (SCDA). Stormwater and river system management falls under the Sindh Irrigation Department and KW&SC. The Sindh Climate Change Policy of 2022 establishes a provincial framework, aligning with global climate initiatives. The city also faces challenges in managing coastal risks, stormwater, river systems, and increased flooding risks requiring more financial support, better governance, technical skills, and stronger leadership.

Climate Education and Community Empowerment in Karachi

Educating and empowering citizens for climate resilience is a shared responsibility among various entities like MoCC, ECC&CD, PDMA, Sindh Education Department, and others. Karachi has some authority but faces challenges in implementing climate change education effectively, including poor coordination and low awareness.

Enhancing the Resilience of Natural Capital:

The responsibility for controlling or supporting agricultural production lies with the Sindh Agriculture and Irrigation Departments, and the city has some authority to influence agricultural policies. The Sindh Water and Agriculture Transformation project indicates the provincial government's commitment to addressing agricultural challenges. Similarly, the Sindh Forest Department is responsible for managing natural ecosystems, however, challenges such as rapid urbanization, lack of data, poor coordination, and low awareness hinder effective ecosystem management for climate adaptation.

The Powers and Related Capacity Assessment underscores Karachi's complex urban landscape, where efforts toward climate action face challenges rooted in governance, coordination, and resource constraints. While Karachi possesses some authority and capacity in various sectors related to climate action, the city faces numerous challenges that impede effective implementation. The commitment to addressing climate change is evident through various policies, plans, and initiatives, but comprehensive reforms, strengthened governance structures, and enhanced capacity are imperative to navigate the intricate web of climate challenges effectively.

D. Goals / Targets & Policy Context Review

D.1 City Climate Goals / Targets

The Table 7 sets out the Karachi's existing documented climate action goals and targets[13]. These include climate mitigation (i.e. greenhouse gas emissions reductions), adaptation (i.e. reductions in climate risks and increase in resilience) and associated benefit / inclusivity targets / goals and objectives. These are reviewed in Table 7 against the following requirements of the CAP Framework:

Mitigation targets:

- Targets or carbon budgets and milestones should be based on the city's emissions inventory and modelling, outlining an accelerated reduction (decline or peaking) in total emissions through to 2050, with an ambitious interim target.
- Where possible, sectoral targets should be set, which should sum to the citywide emissions neutrality scenario.

Adaptation goals:

- Goals and milestones should be based on the city's climate change scenarios and hazard or risk assessments, outlining the adaptation requirements for specific time periods through to 2050.
- Goals may be stated in relation to the city as a whole, for specific sectors, communities and/or actions, or per risk / hazard, ensuring transparency with regards to the city's anticipated progress.

Equitable delivery of climate action benefits:

- Goals should be developed for other social, economic or environmental benefits associated with climate action (e.g. health, employment, air quality and/or affordability), with an equitable approach to delivering these benefits across the city population.

An overview of the findings of this review and whether there are any gaps / issues that need to be addressed in the city's climate action planning process are described below the table.

[13] A goal is a high-level ambition, and is often, but not always, set out as a qualitative statement (e.g. to achieve a more climate change resilient city by 2050). A target is an aim that is usually stated quantitatively (e.g. a 50% reduction in greenhouse gas emissions by 2030).

Table 7: City Climate Action Targets / Goals Review

1. Climate Mitigation Target	2. Plan / Policy in which this is captured	3. Are targets based on the city's emissions inventory and modelling, and set an accelerated reduction (decline or peaking) in total emissions by 2050, with an ambitious interim target?	4. Are there sectoral targets that sum to a citywide emission's neutral scenario?
"By 2030, 60 % of all energy produced in the country will be generated from renewable energy resources including hydropower"	NDCs 2021	Yes, this target is based on the national GHG inventory and the projected energy demand and supply scenarios for 2030. The target implies a 20% reduction in GHG emissions from the energy sector by 2030 compared to the business-as-usual scenario.	No, this target is not broken down by sector or city. It is a national-level target that applies to the whole country.
"From 2020, new coal power plants are subject to a moratorium, and no generation of power through imported coal shall be allowed, shelving plans for two new coal fired power plants in favour of hydroelectric power and focusing on coal gasification and liquefaction for indigenous coal"	NDCs 2021	Yes, this target is based on the national GHG inventory and the projected energy demand and supply scenarios for 2030. The target implies a 14% reduction in GHG emissions from the power sector by 2025 and a 28% reduction by 2030 compared to the business-as-usual scenario.	No, this target is not broken down by sector or city. It is a national-level target that applies to the whole country.
"By 2025, 20% renewable energy generation and at least 30% by 2030"	ARE 2019	Yes, this target is based on the national GHG inventory and the projected energy demand and supply scenarios for 2030. The target implies a 14% reduction in GHG emissions from the power sector by 2025 and a 28% reduction by 2030 compared to the business-as-usual scenario.	No, this target is not broken down by sector or city. It is a national-level target that applies to the whole country.
"By 2030, 30 % of all new vehicles sold in Pakistan in various categories will be Electric Vehicles (EVs)"	NDCs 2021	Yes, this target is based on the national GHG inventory and the projected transport demand and emissions scenarios for 2030. The target implies a 7% reduction in GHG emissions from the transport sector by 2030 compared to the business-as-usual scenario.	No, this target is not broken down by sector or city. It is a national-level target that applies to the whole country.
EV Penetration Targets: "By 2030, 30% of New Sales (Approximately 60,000) of Cars (including Vans, Jeeps and small Trucks) and 90% of New Sales by 2040; By 2030, 50% of New Sales	EV Policy, 2019	Yes, these targets are based on the national GHG inventory and the projected transport demand and emissions scenarios for 2030 and 2040. The targets imply a 9% reduction in GHG emissions from the transport sector by 2030 and a 37%	No, these targets are not broken down by sector or city. They are national-level targets that apply to the whole country.

1. Climate Mitigation Target	2. Plan / Policy in which this is captured	3. Are targets based on the city's emissions inventory and modelling, and set an accelerated reduction (decline or peaking) in total emissions by 2050, with an ambitious interim target?	4. Are there sectoral targets that sum to a citywide emission's neutral scenario?
(Approximately 90,000) of Two and Three Wheelers and 90% of New Sales by 2040; By 2030, 50% of New Sales of Buses and 90% of New Sales by 2040; By 2030, 30% of New Sales of Trucks and 90% of New Sales by 2040"		reduction by 2040 compared to the business-as-usual scenario.	
"By 2023, total protected areas in the country will be enhanced from 12% to 15% that will result in preserving rare fauna / flora, green job opportunities for 5,500 people, and promoting ecotourism"	NDCs 2021	No, this target is not based on the city's emissions inventory and modelling, nor does it set an accelerated reduction in total emissions by 2050. It is a national-level target that aims to enhance the resilience of natural ecosystems and biodiversity to climate change.	No, this target is not broken down by sector or city. It is a national-level target that applies to the whole country.
5. Climate Adaptation Goals	**6. Plan / Policy in which this is captured**	**7. Are goals based on the city's climate change scenarios and hazard or risk assessments, outlining the adaptation requirements for specific time periods through 2050?**	**8. Are goals broken down per sector, per risk / hazard / communities / action?**
"By 2023, total protected areas in the country will be enhanced from 12% to 15% that will result in preserving rare fauna / flora, green job opportunities for 5,500 people, and promoting ecotourism"	NDCs 2021	It is a national-level target that aims to augment the resilience of natural ecosystems and biodiversity to climate change.	No, this target is not broken down by sector or city. It is a national-level target that applies to the whole country.
9. To what extent do the city's climate goals / targets recognise or promote an equitable approach to delivery of climate action co-benefits across the city?	The lack of regional/provincial and local-level goals and targets that can address the specific needs and priorities of different cities and regions in Pakistan. The lack of explicit references to equity, social justice, or human rights in the national-	**10. To what extent are goals for other social, economic or environmental benefits developed?**	Karachi Strategic Development Plan 2020 has some goals for other social, economic, or environmental benefits developed for Karachi city such as improving the quality of life, enhancing the economic competitiveness,

1. Climate Mitigation Target	2. Plan / Policy in which this is captured	3. Are targets based on the city's emissions inventory and modelling, and set an accelerated reduction (decline or peaking) in total emissions by 2050, with an ambitious interim target?	4. Are there sectoral targets that sum to a citywide emission's neutral scenario?
	level goals and targets, which can ensure that the co-benefits of climate action are distributed equitably and inclusively among different groups and communities.		protecting and restoring the natural and cultural heritage, and improving the urban governance and management of the city. However, these goals are not yet fully implemented or operationalized.

D.2 Policy Context Review

This section presents a high-level contextual review of internal and external policies that set out climate, environmental, social and economic development goals and objectives which may impact on, or need to be considered in the Karachi 's climate action plan.

D.2.1 Internal Policies

The key internal policies that set the context for the climate action plan are set out in Table 15.

The city of Karachi operates within a framework of internal policies[14] that play a crucial role in shaping its climate, environmental, social, and economic development goals. These policies provide a high-level contextual review, influencing the direction and strategies outlined in Karachi's Climate Action Plan. Following is an overview of key internal policies and their relevance to the city's climate initiatives:

Karachi Heatwave Management Plan (KHWMP 2017)[15]*:* The KHWMP is a critical policy within the climate and environment sector, addressing strategies to prevent heat-related illnesses. While focusing on weather conditions and heat health, it forms a basis for KCAP to enhance recommendations and interventions for climate resilience.

Karachi Strategic Development Plan 2020[16]: As a strategic and cross-cutting plan, KSDP identifies key issues across various sectors, providing a framework linked to GHG emission reductions. The strategic

[14] Here 'Internal Policies' are defined as the policy frameworks for Karachi City as well as the Sindh Province
[15] https://ghhin.org/wp-content/uploads/HeatwaveManagementPlan.pdf
[16] Around 7 master plans were proposed for Karachi city in the past, including two before independence (1922 - Approved and 1946 – Not Approved). The attempts were made in 1952 (Swedish firm Merz Randal Vatten Plan – Not Approved), 1958 (The Greater Karachi Resettlement Plan – Not Approved), 1974 (Karachi Development Plan 1974-1985 – Never officially notified), 1991 (Karachi Coastal Management Plan – Approved), 2000 (The Karachi Development Plan – Never officially notified), and 2020 (Karachi Strategic Development Plan Notified by City Council and Karachi Master Plan - Draft). Here the latest plan i.e. KSDP Karachi strategic Development Plan 2020 is considered for assessing the relevance with K-CAP.

directions and actions outlined in KSDP will play a pivotal role in formulating mitigation and adaptation measures for climate resilience in Karachi.

At provincial scale, the key relevant frameworks are as follows;

Sindh Strategy for Sustainable Development 2007: This strategy focuses on research and studying the impacts of climate change on multiple sectors. KCAP, grounded in evidence-based practices, will provide a comprehensive mitigation and adaptation plan for climate resilience and sustainable development.

Sindh Sanitation Policy 2016: Setting targets for integrated solid waste management, this policy aligns with KCAP's emphasis on achieving net-zero GHG emissions from waste treatment within the city.

Sindh Growth Strategy 2017: This strategy recognizes the potential for energy efficiency in Sindh and focuses on climate-change adaptation across sectors. KCAP will address and align its adaptation and mitigation actions with the measures and strategies provided in the Sindh Growth Strategy to meet future climate projections.

Sindh Agriculture Policy (2018-2030), 2018: Aiming for resilient and climate-smart agriculture, this policy aligns with KCAP's key focus on sectoral contributions in the city's consumption-based emission inventory, prioritizing actions for the agriculture sector.

Sindh Climate Change Policy 2022: Operating at the provincial level, this policy outlines specific measures for mitigation, adaptation, and capacity development, aligning with international commitments. KCAP, in harmony with this policy, will focus on reducing climate risks, vulnerability assessments, and strategies for managing climate change at the micro scale within the city.

Sustainable Development Goals Framework for Mainstreaming, Sindh, 2022: Aligning with SDG 13, this framework focuses on climate action for immediate, medium, and long-term measures. KCAP is directly linked to SDG 13, targeting enhanced resilience and adaptive capacity for Karachi through evidence-based actions.

Sindh Water Policy 2023: In the water sector, this policy addresses challenges in water supply, emphasizing governance and resilience to climate-induced pressures. KCAP will assess the impacts on water resources and provide mitigation and adaptation actions concerning future climate scenarios for Karachi.

Sindh Urban Transport Policy: With a 20-year horizon, this policy recognizes the emission share of the transport sector and aims to create an environmentally friendly transport system. KCAP identifies transport as a key sector for climate hazard impacts assessment, emission inventory, and mitigative measures toward achieving net zero emissions.

This contextual review underscores the interconnectedness of Karachi's climate action plan with internal policies, ensuring a comprehensive and integrated approach to climate resilience and sustainable development. The policies collectively provide a roadmap for addressing climate-related challenges across various sectors in the city.

D.2.2 External Policies

The key external policies[17] that set the context for the climate action plan are set out in Table 16.

Karachi's journey towards a sustainable and climate-resilient future is intricately woven into the fabric of key external policies that set the stage for comprehensive climate action. These policies provide a robust framework, aligning environmental, social, and economic development goals with the aspirations of Karachi's Climate Action Plan. Each policy plays a pivotal role, contributing unique perspectives and solutions to the multifaceted challenges faced by the city.

National Environmental Policy 2005: This policy, operating in the climate and environment sector, recommends the development of climate action policies and plans to effectively address climate change challenges. While providing guidance on national-level strategies, it emphasizes renewable energy and cleaner technologies, aligning with the broader goals of KCAP.

National Transport Policy 2018: The focus on strengthening the resilience of transport infrastructure and services, coupled with reducing greenhouse gas emissions, aligns with the core objectives of KCAP. As the plan aims for a climate-neutral city through net-zero GHG emissions, the National Transport Policy becomes pivotal in guiding actions related to the transport sector.

National Electric Vehicle (EV) Policy, 2019: With a primary objective of mitigating climate change through emission reduction in the transport sector, this policy finds direct relevance to KCAP. As the plan seeks to achieve net-zero emissions from fuel consumption sectors, including transport, the National EV Policy becomes a key reference for transformative actions.

Alternative & Renewable Energy Policy – ARE 2019: The policy's focus on increasing the share of "green" energy in the country's overall energy mix aligns with KCAP's emphasis on decarbonizing the electricity grid and optimizing energy use in buildings. KCAP will draw guidance from these policy measures for prioritizing actions aimed at achieving net-zero emissions.

Updated Nationally Determined Contributions – NDCs 2021[18]: The NDCs outline ambitious targets for emission reduction, forming the cornerstone of KCAP in designing and prioritizing mitigation measures. With a cumulative aim of a 50% reduction in projected emissions by 2030, these targets guide KCAP's efforts towards a sustainable and resilient Karachi.

National Climate Change Policy – NCCP 2021: Focusing on mainstreaming climate change in vulnerable sectors, the NCCP sets the tone for KCAP interventions. Aligning with NCCP's emphasis on GHG inventories and reliable climate change projections, KCAP ensures evidence-based climate action planning for Karachi.

National Hazardous Waste Management Policy 2022: This policy aims for environmentally sound management of hazardous waste, aligning with KCAP's commitment to safe disposal and effective waste

[17] Here, the 'external policies' covers the frameworks at national scale, including NDCs and multilateral agreements

[18] The federal government submits these NDCs in align with the multilateral environmental agreements i.e. the Paris Agreement to the United Nations Framework Convention on Climate Change (UNFCCC) as an all-inclusive national consensus to accelerating the transition to net-zero and a climate-resilient economy. https://docc.sindh.gov.pk/files/DoCC/Sindh%20Climate%20Change%20Policy_June%202022.pdf List of all MEAs is provided at https://mocc.gov.pk/Detail/MWYwYTEwMWYtNGQ0OC00ZWY4LWE1ZWUtMTNlZTRkYWE1OTlh

management. It ensures that waste-related actions within KCAP adhere to international standards and safeguard public health and the environment.

National Clean Air Policy – NCAP 2023: The NCAP's key focus on improving air quality through strategic, technological, and management actions directly aligns with KCAP's objectives. By monitoring air quality in various sectors, the policy guides KCAP in implementing measures that contribute to a cleaner and healthier environment in Karachi.

In summary, these key external policies provide a comprehensive framework for Karachi's Climate Action Plan. Ranging from environmental conservation to hazardous waste management and air quality improvement, these policies offer a roadmap for integrating climate, environmental, social, and economic development goals into Karachi's strategic initiatives. The relevance of each policy to the City's Climate Action Plan is evident in their shared objectives and commitment to building a resilient and sustainable urban environment.

E. City Context

An evidence-based climate action plan will be tailored to the environmental, social and economic context of the Karachi City has identified through the generic set of indicators in Table 18. This city context review provides an overview of the current climate and environmental quality within the city, and its socio-economic context and key future trends.

E.1 Current Climate & Environmental Quality within the City

E.1.1 Karachi Climate

Karachi has BWh Climate (B = Arid, W= Desert h= hot Arid) or subtropical hot desert climate according to the Koppen's classificationi.e. climate of lower middle latitudes, beneath the subtropical ridge, with descending air, high pressure and disperse clouds, resulting the hot, dry weather with bright sunny days in that area[19]. Its climate is influenced by El-Nino Southern Oscillation, Westerlies, Indian Ocean Dipole and Noth Atlantic Oscillation (NAO)[20].

Temperature: The maximum, minimum and average monthly temperatures of the Karachi for the years 2001-2022 acquired from Merra-2 reanalysis indicates a homogeneous pattern of average monthly temperature i.e. average maximum monthly ranges from 27°C to upwards of 42°C and the average minimum monthly temperature range is 12 to 30°C.

Precipitation: The onset of Asian monsoon over Karachi develops under low atmospheric pressure conditions with a high humidity profile which results in increased precipitation[21]. The total monthly rainfall (mm) of Merra-2 reanalysis data against climate normal rain of Karachi from 2001-2022 shows lesser rain during the winter season as compared to the summer / monsoon period. In the August 2020 alone[22], Karachi received almost 19 inches (~484 mm) downpour, breaking the record of last 90 years, shambling the whole city with flooded roads, residential areas including urban slums in the peri urban areas of Karachi city.

In 2015, the National Institute of Oceanography (NIO) indicated that the Karachi city could be submerged by 2060, if the concrete measures are not taken to control the sea intrusion Indus delta and coastlines[23]. The Asian Development Bank (ADB) estimated 1.1 mm/yr sea level rise along the coastlines of Karachi in from 1856–2000.[24]

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[19] Beck, H. E., Zimmermann, N. E., McVicar, T. R., Vergopolan, N., Berg, A., & Wood, E. F. (2018). Present and future Köppen-Geiger climate classification maps at 1-km resolution. *Scientific data*, *5*, 180214. https://doi.org/10.1038/sdata.2018.214.

[20] Herekar F, Iftikhar S, Nazish A, Rehman S. (2020). Malaria and the climate in Karachi: An eight-year review. Pak J Med Sci. 36(1):33-37. doi: 10.12669/pjms.36.ICON-Suppl.1712. PMID: 31933604; PMCID: PMC6943108.

[21] Hussain, M. A., Iqbal, M. J., & Soomro, S. (2012). Urban wind speed analysis in global climate change perspective: Karachi as a case study. *International Journal of Geosciences*, *3*(05), 1000.

[22] Health And Nutrition Development Society (HANDS). (2020). Rapid Need Assessment Report: Monsoon Rains Karachi Division, 24th – 27th August 2020, retrieved from https://reliefweb.int/report/pakistan/rapid-need-assessment-report-monsoon-rains-karachi-division-24th-27th-august-2020 on 27 December 2023

[23] https://www.thethirdpole.net/en/climate/karachi-could-be-submerged-by-2060/

[24] Chaudhry, Q-Z. (2017). Climate Change Profile of Pakistan. Asian Development Bank, Manila, Philippines.

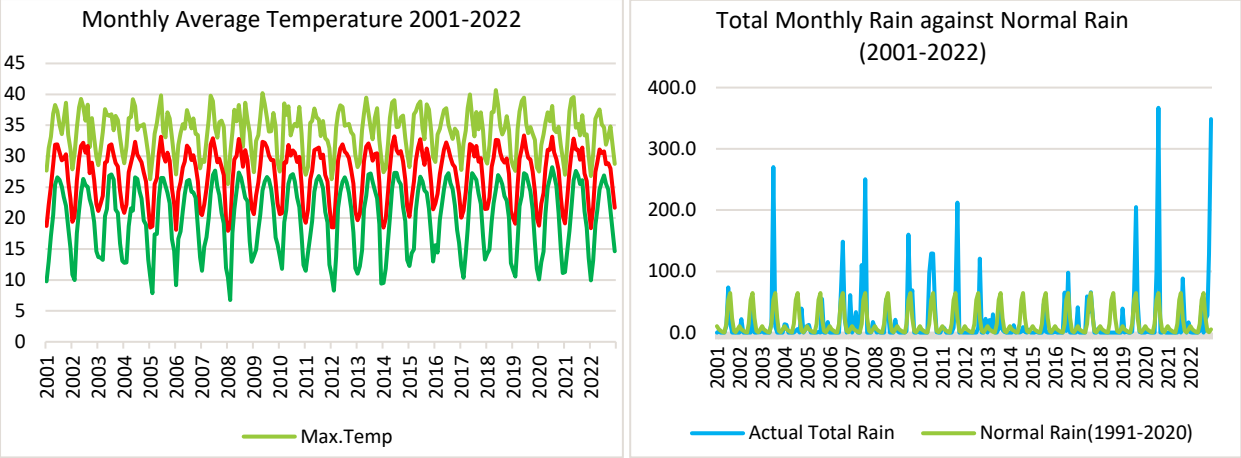

Figure 5: Monthly Average Maximum and Minimum Temperature °C and Total Monthly Rainfall (mm) in Karachi (2001-2022)

Relative Humidity: The low-pressure systems originate over the Bay of Bengal and Arabian Sea have significant moisture sources, resulting in precipitation over Karachi and other regions of Pakistan. The humidity levels usually remain high from March to November due to westerly winds, while very low in winter as northeasterly winds are dominant.

Wind: The wind speed has average monthly velocities ranges from 10-22 km per hour during the years (2001-2022). During the summer season, the west-southwest wind direction dominates with higher speed in the Karachi region. In winters, the wind direction changes and blows from north to northeast, shifting southwest to west in the evening hours. This wind typically transports sand and salt, and cause wind erosion and corrosion. During the monsoon season (mainly in June), tropical cyclones are usually forms.

Air Pressure: A monthly average air pressure for 2001-2022 over Karachi is less than 1000 millibars (mb) from May to October. The low-pressure values are associated with cloudy, windy, and rainy weather at a local level. During these months, Karachi experienced tropical cyclones originating from the Arabian sea and monsoon currents over Karachi. At the same time, high-pressure values show clear weather conditions.

E.2 City Socio-economic Context & Key Future Trends

Karachi, a sprawling metropolis on the Arabian Sea, boasts a distinctive administrative and physical geography that significantly shapes its urban dynamics. It is one of the megacities of the world and the provincial capital of Sindh. The topography of the city comprises both flat and undulating plains with urban extent towards the North and mountains to the West. Two rivers, Malir and Lyari pass through the city flowing towards the south and fall into the Arabian Sea.

Location:	*24.8607° N and 67.0011° E along the coast of the Arabian Sea*	*Area:*	*3,527 sq. km*
Districts:	*Seven - Karachi West, Karachi South, Karachi Central, Malir, Keamari, Korangi and Karachi East*	*Towns and UCs:*	*25 towns and 246 Union Councils*

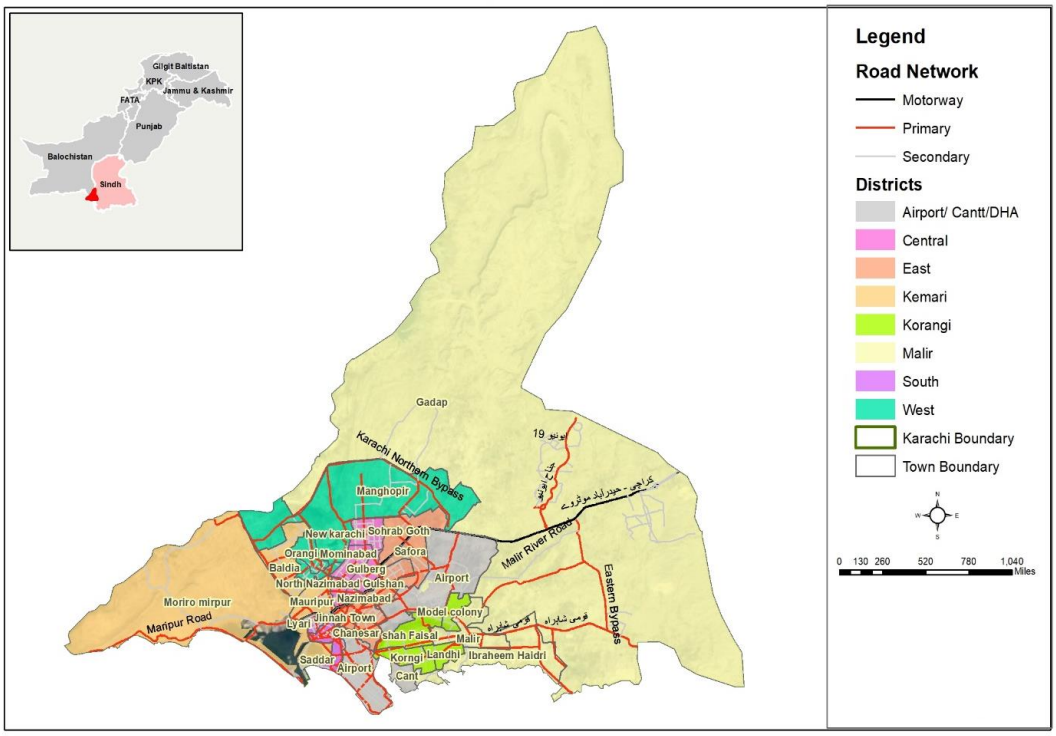

Figure 6: Karachi Administrative Boundaries

E.2.1 Karachi Livability: A Case to Ponder

Pakistan's financial capital, Karachi, is incessantly ranking in bottom 10 least liveable cities in the world. The latest Global Livability Index Report ranked Karachi as 5th bottom city in the world concerning its performance in managing multiple sectors[25].

Bottom 10 positions

City	Location	Rank	Index	Stability	Healthcare	Culture & environment	Education	Infrastructure
Douala	Cameroon	164	46.4	60.0	29.2	51.2	41.7	42.9
Kyiv	Ukraine	165	44.0	40.0	41.7	54.2	75.0	23.2
Harare	Zimbabwe	166	43.8	40.0	29.2	56.7	66.7	35.7
Dhaka	Bangladesh	166	43.8	50.0	41.7	40.5	75.0	26.8
Port Moresby	Papua New Guinea	168	43.4	30.0	41.7	49.8	58.3	46.4
Karachi	Pakistan	169	42.5	20.0	50.0	38.7	75.0	51.8
Lagos	Nigeria	170	42.2	25.0	37.5	54.4	41.7	53.6
Algiers	Algeria	171	42.0	35.0	50.0	45.4	58.3	30.4
Tripoli	Libya	172	40.1	30.0	45.8	37.5	58.3	41.1
Damascus	Syria	173	30.7	20.0	29.2	40.5	33.3	32.1

Rating description

Rating	Description	Suggested allowance (%)
80-100	There are few, if any, challenges to living standards	0
70-80	Day-to-day living is fine in general, but some aspects of life may entail problems	5
60-70	Negative factors have an impact on day-to-day living	10
50-60	Liveability is substantially constrained	15
50 or less	Most aspects of living are severely restricted	20

[25] Economist Intelligence Unit (EIU). (2023). The Global Livability Index 2023.

Karachi's livability and competitiveness are impacted by a number of factors such as limited institutional capacities, overlapping of responsibilities, inefficient and inadequate service delivery, limited financing and insufficient capital investment (gaps in own-source revenue generation), etc. The recent projects of the World Bank, namely Karachi Neighbourhood Improvement Project (KNIP)[26] and the Competitive and Livable City of Karachi Project (CLICK) [27] emphasize on upgrading the public spaces in the neighbourhoods and achieving adequate services and a competitive business environment to attain sustainable and climate compatible development in the city.

In 2018, the World Bank study[28] benchmarked Karachi city with other comparator cities such as Mumbai, Dhaka, Istanbul etc. The results indicated that Karachi is lagging behind and has a great potential to emerge as a city with high quality of life through sound policy and strategic measures at local scale.

E.2.2 Karachi's Diverse Tapestry: A Demographic Chronicle

Karachi, the bustling metropolis at the heart of Pakistan, is a melting pot of cultures, languages, and vibrant communities, with a total population of 20.3 million (4.10% growth rate).[29] Karachi city comprises of 07 urban districts; each characterized by varying population distributions. As the city evolves, so does its population density, currently standing at 4,115 people per sq. km., reflecting a significant increase from 2,794 persons per sq. km.[30]. This dynamic density mirrors Karachi's status as a thriving urban center, bustling with life, commerce, and cultural interactions.

It is the only developed maritime hub of the country. The coastline of Sindh province is shared by Indus Delta and Karachi City Coast. The coastal areas of Karachi comprised of two ports, a nuclear power plant, fish harbours, (small to large) industrial estates, and steel mills. Whereas, 85% of the Sindh coast is covered by the Indus Delta creeks covers by a small settlements of fishermen communities with negligible infrastructural or industrial activities.

However, it is observed that city's population centers are seen expanding continuously from Karachi Port to the north, with notably dense populations in eastern districts such as Shah Faisal Town, Malir Town, Korangi Town, and Landhi Town due to favourable factors. These key factors include a flat terrain, strategic access via the National Highway (N-5) and Superhighway (M-9), as well as proximity to industrial hubs like Korangi, Landhi, and Port Qasim.

The 2023 Census indicates that Karachi East is the densely populated part of the city and has the highest population growth rate.

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[26]World Bank. (2019). Competitive and Livable City of Karachi Project, Washington, D.C. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/516881497751250993/pakistan-karachi-neighborhood-improvement-project

[27] World Bank. (2017). Karachi Neighbourhood Improvement Project. Washington, D.C. https://documents1.worldbank.org/curated/en/397431561946455682/pdf/Pakistan-Competitive-and-Livable-City-of-Karachi-Project.pdf

[28] World Bank. (2018). Transforming Karachi into a Livable and Competitive Megacity: A City Diagnostic and Transformation Strategy. Directions in Development. Washington, DC: World Bank. doi:10.1596/978-1-4648-1211-8.

[29] https://www.pbs.gov.pk/sites/default/files/population/2023/Sindh.pdf

[30] Pakistan Population Census 2017 https://urckarachi.org/2022/08/17/what-the-census-tells-us-about-karachi/)

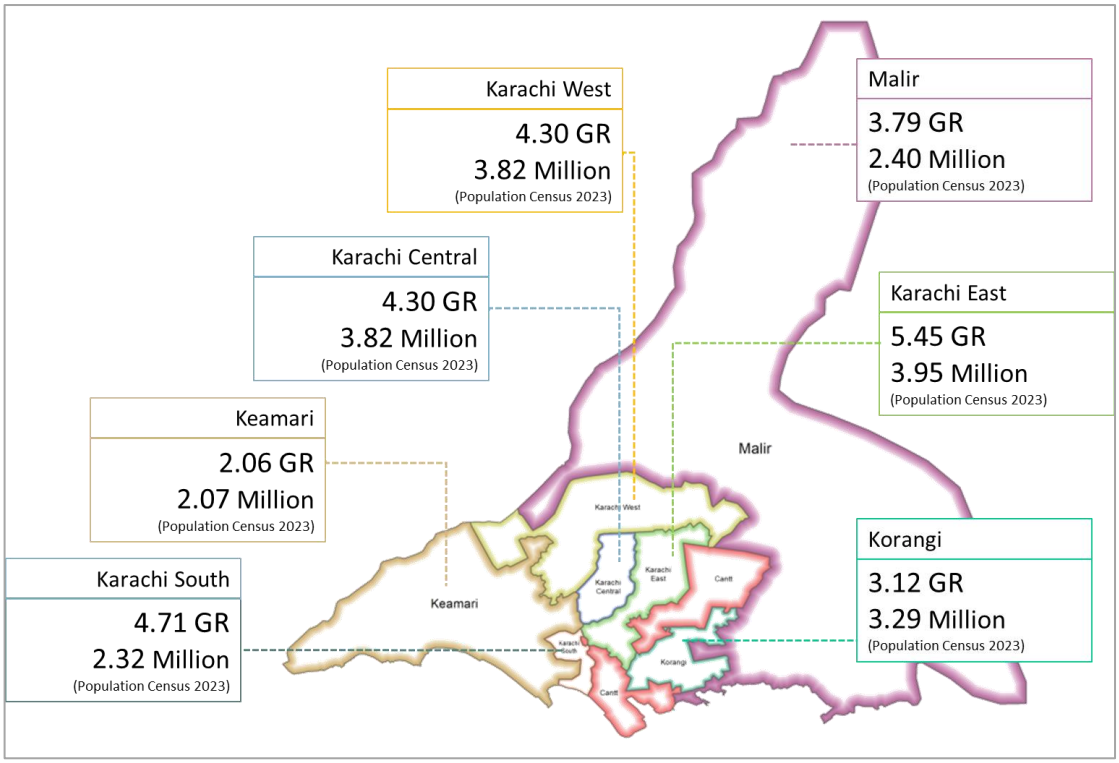

Figure 7: Karachi Population and growth rate based on Census 2023

E.2.3 Karachi's Changing Landscape: Urbanization Trends and Environmental Resilience

Karachi's dynamic urban landscape has witnessed significant transformations in land use patterns over the past three decades, reflecting the city's evolving socio-economic and environmental dynamics. A faced paced development is observed in the north and north-east of the city. Multiple land-owning agencies are carrying out development works in the city, for instance, the city core is comprised of Clifton / Defence Housing Authority is under the federal-military control. Similarly, the northeast of the city i.e. Malir is under the provincial control, whereas the city government regulated cooperative housing societies[31].

Some of the facts and figures with reference to land-use change are elaborated below;

- In 1990, bare land covered an extensive 2663 km^2, and while it increased to 2811 km^2 in 2000, a noticeable decline ensued, reaching 2156 km^2 in 2020. This represents a change rate of -13.44% between 2010 and 2020, indicating a shift towards more developed and built-up areas.
- Contrastingly, the built-up area, a key indicator of urbanization, exhibited substantial growth over the years. From 221.1 km^2 in 1990, it surged to 573.9 km^2 in 2020, marking an impressive change rate of 35.25% between 2010 and 2020. This expansion underscores Karachi's rapid urban development, accommodating the burgeoning population and economic activities.

[31] World Bank. (2018). Transforming Karachi into a Livable and Competitive Megacity: A City Diagnostic and Transformation Strategy. Directions in Development. Washington, DC: World Bank. doi:10.1596/978-1-4648-1211-8.

- Cultivated land, however, witnessed a contrasting trend, shrinking from 112.2 km^2 in 1990 to 81.5 km^2 in 2020, with a change rate of -45.08% between 2010 and 2020. This decline may reflect urban encroachment into agricultural areas or shifts in land use practices.
- The category of grassland and shrubland experienced a notable increase from 563 km^2 in 2010 to 867.7 km^2 in 2020, representing a significant change rate of 54.12% during the same period. This suggests efforts or natural trends favouring green cover and ecological diversity within the city.
- Mangroves, vital for coastal ecosystems, displayed a positive trajectory, expanding from 14.2 km^2 in 2010 to 17 km^2 in 2020, with a change rate of 19.71% between 2010 and 2020. This emphasizes conservation initiatives and the city's commitment to preserving coastal biodiversity.
- Similarly, water bodies in Karachi exhibited a modest increase from 54 km^2 in 2010 to 56.8 km^2 in 2020, with a change rate of 5.18% between 2010 and 2020[32].

Thus, the unplanned and haphazard development patterns are significantly impacting Karachi's land use and putting considerable pressures on municipal infrastructures, and ultimately affecting city's adaptability to bear climate shocks.

E.2.4 Karachi's Hydrological Dynamics: A Crucial Nexus of Coastline, Water Resources, Water and Sewerage Infrastructure and Urban Resilience

- Karachi's coastline, spanning approximately 135 km from Ras Muari to Clifton beaches, showcases a diverse landscape featuring low rocky cliffs and expansive sandy beaches.
- The city heavily depends on crucial surface water resources, including Lake Haleji covering 17.04 km^2, Lake Keenjhar with an extensive 98.42 km^2, and the substantial Hub Dam spanning 272.19 km^2. These water bodies, in conjunction with the river basins of Hab, Malir, and Lyari, assume a pivotal role in both the city's water supply and the intricate management of stormwater.
- The intricate network of rivers and tributaries, particularly within the Malir River Basin (2254 km^2) and Lyari River Basin (578 km^2), underscores Karachi's reliance on a complex hydrological system. Noteworthy is the expansive catchment area of the Hab River, situated in the northern part of Karachi within Balochistan, covering a substantial 8832 km^2. This catchment area significantly contributes to effective stormwater management and facilitates drainage into the Arabian Sea.
- The total surface water within the city boundary is measured at 94.7 km^2, emphasizing the centrality of water bodies in Karachi's geographical and hydrological dynamics.
- According to the per capita standards of WHO, the water supply should be 55 gallons/cap/day, and based on the population of 2017 census, the water demand in Karachi is estimated at 1200 MGD. These estimates indicate a shortfall of about 550 MGD in 2017. Karachi Strategic Development Plan projects a demand of 1400 MGD for the year 2020. As the population increases, the demand is likely to increase and cause more water shortages. About 42% of the water demand in the city

[32] Muhammad Fahad Baqa, F. C. (2021). Monitoring and Modeling the Patterns and Trends of Urban Growth Using Urban Sprawl Matrix and CA-Markov Model: A Case Study of Karachi, Pakistan. MDPI, Land, 10(7), 700; https://doi.org/10.3390/land10070700.

is met through informal water supply tankers[33]. About 30-35% of water supplied to the city is lost due to obscure and rusty infrastructure and chronic leakages[34].

- According to the estimates of Karachi Water and Sewerage Board (KWSB), about 472 MGD (70% water supply to the city) sewage is generated from domestic and industrial wastewater generation sources in the city. The sewerage network provides coverage to 60% of the city, and suffers from the lack of sufficient capacity for wastewater treatment and the malfunctioning infrastructure[35.] About 54 MGD sewage is treated at the sewage treatment plants[36].
- Industries are responsible for 60% of the pollution load and the domestic sector is responsible for 40% of the pollution load that is discharged. River Lyari and Malir pass through the city and are the main carriers of wastewater transport from the city to the adjacent sea[37].
- In terms of treatment capacity, KWSB owns 3 sewage treatment plants and 8 water filtration plants. There are a total of 65 industrial wastewater treatment plants against a total of 1,576 wastewater-generating industrial units in the industrial zones of Korangi, Malir, Karachi South, Karachi West, and Karachi Central. Whereas, there are 1,514 industrial units with no treatment system[38].

E.2.5 Karachi's Environmental Conservation: A Commitment to Biodiversity and Sustainability

- The World Banks's blue carbon stock assessment indicated the presence of large-scale mangroves along the coast line of Sindh as a potential source for emissions reductions and flood protection. In the recent years, the Government of Sindh has taken various initiatives for mangroves protection and restoration, however the mangroves in the vicinity of Karachi are still at risk due to unplanned and haphazard development activities[39].
- Notable entities within this region include 35 Wildlife Sanctuaries, 14 Game Reserves, 4 unclassified areas, and a National Park forming a comprehensive total of 54 protected areas. The dedicated conservation efforts in Sindh contribute significantly to the overall area under formal conservation, amounting to 1,307,575 hectares, representing an admirable 9.27% of the province's total land area[40].

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[33] World Bank. (2018). Transforming Karachi into a Livable and Competitive Megacity: A City Diagnostic and Transformation Strategy. Directions in Development—Infrastructure;. © Washington, DC: World Bank

[34] Alamgir, A., Khan, M. A., Iftikhar, T., & Shaukat, S. S. (2021). Public health assessment and water quality index of tanker water available in Karachi City. International Journal of Biology and Biotechnology, 18(2), 281-297.

[35] World Bank. (2018). Transforming Karachi into a Livable and Competitive Megacity: A City Diagnostic and Transformation Strategy. Directions in Development—Infrastructure;. © Washington, DC: World Bank

[36] WWF. (2019). Situational Analyses of Water Resources in Karachi, ILO. European Union.

[37] Ibid

[38] WWF. (2019). Situational Analysis of Water Resources in Karachi, ILO. European Union.

[39] World Bank. (2021). Pakistan: Blue Carbon Rapid Assessment - Policy Recommendations for the Revision of Nationally Determined Contribution. Washington, D.C.: The World Bank.

[40] Mehmet SOMUNCU, A. A. (2009). Review of Protected Areas System in Pakistan: Present Status and Problems Concerning Future Development: Pakistan'daki Korunan Alanlar Sisteminin Değerlendirilmesi: Mevcut Durum ve Gelecekteki Gelişm. *Ankara Üniversitesi Çevrebilimleri Dergisi*, DOI:10.1501/Csaum_0000000010.

- A highlight within this conservation paradigm is the National Kirthar Park, an expansive area covering 73,000 hectares. Notably, the Hub Dam, encompassing 27,219 hectares in Karachi/Balochistan, is a protected area of paramount importance[41].
- Designated for its critical role as a habitat for Grey and Black Partridges, Sandgrouses, Houbara Bustard, and various water birds, the Hub Dam and National Kirthar Park further exemplifies Karachi's commitment to preserving biodiversity and ensuring the sustainability of its natural ecosystems.

E.2.6 Solid Waste Management in Karachi: Navigating Complex Challenges

Karachi, a bustling urban hub, grapples with the complex challenge of solid waste management, with efforts in place to mitigate its impact on the environment and public health.

- Approximately 75 to 80 % of the city's residential solid waste is efficiently collected and transported to designated dumpsites, signifying a substantial but not complete coverage[42].
- Indigenous waste at Karachi's landfill sites reveals that 54% is organic, emphasizing the organic nature of a significant portion. The remaining waste encompasses various recyclable materials, including paper (11.5%), plastic (10%), glass (7%), metal (4.5%), and other inorganic waste (10%)[43].
- Notably, hazardous waste constitutes approximately 2% of the total solid waste, highlighting the importance of responsible disposal practices[44].
- Despite these efforts, the city faces challenges in recycling, with only 8.3%, equivalent to 1000 tons per day, of the garbage being re-utilized. This recycling primarily occurs through informal means, involving scavengers. The absence of a formalized recycling system indicates a potential area for improvement in sustainable waste management practices.
- The city grapples with the absence of waste disposal in sanitary landfill sites, revealing a critical gap in sustainable waste management practices.
- A significant proportion of solid waste, estimated at 30%, is openly burned when left uncollected. This practice not only contributes to air pollution but also poses risks to public health[45].
- Karachi's hazardous waste generation, specifically medical waste from hospitals, clinics, and laboratories, is estimated at 200 to 250 tons daily. The scale of hazardous waste generation is contextualized by the country's average rate, standing at approximately 0.667 kilograms per hospital bed per day.
- The incineration of hospital waste, accounting for 20% of the total hospital waste generated (200-250 tons/day), raises environmental and health concerns[46].

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[41] Ibid

[42] World Bank. (2023). Updated Environmental and Social Management Framework. Solid Waste Emergency and Efficiency Project. Karachi

[43] Ahmed, S., Ali, M., & Basti, A. (2022). An overview of solid waste management systems in the city of Karachi: past and present. Rubbish, Resources and Residues: waste and well-being in Ethiopia and Pakistan.

[44] Ibid

[45] Iqbal, A., Abdullah, Y., Nizami, A. S., Sultan, I. A., & Sharif, F. (2022). Assessment of solid waste management system in Pakistan and sustainable model from environmental and economic perspective. Sustainability, 14(19): 12680.

[46] Asian Development Bank (ADB). 2020. Feasibility Study – Integrated Medical Hazardous Waste Management, Karachi. Solid Waste Management Sector in Pakistan, A Reform Road Map for Policy Makers.

As Karachi strives to address these challenges, a comprehensive and integrated approach to waste management is imperative.

E.2.7 Powering Karachi: A Snapshot of Energy Dynamics

Karachi, a bustling metropolis, stands as a testament to the evolving energy landscape in Pakistan, with a focus on residential electricity use, renewable sources, and overall energy consumption.

- Residential electricity consumption in Karachi reflects a per capita usage of 3032 kWh per year. This substantial demand is met by a robust electrical infrastructure that delivers a staggering 8041 million kWh to over 2.6 million domestic consumers[47]. This underscores the critical role electricity plays in sustaining the daily lives of Karachi's residents.
- In terms of total energy capacity, Karachi boasts an impressive generation capacity of 2,267 megawatts, supplemented by an additional 1,162 MW sourced externally[48]. This substantial capacity underscores the city's commitment to meeting the growing energy demands of its dynamic population and thriving industries.
- A commendable 20.32% of the total energy consumed in the city is derived from renewable sources. This commitment to green energy sources aligns with global efforts to reduce carbon footprints and build a more sustainable future.
- Considering the broader spectrum of energy consumption, the total electrical energy uses per capita reaches 5045 kWh per year. This figure encompasses a vast energy landscape, with a total consumption of 16,070 million kWh catering to over 3.18 million consumers[49]. This robust energy infrastructure plays a pivotal role in fuelling the city's economic activities, technological advancements, and the overall well-being of its residents.

E.2.8 Karachi's Transportation Landscape

Karachi, a bustling metropolis, is navigating the complexities of urban mobility, striving to create a sustainable and efficient transportation system. A key component of this effort is the development of high-capacity public transport systems, including operational and planned Bus Rapid Transit (BRT) lines.

- The Green Line, covering 22 km and accommodating 100,000 passengers daily, along with the Orange Line, spanning 3.88 km and serving 50,000 passengers daily, represent critical strides in enhancing public transport accessibility[50].
- Looking ahead, the city has ambitious plans until 2030, envisioning the implementation of the Red Line (29 km), Blue Line (10.1 km), Yellow Line (26 km), and the Karachi Circular Railways (43.13 km), expected to cater to a substantial 550,000 passengers per day[51]. These planned expansions underscore Karachi's commitment to creating an extensive and interconnected public transportation network.

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[47] Sindh Bureau of Statistics. (2022). https://sbos.sindh.gov.pk/files/SBOS/Development%20Statistics/SINDH%20STATISTICS%202022-04092023.pdf
[48] Ibid
[49] Ibid
[50] Mass Transit Projects in Karachi. (2018). Transport and Mass Transit Department Government of Sindh.
[51] Ibid

- A critical aspect of Karachi's transportation fabric is the percentage of commuters opting for travel modes other than personal vehicles. According to the Urban Resource Center research conducted in 2014, public transport represents 4.5% of the more than 3.6 million vehicles in the city. Strikingly, this mode of transport carries 42% of the total commuter load[52]. This underscores the significant role public transport plays in alleviating the burden of daily commutation.

These insights collectively portray Karachi as a dynamic urban center grappling with the challenges and opportunities inherent in managing the mobility needs of its vast and diverse population. As the city continues to evolve, these transportation metrics serve as valuable benchmarks, guiding ongoing initiatives and shaping future policies aimed at enhancing accessibility, sustainability, and the overall quality of urban life.

E.2.9 Karachi's Water and Sanitation Dynamics

The sewerage network stands as a vital component, providing coverage to 60% of the city[53], a testament to ongoing efforts in extending sanitation services to a significant portion of the population.

- The urban landscape grapples with a critical concern as 67.1% of the city's wastewater remains untreated, underscoring the need for comprehensive strategies to enhance wastewater treatment infrastructure[54]. This highlights a pressing challenge in ensuring the effective management of wastewater to safeguard public health and the environment.
- On the water supply front, Karachi has made commendable strides with 85% of the city's population having access to a potable water supply service or improved water sources. This achievement aligns with global standards for water access.
- Delving into the specifics of water consumption, the city registers a total domestic water consumption of 54 gallons per capita, equivalent to 245.5 litres per capita per day, as assumed by the Karachi Water and Sewerage Corporation (KWSC) [55]. This metric serves as a crucial benchmark for evaluating water usage patterns and shaping future water resource management strategies.
- Challenges persist in the form of water loss, with approximately 30-35% of supplied water lost due to issues such as obscure and rusty infrastructure, coupled with chronic leakages[56]. Addressing these inefficiencies is paramount for ensuring the optimal utilization of water resources and bolstering the city's resilience in the face of growing water demand.

As Karachi navigates the complex terrain of urban water and sanitation management, these insights serve as foundational pillars for informed decision-making, fostering strategic initiatives aimed at enhancing service coverage, treatment capacities, and overall water resource efficiency. The city's journey toward

[52] Raza, M. (2020). Karachi Transport Conundrum. https://tribune.com.pk/story/2387129/karachis-transport-conundrum-1
[53] World Bank. (2018). Transforming Karachi into a Livable and Competitive Megacity: A City Diagnostic and Transformation Strategy. Directions in Development. Washington, DC: World Bank. doi:10.1596/978-1-4648-1211-8.
[54] Karachi Strategic Development Plan 2020, https://www.shehri.org/2020.pdf
[55] Khan, H. F., Arif, M. A; Intikhab, S. and Arshad, S. A. 2023. Quantifying Household Water Use and Its Determinants in Low-Income, Water-Scarce Households in Karachi. 15, 3400. https://doi.org/10.3390/w15193400
[56] Alamgir, A., Khan, M., Iftikhar, T. and Syed, S. (2021). Public Health Assessment and Water Quality Index of Tanker Water Available in Karachi City. International Journal of Biology and Biotechnology. 18: 281-297.

a sustainable water and sanitation ecosystem remains a dynamic narrative, shaped by ongoing initiatives and a commitment to resilient urban development.

E.2.10 Karachi's Economic Performance

Karachi is also known as a power house of manufacturing sector (labour-intensive industries) of the country, generating 12–15% of country's GDP. The World Bank Study[57] evidently highlighted the fact that the city (and its neighbouring areas) is not generating the anticipated economic gains/productivity beside having a considerable potential. The night time analysis indicated that the haphazard agglomeration of economic activities are moving away from core city to the periphery. Such economic changes in the central areas of the city could have long lasted social and economic impacts on the city economy. Contrary to this, the city reported a significant reduction in poverty in the last decade, making Karachi the least poor district of the province (3rd least poor of the country). Despite this reduction, Karachi still have a high poverty areas/pocket and a variety of income brackets concerning to the large population size and area.

The more frequent and intense impacts of the climate change in the near future would bring economic misery at a larger scale. The World Bank estimated around US$10 billion as capital investments to manage key infrastructure gaps, to enhance the economic potential and to achieve more livable, inclusive, climate resilient and productive city.[58]

The multifaceted economic activities in Karachi are mainly associated with the fishing, forestry and related businesses. The fisheries activities are concentrated at Karachi Fish Harbor (west side of the Karachi port) and some areas along the Ibrahim Haidari Harbor. Recreational infrastructure also plays a role in the city's economy. However, it is not harvested in a way to gain maximum benefits.

City level governance is completely missing in the country, leading multiple challenges and pressures for sustainable development in the cities. The cities rely on respective provincial governments e.g. Karachi city is highly dependent on the Sindh government, whereas, the revenue generation capability of city is too weak to finance its services. Thus, having difficulties in managing the city-level revenue and expenditure flows.[59]

Climate resilient infrastructure is inadequate, leaving substantial impacts on the socio-economic sector of the city. As per the World Bank estimation, almost 50% of the residents of Karachi are forced to live in informal settlements due to acute gap in affordable housing. To resolve these critical challenges, the city management needs evidence-based planning and investments on immediate basis.

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[57] World Bank. (2018). Transforming Karachi into a Livable and Competitive Megacity: A City Diagnostic and Transformation Strategy. Directions in Development. Washington, DC: World Bank. doi:10.1596/978-1-4648-1211-8.

[58] Ibid

[59] Haseeb, S., Iftikhar, M. N. and Hasan, S. 2020. Reimagining Pakistan's Cities: Making Cities More Competitive. ISSRA Papers Volume-XI, Issue-I. https://www.researchgate.net/publication/338886264_REIMAGINING_PAKISTAN'S_CITIES_MAKING_CITIES_MORE_COMPETITIVE/link/5e315dac92851c7f7f08fe20/download?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InB1YmxpY2F0aW9uIiwicGFnZSI6InB1YmxpY2F0aW9uIn19

In summation, Karachi stands as a formidable economic engine, characterized by robust GDP contributions, a balanced income distribution, and a competitive cost of living. The city's economic dynamism not only bolsters its residents' livelihoods but also plays a pivotal role in shaping Pakistan's overall economic trajectory.

E.2.11 The State of Health and Education

Adverse health outcomes of higher transmissibility of infectious diseases due to climate change leading to threats for public health of Karachi city. Events of severe precipitation and heat waves have caused outbreaks of malaria, dengue fever, and severe gastroenteritis[60].

A considerable proportion of Karachi's population resides in either katchi abadis or slums, characterized by insufficient infrastructure and restricted access to fundamental services. People residing in these areas is notably susceptible to diseases linked to environmental pollution, encompassing air, land, and water pollution resulting from inadequate solid and hazardous waste management. From the estimates, it is observed that annual health cost of around Rs. 30-40 billion is attributed to air pollution as residents commonly experience various respiratory diseases due to elevated concentrations of pollutants in the air.[61, 62] In June 2015, Karachi experienced a severe heatwave that caused over 1,200 deaths and over 65,000 cases of heat illness.[63]

As per the World Bank's estimations, annual cost of environmental health impacts in Sindh province is 10 % of provincial GDP (PKR 371 billion). Whereas, 70% of this cost (PKR 260 billion) occurs in Karachi. Concerning to the air pollution, the estimated health costs in Karachi are estimated is around 30-40 billion every year.[64]

According to the 2016 District Wise Rankings[65], Karachi holds the 43rd national position (the best in Sindh) based on indicators like education, retention, enrolment, gender parity, and learning. Moreover, the city is ranked 57th (2nd in Sindh) concerning school infrastructure facilities.[66]

[60] Babar, M. S., Tazyeen, S., Khan, H., Tsagkaris, C., Essar, M. Y., and Ahmad, S. 2021. Impact of climate change on health in Karachi, Pakistan. The Journal of Climate Change and Health. 2: 100013. https://doi.org/10.1016/j.joclim.2021.100013.
[61] Ibid
[62] IUCN-Pakistan. (2017). Sindh Strategy for Sustainable Development.
[63] Commissioner Office, Karachi; CDKN Karachi Heat Wave 2015: A Visual Guide.
[64] World Bank. (2015). Sustainability and Poverty Alleviation: Confronting Environmental Threats in Sindh, Pakistan. Directions in Development. Washington, DC.
[65] Alif Ailaan is a nonprofit organization working in the field of education in Pakistan since 2013
[66] Alif Ailaan and SDPI. (2016). Alif Ailaan Pakistan District Education Rankings 2016.

F. Emissions Baseline & Trajectories Status

F.1 Emissions Baseline

This section of the Strategic CAP Appraisal Report outlines the current status of emissions baseline relative to the CAP Framework requirements. **No emission inventory has been developed for Karachi city so far.**

Concentration of Particulate Matter: In contrast to the dense network of ground-based particulate matter monitoring equipment in various metropolitan cities of the world, Karachi does not have a sufficient amount of equipment for air quality profiling and source-based apportionment. The daily average $PM_{2.5}$ variations (July, 2019 – October 2023) plotted below shows elevated levels of $PM_{2.5}$ concentrations in the winter season in all years. These variations in $PM_{2.5}$ concentrations is influenced by both anthropogenic and natural factors as well as the local meteorological conditions.

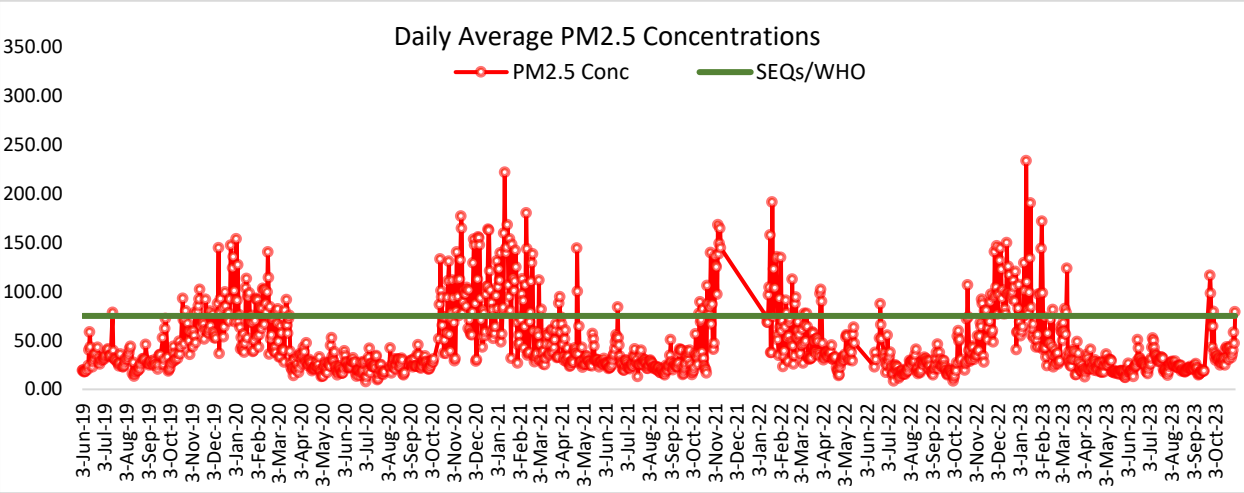


Figure 8: Daily Average PM2.5 Concentrations (June 2019 – October 2023)

The monthly average concentrations of PM2.5 have been obtained from the US–EPA Certified Continuous Air Quality Monitoring System which exhibits higher concentrations in the Winter season due to the temperature inversion phenomena.

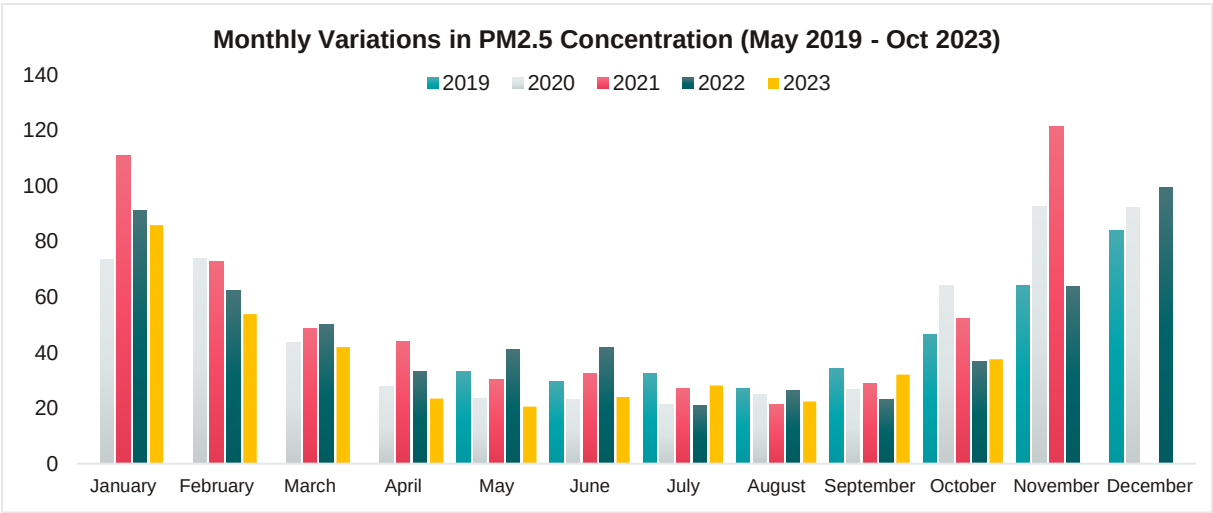


Figure 9: Monthly Average PM2.5 Concentration ug/m3 (2019-2023)

Concentration of Aerosols: The aerosols concentrations[67] present over Karachi city are predominantly from natural sources, i.e., sea salt and dust, whereas 34% are from anthropogenic activities[68]. An increasing trend can be observed in annual average concentrations of aerosols over the years in Karachi (Figure 9). Whereas, the annual average concentration obtained from Snetinel-5P satellite indicates that the central region of Karachi with high urban density is the hotspot of aerosols concentration.

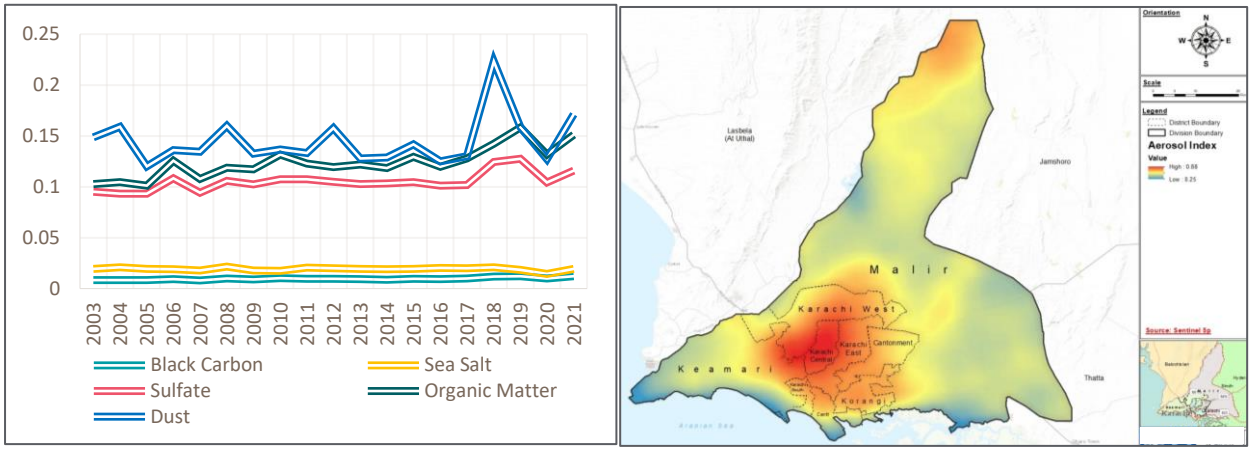


Figure 10: Annual Average Concentrations of Aerosols in Karachi (2003-2021) and in Year 2022

Concentration of Gaseous Pollutants[69]: Using Sentinel 5P, a satellite-based data source, the spatial distribution of Carbon Monoxide, Nitrogen Dioxide, Sulphur Dioxide, and Ozone in Karachi City is assessed.

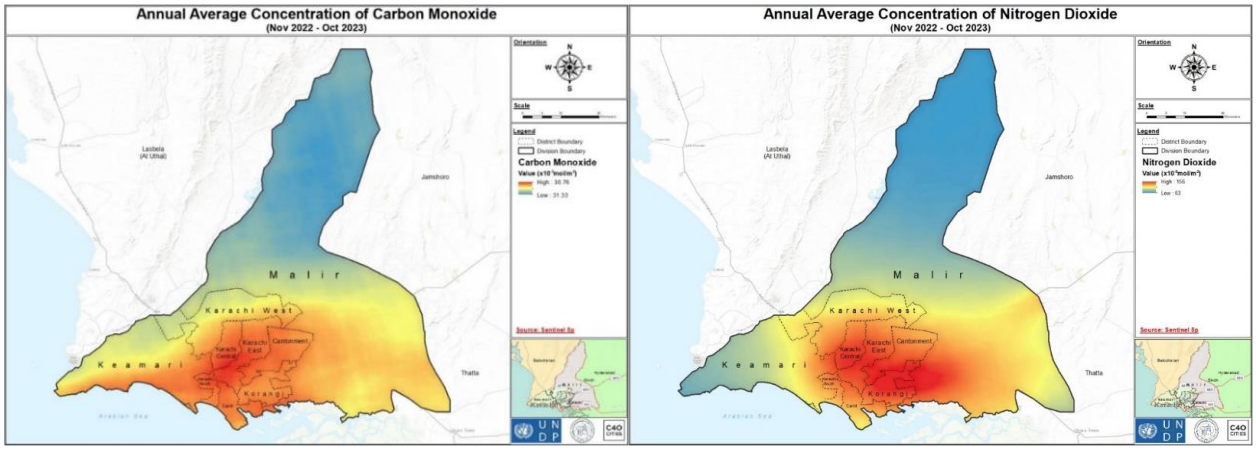


Figure 11: Annual Average Concentrations of Carbon Monoxide and Nitrogen Dioxide

[67] Darya Labs. (2021). Cleaning Karachi's Air. A Study for Air Quality Trends and Major Air Pollutants in Karachi. Climate Action Center. (Available at: https://cackarachi.com/air-quality/#dearflip-df_739/13/)

[68] Khan, M., Tariq, S., & Haq, Z. U. (2023). Variations in the aerosol index and its relationship with meteorological parameters over Pakistan using remote sensing. Environmental Science and Pollution Research, 30(16), 47913-47934.

[69]

- Carbon Monoxide is mainly emitted during incomplete combustion in automobile exhaust engines and the burning of solid waste & biomass.
- Nitrogen Oxides mainly originate during the combustion of diesel and petrol in light-duty and heavy-duty vehicles. Using CNG as a fuel source in domestic cooking also adds NOx into the air.
- Burning of Sulphur-containing fuel such as diesel and coal in oil refineries, power plants, heavy-duty vehicles, industrial manufacturing, and heat generation in low-income areas causes SO_2 emissions in the air. The concentration of Sulphur Dioxide is recorded as the highest among all other pollutants in Karachi city, making it the key pollutant.
- Ozone forms as a product of chemical reactions between nitrogen oxides and volatile organic compounds in sunlight, thus it is a secondary pollutant. The emissions from the transport sector, oil refineries, manufacturing activities, open refuse burning, and residential combustion are responsible for the formation of Ozone.

The spatial presentation of the annual average CO concentration shows that Karachi East and Karachi Central are the most polluted areas, followed by Karachi South, Cantonment, and Korangi Districts. A similar spatial pattern can be observed for the annual average concentrations of Nitrogen Dioxide. The annual average concentration of Ozone is highest near the western boundary of Karachi City. The concentration of Sulphur Dioxide is recorded as the highest among all other pollutants making it the key pollutant in Karachi City.

The location of various pollution sources influences the spatial distribution of pollutants within the city boundary. The population density is highest in Karachi Central, Karachi East, and Karachi South areas. The high population density is associated with increased vehicular activity, waste generation, and open burning of waste. Moreover, there are 12 industrial zones in Karachi comprising small-medium-and-large scale enterprises, located within the residential areas.

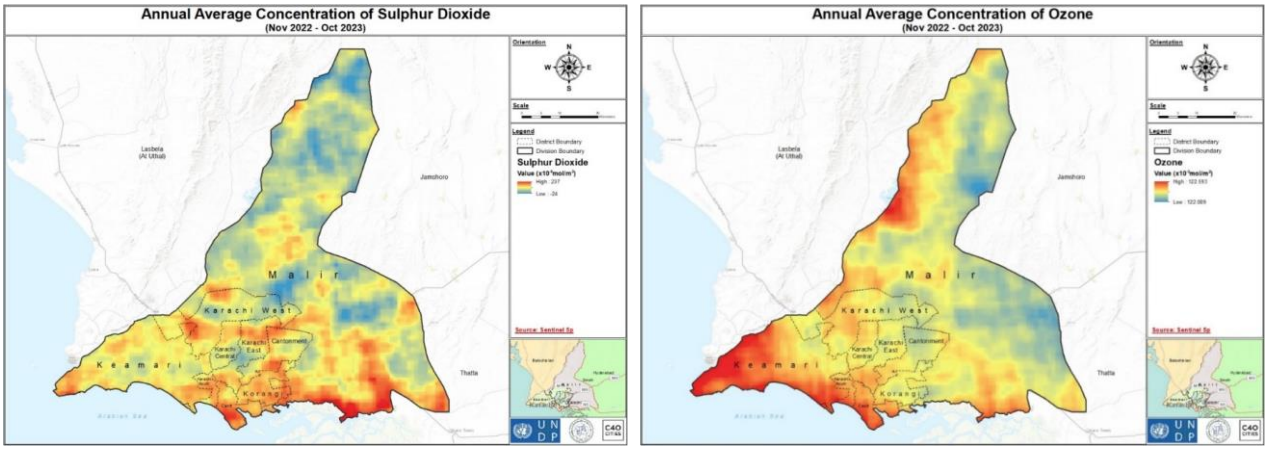


Figure 12: Annual Average Concentrations of Sulphur Dioxide and Ozone

F.2 Emissions Reduction Trajectories

The Karachi's climate action plan needs to be informed by information on the likely change in the city's greenhouse gas emissions if no further climate action is taken – i.e. the business as usual (BAU) scenario given anticipated population, economic and sectoral energy intensity changes - as well as a target trajectory or carbon budget to achieve the targets stated under Pillar 1 of the CAP Framework (i.e. zero emissions by 2050 and an interim target).

The BAU emissions trajectory is important to help frame action and support target setting. The city's climate action plan will need to include an evidence-based target emissions trajectory or carbon budget that is in line with the 2050 and interim targets (see Pillar 1), and actions identified (see Pillar 3 – mitigation and adaptation actions). The target trajectory should incorporate estimated impacts of existing and planned policies and acknowledge the limits to the city's own ability to reduce emissions within its boundary by including the reduction that will be achieved through national government policy for example.

G. Climate Hazards, Risks & Impacts Baseline Status

A climate risk assessment seeks to understand current and future climate hazards and the potential impacts of these hazards on Karachi and its inhabitants. The assessment is critical for informing the prioritization of actions and investment into climate adaptation and resilience. This section presents an overview of the current status of climate hazards, risks and impact analysis / modelling that has been undertaken in the city.

G.1 Climate Hazard Assessment

In the last two decades, climate change has triggered extreme meteorological events creating uncertainties observed in the weather phenomena. The extreme climate change observed over South Asia is a result of the induced variability of ENSO and IOD[70]. Due to changes in hydrological and other energy cycles South Asian Countries especially coastal cities like Karachi are at extreme risk.

Karachi stands on the edge, where the urban landscape strikes with the climate hazards, posing unique challenges, oscillating between Urban Heat Island effect, where the concrete jungle intensifies the city's temperature extremes, and journey through the chronicles of sudden downpours, revealing the vulnerability of Karachi to flash floods.

A report by the Asian Development Bank on the Climate Profile of Pakistan provides district-wise ranking on the basis of vulnerability to different climate-related risks and hazards (Table 8). According to this ranking, Karachi district is most vulnerable to climate disasters, as compared to other districts of Pakistan[71], particularly, with respect to earthquake, tsunami, drought and cyclone risks.

Table 8: District-Level Climate Risk and Hazard Assessment Classification72

Rank	District	Flood Risk	Landslide Risk	Earthquake Risk	Tsunami Risk	Drought Risk	Cyclone Risk	Avalanche	Total
1	**Karachi**	4	1	5	5	5	5	**1**	**30**
Scoring Key									
Very High		High		Medium		Low		Very Low	
5		4		3		2		1	

Provincial Disaster Management Authority (PDMA), Sindh with the technical assistance of SUPARCO has developed Sindh Hazard and Risk Atlas, 2022 in which Multi Hazard Vulnerability and Risk Assessment (MHVRA) was done for the district level. The hazard assessment of Karachi districts along with their frequency, severity, and past events are provided in a below mentioned table.

[70] Stacey, J., Salmon, K., Janes, T., Colman, A., Colledge, F., Bett, P. E., ... & Pai, D. S. (2023). Diverse skill of seasonal dynamical models in forecasting South Asian monsoon precipitation and the influence of ENSO and IOD. Climate Dynamics, 1-18.
[71] Chaudhry, Q-Z. (2017). Climate Change Profile of Pakistan. Asian Development Bank, Manila, Philippines.
[72] Ibid

Table 9: Multi-Hazard District Profiles of Karachi Districts[73]

Districts	Hazard	Frequency	Severity	Years
1. Karachi Central	Urban Floods	Monsoon	Medium	1966, 1977
	Heat Wave	Frequently	High	Almost every year
	Earthquake	Rare	Low	2013
2. Karachi East	Urban Floods	Monsoon	Medium	2017
	Heat Wave	Frequently	High	Almost every year
	Earthquake	Rare	Low	2013
3. Karachi South	Urban Floods	Monsoon	Medium	1966, 1977, 2017
	Heat Wave	Frequently	High	2015
	Earthquake	Rare	Low	2013
4. Karachi West	Urban Floods	Monsoon	Medium	1966, 1977
	Heat Wave		High	Almost every year
	Earthquake	Rare	Low	2013
5. Korangi	Urban Floods	Monsoon	Medium	1966, 1977, 2017
	Heat Wave	Frequently	High	2015-2017
	Earthquake	Rare	Low	2013
6. Malir	Floods	Monsoon	Medium	2013, 2014
	Heat Wave	Frequently	High	Almost every year
	Earthquake	Rare	Low	2013

The moderate to high-risk hazard profiles of districts of Karachi are mapped below;

Table 10: High to Medium Risk Hazard Districts Profile of Karachi[74]

Districts	Met Drought	Agriculture Drought	Tsunami	Heatwave	Storm Surge
Karachi Central					
Karachi East					
Karachi South					
Karachi West					
Korangi					
Malir					

G.2 Impact assessment

G.2.1 Heatwave

Heatwaves have cascaded multiple impacts limiting not only on humans but on agriculture, ecosystems, economy, water, and energy supplies. In June 2015, Karachi City experienced a severe heatwave that caused over 1,200 deaths and over 50,000 cases of heat illness considered as 5th deadliest recorded in worldwide history across the South Asian Countries[75,76,77]. Weather conditions leading up to the June 2015 heatwave included a persistent air depression over the Arabian Sea that "cut-off the incoming sea breeze to the metropolitan city with clear skies further exacerbating the situation by making the air warmer and stagnant over the region for many days".

[73] PDMA Sindh. (2022). Hazard and Risk Atlas, Sindh.
[74] PDMA Sindh. (2023). MHVRA Informed Disaster Management Plan 2023-2032, Sindh.
[75] Chaudhry, Q-Z. (2017). Climate Change Profile of Pakistan. Asian Development Bank, Manila, Philippines.
[76] Escape, U., (2016). Disasters in Asia and the Pacific: 2015 year in review. [online] United Nations report. Economic and social commission for Asia and the Pacific. Available https://www.unescap.org/ resources/disasters-asia-and-pacific2015-year-review
[77] Heatwave Management Plan: A guide to Planning and Response, 2017, Karachi Metropolitan Corporation

Temperatures in Karachi were not as high during the June 2015 heatwave as they were in other areas of Pakistan and temperatures in Karachi did not break records for that city. Historic maximums in May and June have seen temperatures in Karachi rise as high as 47.8°C in 1938 and 47°C in 1979. In comparison, the highest recorded maximum temperature during the 2015 heatwave occurred on June 20, reaching 44.8°C. What was remarkable during the 2015 event was that there was no relief in terms of minimum temperatures during the night time for the period over which the maximum temperatures were also high during the day; this pattern of hot weather continued for several days resulting in heatwave.

The urban sprawl in Karachi caused changes in the ground heat flux, long wave emissivity, and aerodynamic resistance. The surface heat flux played a significant role in the development of the heatwave event of May 2018 in Karachi, due to the less vegetation and thick urban canopy[78].

G.2.2 Urban Flooding

Global precipitation extremes have become more frequent and intense due to human-caused global warming, according to the Intergovernmental Panel on Climate Change's Sixth Assessment Report (IPCC-AR6)[79]. Karachi City's rapid urbanization and population increase are making it more susceptible to the effects of flash floods. During the Monsoon season (July to September), the risk of urban flooding is usually high in the city which causes extreme disruption in routine activities and damage of infrastructure.

Karachi has 58 storm water drains which are connected with 2 non-perennial rivers i.e. Malir River and Liari River crossing the densely populated areas in Karachi before falling out in the Arabian Sea. Malir River basin has a large network of streams but due to rapid urban sprawl and encroachment, resulted in the stream abatements[80]. Unfortunately, there is widespread encroachment on practically all natural drains and nulahs. Karachi has experienced intense downpour events, which caused colossal damage to lives, halted transportation and communication for several hours. A severe urban flooding event that occurred in 1977 in the flood plains of the Malir and Lyari rivers claimed 267 lives, leftover 30,000 homeless, and temporarily displaced 100,000 more[81]. A record-breaking unprecedented precipitation event of 223 mm of rainfall received in Karachi on August 27th, 2020, in one day, caused catastrophic inundations in the major areas[82,83]. Due to heavy precipitation spells, Karachi is experiencing urban flooding in Surjani Town, Gadap Town, North Nazimabad, North Karachi, Jinnah Old Terminal, Tariq Road, Gulshan-e-Maymar, Defence View, Gulshan-e-Iqbal, FC Area, Saddar, Shahrah-e-Faisal, Guru Mandir, Nazimabad and Gulistan-e-Jauhar.

[78] Arshad A, Ashraf M, Sundari RS, Qamar H, Wajid M, Hasan M (2020) Vulnerability assessment of urban expansion and modelling green spaces to build heat waves risk resiliency in Karachi. Int J Disaster Risk Reduct. 46:101468

[79] IPCC, 2022: Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press. USA, 3056 pp., doi:10.1017/9781009325844.

[80] Rasool, U., Yin, X., Xu, Z., Padulano, R., Rasool, M. A., Siddique, M. A., ... & Senapathi, V. (2023). Rainfall-driven machine learning models for accurate flood inundation mapping in Karachi, Pakistan. Urban Climate, 101573.

[81] Karachi Development Authority KDA (1981) "Urban Water Systems of Karachi": 22-32.

[82] https://iips.com.pk/urban-flooding-the-case-of-karachi/

[83] https://www.iied.org/urban-flooding-case-karachi

H. Climate Actions Baseline

The climate action plan will use the available evidence-base to identify climate mitigation and adaptation actions that are implementable within available city capacity and powers. To maximise efficiencies and minimise risk, climate change mitigation and adaptation should be considered in an integrated way. Transformational actions – those actions which transform whole systems to be decarbonised and resilient to climate change – should be prioritised for immediate implementation upon approval of the climate action plan.

This section provides an overview of the main climate actions that the Karachi has identified and is implementing (or has planned to implement) based on information presented in Table 19. These potentially provide a base from which important initiatives can be upscaled, thereby rapidly expanding the beneficial outcomes[84].

In the pursuit of a resilient and sustainable future, Karachi's Climate Base Actions form the bedrock upon which the city is building its climate mitigation and adaptation strategies. These actions, outlined in Table 19, represent a comprehensive and integrated approach, aligning with the city's vision for transformational change to combat climate change effectively.

H.1 National Climate Actions: A Comprehensive Overview

The climate action initiatives in Pakistan span across various sectors, reflecting a concerted effort at the national, provincial, and city levels. The national-level strategies involve both mitigation and adaptation measures, illustrating a holistic approach to combat climate change. The "Power Acquisition Programme" focuses on renewable energy, aligning with Pakistan's NDC plan under the Paris Agreement. Additionally, the "Biodiversity Action Plan" outlines a comprehensive strategy to protect the nation's biodiversity, with funding from the World Bank/GEF. The "Clean Green Pakistan Movement" is a nationwide campaign addressing plantation, waste management, sanitation, hygiene, and safe drinking water, showcasing a commitment to behavioural change.

H.2 Provincial Climate Initiatives: Scaling Impact

Provinces such as Sindh, Punjab, and Khyber Pakhtunkhwa have undertaken significant climate-focused projects. The commitment of Sindh, Punjab, and Khyber Pakhtunkhwa to the CDP-ICLEI[85] Track and Race to Zero indicates a collective drive toward sustainable practice.

H.3 City-Level Climate Actions: Localized Impact

H.3.1 Bus Rapid Transit (BRT) Projects:

Karachi's commitment to revolutionizing its transportation system is evident in the ongoing Bus Rapid Transit (BRT) Red Line Project. This mitigation-focused initiative, currently under construction and funded

[84] Progress Report Regarding Implementation of National Climate Change Policy (NCCP) And Its Implementation Framework by UNDP, 2021

[85] CPD - Carbon Disclosure Project, ICLEI - International Council for Local Environmental Initiatives: CDP-ICLEI Track is the World's Leading Climate Reporting Platform and Progress Accountability Mechanism for Cities.

by the Asian Development Bank and the Green Climate Fund, aims to enhance public transport efficiency, reduce journey times, and promote affordability. Simultaneously, the Safe BRT Travel Program addresses adaptation concerns by ensuring the safety of passengers through training programs, anti-harassment measures, and gender-sensitive infrastructure.

H.3.2 Green and Sustainable Urban Development:

The Competitive and Liveable City of Karachi Project and the Karachi Mobility Project underscore Karachi's dedication to enhancing urban management, service delivery, and mobility. With financing from the World Bank, these mitigation and adaptation initiatives aim to modernize property tax systems, incentivize private sector participation, improve solid waste management, and provide safe and accessible transport along key corridors.

H.3.3 Waste Management and Environmental Governance:

The Solid Waste Emergency and Efficiency Project, funded by the World Bank, addresses adaptation in waste management by constructing sanitary disposal cells, upgrading transfer stations, and developing a comprehensive waste solution plan. Additionally, the Punjab Green Development Program, supported by the World Bank, strengthens environmental governance in the region, promoting green investments and sustainable practices.

H.3.4 Renewable Energy Initiatives:

The Power Acquisition Programme, in progress and funded by Karachi Electric, aligns with Pakistan's NDC plan under the Paris Agreement. This mitigation-focused initiative outlines a long-term plan for power supply, emphasizing indigenous fuel resources and renewable energy. Simultaneously, the ongoing development of 560 MW of 11 New Wind Power Projects, funded by IFC and ADB, contributes to increasing renewable energy share to 20% by 2025.

H.3.5 Water and Sanitation Projects:

The Karachi Water and Sewerage Services Improvement Project, funded by the World Bank, addresses both mitigation and adaptation objectives. It supports a reform program to enhance efficiency and sustainability in providing clean drinking water and sanitation services to the citizens of Karachi.

H.3.6 Ecological Restoration and Urban Forest Initiatives:

Karachi's commitment to ecological restoration is demonstrated through projects like the Living River Initiative and the Clifton Urban Forest. The former, led by the Multinational Project Task Force Office (MPTFO), aims to develop a Master Plan for the Indus River Basin, ensuring the conservation of resources and restoration of the ecosystem. The latter, funded by various sources including Sugi Projects and the Rotary Club, focuses on creating urban forests using the Miyawaki Method for cooling and biodiversity.

H.3.7 Climate-Resilient Agriculture and Disaster Risk Reduction:

Initiatives like the Transforming the Indus Basin project, funded by the Green Climate Fund, focus on enhancing resilience among vulnerable farmers in the Indus Basin. On the other hand, the Karachi Heatwave Management Plan, already implemented and funded by the Climate and Development

Knowledge Network, outlines strategies to prevent heat-related illnesses and deaths, particularly among vulnerable residents.

H.4 International Collaborations and Funding:

Karachi's global collaboration is evident in projects like the UN-Habitat initiative, which strengthens capacities for climate change mitigation and adaptation. Funding from UN-Habitat and the Ministry of Climate Change, in collaboration with the Korea Land and Housing Corporation, supports urban slum development and environmental upgrading.

H.5 Large-Scale Reforestation:

The 10 Billion Tree Tsunami Project, an ongoing effort with substantial funding, focuses on large-scale reforestation, exceeding commitments under the Bonn Challenge. This initiative aligns with the city's broader climate goals, emphasizing the significance of green cover in mitigating climate change impacts.

Several initiatives offer compelling opportunities for upscaling, amplifying positive outcomes across different levels of governance. The "Power Acquisition Programme," if extended to provinces and other cities, holds the potential to substantially contribute to a cleaner energy mix nationwide. The success of the "Biodiversity Action Plan" provides a model for regions to adopt comprehensive conservation strategies. Furthermore, replicating the innovative features of the "Red Line BRT Karachi Project" in other urban centers can advance sustainable public transportation. These actions underscore Karachi's proactive stance on climate change, emphasizing both mitigation and adaptation. The city's commitment to transformative change is evident in initiatives addressing immediate challenges while laying the foundation for a sustainable and climate-resilient future. Integrating these actions into a cohesive Climate Action Plan reflects Karachi's dedication to efficiency, risk reduction, and a holistic response to the intricate challenges posed by climate change.

I. Preliminary Climate Stakeholder Mapping

Owing to the cross-cutting nature of climate actions, there are several sectors or departments within the Karachi city that historically or currently have a role to play in preparing climate policy or delivering the city's climate actions. This section of the report outlines these existing role players. Cities cannot deliver climate action at scale without engaging and partnering with others, for example other tiers of government, the private sector, not-for-profit organisations, universities and citizens. This section therefore also provides a preliminary identification of key non-city stakeholders that are already working with the city on climate change. This information will be used as a basis for more detailed climate stakeholder mapping and development of a stakeholder engagement strategy during the climate action planning process.

The preliminary climate stakeholder mapping for Karachi city reveals a diverse and interconnected network of actors from various sectors, each contributing to the formulation and implementation of climate policies and actions. The stakeholder mapping is crucial for effective climate action planning, ensuring collaboration, and leveraging resources across different entities. Here is a detailed overview of the key stakeholders identified.

Table 11: Preliminary Climate Stakeholder List

Stakeholder Type	Name	How are they involved in the city's climate policy / actions?
Governance and Administration	Karachi Metropolitan Corporation (KMC)	Responsible for urban planning and management, transport and mobility, water and sanitation, solid waste management, energy and climate change, disaster risk management, social development, and governance and institutional reform
	Government of Sindh	Formulates and implements policies and regulations on environmental and climate issues, provides support to the city government.
	Government of Pakistan	Signatory to international climate agreements, provides strategic guidance, and coordinates climate action among provincial and city governments.
	Ministry of Climate Change (MoCC)	Responsible for formulating and implementing policies and strategies for climate change mitigation and adaptation in Pakistan. Coordinates with provincial and local governments, civil society organizations, and international partners on climate change matters
	Environment, Climate Change & Coastal Development Department	Responsible for coordinating and implementing the provincial climate change policy and action plan. Key actions include legislative reviews, adaptation of national

Stakeholder Type	Name	How are they involved in the city's climate policy / actions?
		policies, and the development of sector-specific operating procedures and guidelines
Federal Level Entities – Power and Energy	Private Power and Infrastructure Board (PPIB)	Facilitates private power projects, including renewables, contributing to the city's long-term power acquisition plans.
	Alternative Energy Development Board (AEDB)	Promotes and regulates renewable energy initiatives in Pakistan, influencing Karachi's renewable energy landscape.
Disaster Management	Provincial Disaster Management Authority	Responsible for disaster management, including response and recovery, in the province, addressing climate-induced risks.
	Climate Data Processing Centre by PDMA	Data processing and analysis for climate events
	Regional Meteorological Centre, Karachi	Local weather monitoring and forecasts
Land Owning, Development, and Management Agencies	KDA, LDA, MDA and other Land-owning agencies	Integration of climate-resilient urban planning.
	Karachi Port Trust (KPT)	The federal government agency that owns and operates the port of Karachi and the land adjacent to it
	Board of Revenue (BoR) Sindh	Regulates land-related affairs and manages provincial custodianship of land, playing a key role in land management.
Residential and commercial development	DHA (Defence Housing Authority)	Sustainable construction and land use practices.
Civil administration within designated cantonments	CBC (Cantonment Board Clifton)	Climate-aware infrastructure development.
Regulatory Bodies and Upgradation Authorities	Sindh Building Control Authority (SBCA)	Ensures compliance with building regulations, contributing to planned urban development.
	Sindh High Density Development Board (SHDDB)	Oversees high-rise building developments in the city.
	Sindh Katchi Abadi Authority (SKAA)	Focuses on regularization and property rights for informal settlements, addressing housing challenges.
Law Enforcement Department	Home Department and Police Department	Responsible for law and order, security, and traffic management, ensuring the safety and orderliness of Karachi.
Provincial Level department	Sindh High Court	Acts as the highest judicial institution hearing civil, criminal, and constitutional matters in Karachi and Sindh province.

Stakeholder Type	Name	How are they involved in the city's climate policy / actions?
Revenue Collection	Excise, Taxation and Narcotics Department	Responsible for tax collection, including property tax, motor vehicle tax, and other levies, contributing to revenue generation for the city.
International Organizations	United Nations, World Bank, UNDP, etc.	Provides technical assistance, funding, and global expertise in climate-related projects and policies.
Private Sector	Various Companies and Industries (SITE, KCCI, ABAD)	Corporate organizations and trade bodies influencing land ownership and allocation policies, economic development, and commerce in Karachi. Contributes to the city's economy and emissions, can invest in low-carbon practices, adopt climate-resilient technologies, and innovate solutions.
Academia and Research Institutions	Universities, Research Centers	Provides knowledge, data, and expertise on climate change, educates future climate leaders, and professionals.
Citizens, people, and communities	Various civil society organizations, NGOs, CBOs, etc. Community Groups, Media, Citizens	**Citizens:** Participate in and benefit from climate change interventions, **Civil Society:** Raise awareness and advocacy, mobilize resources and support, and participates in climate action, holds the government and private sector accountable, and monitor and evaluate the impacts and outcomes of climate action. **NGOs:** Implements grassroots projects, advocacy, and community engagement on climate-related issues
Marginalized groups and minorities	Women, youth, persons with disabilities, ethnic and religious minorities, etc.	Represent the most vulnerable and affected segments of the society, voice their needs and concerns, and demand inclusive and equitable climate solutions.
Manufacturing sector	Industries, factories, businesses, etc.	Contribute to the GHG emissions and environmental degradation, but also have the potential to adopt cleaner and greener technologies, practices, and standards, and to invest in low-carbon and climate-resilient development.
Experts group	Sectoral experts related to environment, urban planning, etc.	Provide scientific and technical knowledge, data, and analysis, and advise on the best practices and innovations for climate change mitigation and adaptation.

Stakeholder Type	Name	How are they involved in the city's climate policy / actions?
Service Providers		
Water supply, sewerage, and drainage services	KW&SC (Karachi Water & Sewerage Board)	Adaptation measures for water scarcity, sustainable water management.
Solid waste management	SSWMB (Sindh Solid Waste Management Board)	Implementation of waste reduction and recycling initiatives.
Public health services	Health Department	Adaptation measures for climate-related health impacts.
Educational services	Education Department	Integration of climate change education in the curriculum.
Energy supply and distribution	Energy Department	Promotion of renewable energy sources, energy efficiency measures.
	K- Electric	Private company with a monopoly on electricity generation, transmission, and distribution, impacting the city's energy policies.
	Sui Southern Gas Company (SSGC)	Public sector company providing natural gas to Karachi, managing transmission, distribution, and installation of gas pipelines.
Transportation infrastructure and services	Department of Transport and Mass Transit	Promotion of sustainable and low-emission transport.
	Sindh Mass Transit Authority (SMTA)	Collaborates on urban transit planning with the city's mayor as part of the Board of Directors.
	Sindh Infrastructural Development Company Limited (SIDCL)	Leads infrastructure projects, including the Bus Rapid Service, contributing to transportation and development initiatives in the city.
Industrial and Commerce services	Industries and Commerce Department	Shapes industrial policies and plans, influencing economic activities related to trade and commerce in Karachi.

This preliminary climate stakeholder mapping provides a foundation for a more detailed analysis and the development of a comprehensive stakeholder engagement strategy during the climate action planning process. Engaging with this diverse network of stakeholders will be essential for the success of climate actions in Karachi, ensuring a collaborative and inclusive approach to building climate resilience in the city.

J. SWOT Analysis

The Strategic CAP Appraisal has generated information which is analysed in this section with the aim of generating a set of clear recommendations for the design of the climate action planning process. A collaborative SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis approach has been used for this purpose. The summary results based on the tool presented in Table 20 are presented in Table 12.

Table 12: SWOT Results Summary

Strengths (internal):

Vision & Commitment, Governance & Powers Review

- Strong political commitment from Mayor Karachi.
- Participation of professionals, academics, and civil society in planning.
- Existence of the Karachi City Council as a potential political platform.
- Presence of national and provincial governance frameworks and policies.
- Established institutions like MoCC, ECC&CD, guiding climate initiatives.
- Active civil society organizations contributing to climate resilience.
- Presence of regulatory bodies for environmental protection (SEPA), SBCA, and SHDDB.

Goals / Targets & Policy Context Review

- National focus on renewable energy aligns with global sustainability objectives.
- Regional contributions can strengthen the overall achievement of national targets.
- National focus on electric vehicles (EVs) aligns with global trends towards sustainable transport.
- National focus on protected areas aligns with biodiversity preservation and job creation.
- Well-established internal policies provide a solid foundation for climate action planning in Karachi.
- Comprehensive internal policies and plans (e.g., KHWMP, KSDP) addressing city-specific challenges.
- Integration of climate considerations in various sectors such as water, transport, and agriculture.
- Alignment with Sustainable Development Goals and other strategic frameworks for a holistic approach.
- National policies provide a strong foundation for climate action, offering guidance and support.
- National policies emphasize renewable energy, aligning with KCAP goals.
- Ambitious targets in national policies (e.g., NDCs) provide a clear direction for mitigation efforts.
- NCAP 2023 focuses on air quality, complementing KCAP goals.
- National Transport Policy 2018 focuses on reducing greenhouse gas emissions, supporting KCAP's net-zero emission goal.
- Alignment of policies with climate resilience and sustainability objectives.

Current Climate & Environmental Quality within the City

- Geographic location with sea access influences the city's climate.
- Global climate patterns influence Karachi's climate dynamics.
- Seasonal variations, including monsoon rains, contribute to climate diversity.
- The city's climate is classified as arid, influencing planning and adaptation strategies.

City Socio-economic Context & Key Future Trends

- Diverse and dynamic urban landscape.
- Commitment to environmental conservation.
- Robust electrical infrastructure.
- Presence of protected areas and national parks.

- Growing energy generation capacity.
- Access to potable water supply for 85% of the population.
- Plans for expansion in public transportation.
- Positive trends in air quality.
- Existing sewerage network covering 60% of the city.
- Karachi's GDP accounting for 25% of Pakistan's total GDP.
- Diverse linguistic and cultural composition.
- Youthful population with a balanced age structure.
- Presence of major healthcare facilities (165 with 14,350 beds).
- High literacy rate (87%).
- Majority of children attending private schools (74%).

Emissions Baseline & Trajectories Status

- Increased awareness and recognition of climate change issues in Karachi.
- Implementation of targeted measures to reduce emissions from various sources.
- Availability of satellite-based data for air quality assessments.
- Advancements in satellite-based monitoring technologies for more accurate measurements.
- Implementation of mass rapid transit projects focusing on efficient fuels.
- Integration of air quality management with urban planning initiatives.
- - Identification of key emission sources through studies like "Cleaning Karachi's Air."

Climate Hazards, Risks & Impacts Baseline Status

- Understanding of climate hazards and risks through assessments.
- Knowledge of district-wise vulnerability ranking based on climate-related risks.

Climate Actions Baseline

- Comprehensive National Climate Actions.
- Diverse portfolio of projects covering multiple sectors.
- Proactive engagement in renewable energy projects (Power Acquisition Programme, Wind Power Projects).
- Behavioural Change & Institutional Strengthening (Clean Green Pakistan Movement).
- Successful completion of various projects (Forest Management, Zigzag Kiln Technology).
- Ongoing initiatives for gender-responsive climate action (Development of National Climate Change Gender Action Plan).

Stakeholder Mapping

- KMC has a central role in delivering essential services and managing various aspects of urban life.
- Government of Sindh formulates and implements policies related to environmental and climate issues, providing vital support to the city government.
- The federal government, a signatory to international climate agreements, offers strategic guidance and coordinates climate actions among provincial and city governments.
- Regional Meteorological Centre: Local weather monitoring and forecasts contribute to climate resilience and preparedness in the city.
- Various Companies and Industries (SITE, KCCI, ABAD): Corporate organizations and trade bodies influence land policies, economic development, and commerce in Karachi.
- Universities, Research Centers provide knowledge, data, and expertise on climate change, educating future climate leaders and professionals.
- Various Civil Society Organizations, NGOs, CBOs, etc. active participation in and benefit from climate change interventions.

- Marginalized Groups and Minorities: Representation of vulnerable segments of society, voicing their needs and concerns.
- Sectoral Experts related to Environment, Urban Planning, etc. provide scientific and technical knowledge, data, and analysis.

Weaknesses (internal):

Vision & Commitment, Governance & Powers Review

- Limited quantified targets in Karachi Master Plan 2020/ Karachi Strategic Development Plan 2020[86].
- Partial representation of climate change measures in planning.
- Limited transformative actions in key sectors.
- Historical capacity challenges in urban management and regulation.
- Challenges in coordination and budget for climate-related plans.
- Limited resources, data, coordination, participation, and accountability within the City Council.
- Limited power, budget, and land ownership of KMC.
- Fragmentation and inefficiency in the governance structure.
- Challenges in revenue generation and fiscal autonomy for KMC.
- Absence of a specific climate function and vacant key position of Director (Environment) in KMC.
- Fragmentation and decentralization obstruct effective decision-making.

Goals / Targets & Policy Context Review

- Limited specific actions or details regarding implementation strategies in some policies.
- Potential challenges in coordinating actions and aligning priorities across different sectors.
- Limited provisions for regular updates or adjustments based on evolving climate scenarios.
- Limited integration of local context in national policies, requiring adaptation to local circumstances.
- Lack of mechanisms for adapting policies to rapidly changing climate conditions.
- Potential mismatches between national targets and city-specific needs.
- Some policies may lack specificity in terms of direct implementation strategies at the city level.
- Insufficient mechanisms for implementation and monitoring of national policies at the city level.

Current Climate & Environmental Quality within the City

- Limited local control over global climate drivers affecting climate variability.
- Lack of resilience to climate change impacts, exacerbated by rapid urbanization.
- Limited natural barriers expose the city to the impacts of climate-related hazards.
- Vulnerability to sea-level rise and climate change impacts.

City Socio-economic Context & Key Future Trends

- Untreated wastewater constitutes 67.1% of total, posing health and environmental risks.
- Limited coverage in sewerage network.
- High water loss due to infrastructure issues.
- Challenges in solid waste management with only 8.3% of garbage being recycled.
- Presence of hazardous waste and inadequate disposal mechanisms for medical waste.
- Reliance on external sources for energy generation.
- Inadequate water infrastructure and chronic leakages in the water supply system.
- Evolving land use patterns impacting environmental resilience.
- Exposure to average inflation rate of 17% over the last 5 years.

[86] https://www.shehri.org/2020.pdf

- Population density challenges and strain on resources.
- High prevalence of slums (64% of the population).
- Housing disparities between regularized and non-regularized settlements.
- Low doctor-to-patient ratio (1:3,029).
- Gender gap in literacy rates in katchi abadis (76% for males, 66% for females).
- Disparities in adult literacy and primary enrollment rates in katchi abadis.
- Governance challenges in managing a rapidly growing urban population.

Emissions Baseline & Trajectories Status

- Limited number of air quality monitoring stations leading to data gaps.
- Dependency on satellite-based data for certain assessments.
- Inadequate ground-based particulate matter monitoring infrastructure.
- Challenges in enforcing regulations for emission reduction.
- Reliance on satellite data for carbon monoxide concentration assessments.
- Lack of stringent regulations and enforcement for certain pollutants.
- Limited public awareness on the significance of air quality standards.
- Seasonal variations and meteorological conditions impacting air quality.
- Continued use of polluting fuels without proper control.
- Pollution from industries and domestic sources contributing to water contamination.
- Lack of treatment systems in numerous industrial units.
- Presence of toxic metals in wastewater raising health concerns.
- Inadequate sewage treatment capacity and malfunctioning infrastructure.
- Contaminants such as toxic metals and high coliform content reported in the water.

Climate Hazards, Risks & Impacts Baseline Status

- High vulnerability ranking of Karachi district to multiple climate disasters.
- Limited historical data on hazards like earthquakes, making future predictions challenging.
- Lack of comprehensive infrastructure to cope with urban flooding and heatwaves.

Climate Actions Baseline

- Limited information on the current status of certain projects.
- Lack of detailed financing information for some projects.
- Limited city commitment for some projects (Public Expenditure and Institutional Review).
- Lack of data on certain ongoing projects (e.g., current status of Climate Change Reporting Unit).

Stakeholder Mapping

- Land Owning, Development, and Management Agencies may pose bureaucratic challenges and administrative hurdles.
- Karachi Port Trust (KPT): Land development may lack adequate climate considerations, posing risks to the city's overall resilience.
- Board of Revenue (BoR) Sindh: Regulatory processes related to land management may lack efficiency, affecting overall climate responsiveness.
- Sindh High Density Development Board (SHDDB): Oversight on high-rise building developments may lack comprehensive climate considerations.
- Industries, Factories, Businesses, etc. contribute to GHG emissions and environmental degradation.

Opportunities (external):

Vision & Commitment, Governance & Powers Review

- Alignment with C40 CAP Framework objectives.
- Initiation of Greater Karachi Region Plan 2047.
- Commitment to Paris Agreement and NDCs.
- Focus on climate resilience in coastal areas.
- Long-term coastal resiliency through habitat protection initiatives.
- Increasing awareness and urgency about climate change impacts.
- Collaboration with international organizations for potential support.
- Capacity-building initiatives for the Karachi City Council.
- Transformation of KMC's Director (Environment) position into a focal point for comprehensive climate action.
- Collaboration with Directorate of Climate Change for cross-sectoral coordination.
- Engagement with international organizations and funding sources.
- Alignment of city-level initiatives with national and provincial frameworks.
- Leveraging support from civil society organizations for city-level initiatives.

Goals / Targets & Policy Context Review

- Opportunities for attracting international investments and expertise in renewable energy projects.
- Collaboration with provinces for diverse renewable energy sources and projects.
- Opportunities for international collaborations and investments in EV infrastructure.
- Collaborations with neighboring regions for efficient and interconnected low-emission transport systems.
- Opportunities for public-private partnerships in local low-emission transport projects.
- Opportunities for collaborative research and innovation in climate resilience technologies.

Current Climate & Environmental Quality within the City

- Implement climate-resilient urban planning practices to mitigate vulnerabilities.
- Leverage global climate initiatives and collaborations for enhanced understanding and adaptation strategies.
- Promote green infrastructure to reduce urban heat island effects and improve climate resilience.
- Explore opportunities for sustainable and climate-friendly urban development.

City Socio-economic Context & Key Future Trends

- Implementation of sustainable waste management practices.
- Strengthening wastewater treatment infrastructure for improved public health.
- Expansion of renewable energy sources and reduction of carbon footprint.
- Enhancing water supply infrastructure for increased coverage.
- Enhancement of public transportation system with planned BRT lines and circular railways.
- Strategic urban planning to mitigate the impacts of climate change.
- Improved governance for efficient urban planning and management.
- Utilizing technological advancements for environmental monitoring and conservation.
- Strengthening conservation initiatives in protected areas and national parks.
- Competitive cost of living ($362).
- Cosmopolitan ambiance due to diverse foreign population.
- Economic diversification and inclusive growth initiatives.

Emissions Baseline & Trajectories Status

- Public awareness campaigns on the health impacts of poor air quality.
- Presence of quality standards for ambient air.
- Collaboration with industries for emission reduction initiatives.

- Development of ground-based monitoring infrastructure for more comprehensive data.
- Implementation of cleaner technologies and fuels to reduce emissions.
- Integration of air quality management with climate action plans.
- Implementation of stricter standards for various pollutants.
- Adoption of cleaner technologies and fuels to reduce emissions.
- Policy support for sustainable urban development to reduce pollution.
- Public-private partnerships for emission reduction initiatives.
- International collaborations to address regional air quality issues.

Climate Hazards, Risks & Impacts Baseline Status

- Opportunities for advanced climate modeling and impact assessment technologies.
- Collaboration with international organizations for climate resilience projects.

Climate Actions Baseline

- Potential for upscaling successful initiatives to other cities and provinces.
- Collaboration with international organizations and funds for additional support.
- Opportunities for knowledge exchange and best practices from global climate initiatives.
- Integration of climate actions with national development priorities and NDCs.
- Funding opportunities from Green Climate Fund (GCF), UNDP, World Bank, and other international sources.

Stakeholder Mapping

- KMC has a potential for strategic partnerships with international organizations and other tiers of government to enhance service delivery.
- GOS: Opportunities for collaborative projects and knowledge exchange with other provinces.
- GoP: Potential for accessing global expertise, funding, and support for climate initiatives.
- Collaboration with international partners through the Ministry of Climate Change for effective climate policy implementation and provision technical assistance, funding, and global expertise in climate-related projects.
- Provincial Disaster Management Authority (PDMA): Collaborative opportunities with international organizations for advanced data processing and analysis.
- Regional Meteorological Centre: Integration of advanced technologies and collaborations for improved weather forecasting and early warning systems.
- Private sector engagement can enhance innovation, investment, and implementation of climate-resilient technologies and practices.
- Various Companies and Industries (SITE, KCCI, ABAD): Opportunities for the private sector to invest in low-carbon practices, adopt climate-resilient technologies, and contribute to the city's economy while reducing emissions.
- Collaboration with research institutions can lead to innovative solutions, knowledge exchange, and informed decision-making in climate actions.
- Citizen engagement can be leveraged for raising awareness, advocating for climate action, and monitoring and evaluating the impacts of climate initiatives.
- Inclusive and equitable climate solutions can be developed by actively involving and addressing the needs of marginalized groups.
- Expert advice can contribute to the development of effective climate change mitigation and adaptation.

Threats (external):

Vision & Commitment, Governance & Powers Review

- Limited city-level plan/policy development and coordination.

- Challenges in waste-to-energy projects and waste disposal initiatives.
- Limited compliance of decision making with climate agenda.
- Resistance to urban governance reforms and resource allocation issues.
- Governance and institutional framework challenges requiring reform.
- Limited engagement processes with non-city stakeholders.
- Capacity gaps in RMC Karachi and challenges in developing a greenhouse gas inventory.
- Challenges in collaboration and communication between city, provincial, and national governments.
- Technical challenges, including the absence of a greenhouse gas inventory and climate adaptation monitoring.
- Climate-induced risks and vulnerabilities impacting climate initiatives.
- Limited authority and resources for local governments, hindering their ability to address climate challenges.
- Political interference, bureaucratic inefficiency, fiscal imbalance, and coordination issues.
- Challenges in intergovernmental relations impacting effective policy implementation.
- Absence of a structured engagement framework for regular communication with non-city stakeholders.
- Lack of representation and integration across multiple city departments.

Goals / Targets & Policy Context Review

- Potential conflicts between national policies and local priorities may hinder effective implementation.
- Dependence on national policies may expose the city to changing national priorities.
- Political changes or shifts in national priorities may affect the continuity and support for climate policies.
- External factors, such as global economic downturns, may impact the availability of international funding for climate projects.
- Inadequate enforcement mechanisms may lead to challenges in achieving emission reduction targets and policy compliance.

Current Climate & Environmental Quality within the City

- Increasing intensity and frequency of heatwaves pose risks to public health and well-being.
- Rising global temperatures and climate change may exacerbate local vulnerabilities and impact the city's climate.
- Urban flooding due to heavy precipitation events poses threats to infrastructure and livelihoods.
- The city is vulnerable to external climate events, such as cyclones, which may result in severe impacts.

City Socio-economic Context & Key Future Trends

- Air pollution from open burning of solid waste and inadequate waste disposal.
- Increasing intensity and frequency of heatwaves pose risks to public health.
- Risks associated with untreated wastewater.
- Urban flooding and infrastructure threats.
- Potential spread of diseases from inadequate medical waste disposal.
- Vulnerability to external climate events, such as cyclones.
- Water scarcity due to high loss in water supply and chronic leakages.
- Environmental and health risks associated with unregulated waste disposal practices.
- Traffic congestion and air pollution due to reliance on personal vehicles.
- Global economic uncertainties affecting GDP growth.
- Dependency on external factors for economic stability.
- Vulnerability to global market fluctuations.
- Social implications of rapid urbanization.
- Vulnerability to disease outbreaks due to insufficient healthcare infrastructure.
- Climate change impacts affecting coastal areas.

Emissions Baseline & Trajectories Status

- Inadequate enforcement of air quality regulations and standards.
- Lack of financial resources for implementing emission reduction measures.
- Increasing urbanization and industrialization without proper control measures.
- Climate change impacts leading to more frequent and severe environmental hazards.
- Resistance to policy changes and adoption of cleaner technologies.
- Political and economic challenges affecting air quality management efforts.
- Limited regulatory measures for certain pollutants like carbon monoxide.
- Continued reliance on conventional and polluting industrial practices.

Climate Hazards, Risks & Impacts Baseline Status

- Increased frequency and intensity of climate hazards due to global climate change.
- Urbanization and population increase contributing to greater susceptibility to climate impacts.
- Potential for catastrophic events like severe heatwaves and urban flooding causing widespread damage.
- Limited resources for implementing large-scale climate adaptation measures.

Climate Actions Baseline

- Dependence on external funding may lead to vulnerabilities if not sustained.
- Potential delays in project implementation due to bureaucratic processes and administrative challenges.
- Climate change uncertainties and evolving risks may impact the effectiveness of planned actions.
- Economic and political changes may affect the prioritization and allocation of resources for climate actions.

Stakeholder Mapping

- Karachi Development Authority (KDA), LDA, MDA, and others: Potential delays in project implementation due to bureaucratic processes and administrative challenges.
- Karachi Port Trust (KPT): Climate-induced risks, such as extreme weather events, may impact land development and infrastructure projects.
- Board of Revenue (BoR) Sindh: Economic and political changes may affect land-related affairs, impacting climate-resilient initiatives.
- Economic fluctuations and external shocks may impact the revenue collection, affecting funding for climate initiatives.
- Sindh High Density Development Board (SHDDB): Vulnerability to climate-related challenges may impact high-rise building projects negatively.
- Industries, Factories, Businesses, Pressure to meet economic demands may pose challenges in adopting cleaner technologies and investing in low-carbon practices.

K. Recommendations

The recommendations emerging from the Strategic CAP Appraisal process are captured here. These are intended to inform the design of the city's climate action planning process such that it produces an inclusive, evidence-based, suitably ambitious, implementable climate action plan that meets the requirements of the CAP Framework.

K.1 Long-term Vision & Political Commitment

- Strengthen the Karachi Climate Action Plan (KCAP) by addressing the weaknesses identified in the Long-Term City Vision & Political Commitment. This includes developing quantified targets in alignment with the C40 CAP Framework objectives to ensure the effectiveness of the plan.
- Establish a robust coordination mechanism for climate-related plans, overcoming challenges in budgeting and coordination. This involves fostering collaboration between different stakeholders, including government departments, professionals, academics, civil society, and other leaders.
- Leverage the initiation of the Greater Karachi Region Plan 2047 to integrate climate considerations into urban governance reforms. This plan should serve as an opportunity to address historical capacity limitations in urban management and regulation.
- Enhance the Greater Karachi Region Plan 2047 by incorporating specific and measurable climate-related targets. Ensure that the plan includes transformative actions for key sectors and adequately represents climate change measures.
- Ensure alignment with global commitments such as the Paris Agreement and Nationally Determined Contributions (NDCs). Enhance the focus on climate resilience in coastal areas, including habitat protection and restoration initiatives.
- Increase awareness and urgency about climate change impacts among the public through targeted communication and education campaigns. This can foster a sense of collective responsibility and support for climate action initiatives.
- Develop and implement a comprehensive waste-to-energy strategy, addressing challenges in waste management infrastructure. This includes actively following up on policy decisions related to waste-to-energy and waste disposal and overcoming resistance to urban governance reforms.
- Strengthen the compliance of decision-making processes with climate agendas to ensure effective implementation of policies and strategies. This involves creating mechanisms for ongoing monitoring, evaluation, and adaptation of climate-related initiatives.

K.2 Climate Governance & City Powers

Recommendations for Strengthening City Climate Governance in Karachi:

K.2.1 Enhance Capacity of Karachi City Council:

- Initiate capacity-building programs for members of the Karachi City Council to improve their understanding of climate issues, governance, and coordination mechanisms.
- Facilitate workshops and training sessions to equip council members with the necessary skills for effective decision-making and implementation of climate initiatives.

K.2.2 Fill Key Positions within Karachi Metropolitan Corporation (KMC):

- Urgently appoint a Director (Environment) within the KMC to provide leadership and direction in environmental and climate-related matters.
- Ensure that the Director (Environment) role is well-defined, adequately staffed, and equipped with the necessary resources to fulfill its responsibilities.

K.2.3 Establish a City-Level Monitoring, Evaluation, and Reporting (MER) System:

- Develop and implement a dedicated MER system within Karachi to monitor and evaluate climate actions at the city level.
- Ensure that the MER system is equipped with the capacity to collect, analyze, and report data related to climate change impacts and adaptation strategies.

K.2.4 Promote Collaboration Between KMC and ECC&CDD:

- Foster collaboration between the Karachi Metropolitan Corporation (KMC) and the provincial Environment, Climate Change and Coastal Development Department (ECC&CDD).
- Establish regular communication channels and coordination mechanisms to align local climate initiatives with broader provincial strategies.

K.2.5 Engage with International Organizations and Civil Society:

- Actively seek collaboration with international organizations such as UNDP, C40, and the World Bank to access resources, funding, and expertise for climate initiatives.
- Leverage support from active civil society organizations, such as Shehri-Citizens for a Better Environment, to enhance community involvement and resilience.

K.2.6 Align City-Level Initiatives with National and Provincial Frameworks:

- Ensure that climate initiatives at the city level align with national and provincial goals, policies, and frameworks.
- Regularly review and update city-level plans to maintain consistency with higher-level climate strategies.

K.2.7 Address Governance and Institutional Framework Challenges:

- Initiate institutional reforms within key sectors such as water and sanitation, drainage, housing, land use, and transportation to improve climate resilience.
- Explore innovative solutions for collaboration among different tiers of government, private sector engagement, and community participation.

K.2.8 Establish Structured Engagement Framework:

- Develop a structured framework for regular communication and collaboration with non-city stakeholders, including governmental bodies, non-profits, and local communities.
- Facilitate engagement processes that allow for meaningful contributions from diverse stakeholders in climate policy development and implementation.

K.2.9 Address Technical and Procedural Challenges:

- Invest in research, data generation, and technical capacity to address challenges in mapping tasks related to climate change adaptation.
- Consider adopting successful sector-based approaches from other cities and adapt them to Karachi's context.

K.2.10 Build Resilience Against Climate-Induced Risks:

- Develop strategies to address climate-induced risks and vulnerabilities that impact the effectiveness of climate initiatives.
- Establish emergency response plans and coordination mechanisms to enhance the city's resilience in the face of climate-related challenges.

Recommendations for Strengthening City Power and Related Capacity in Karachi:

K.2.11 Enhance Governance Structure:

- Streamline the three-tiered governance system to minimize conflicts and improve coordination between federal, provincial, and local bodies.
- Establish a comprehensive planning implementation agency to ensure effective coordination and inclusive development, addressing challenges posed by diverse land-owning agencies.

K.2.12 Fiscal Autonomy and Resource Allocation:

- Advocate for a critical review of fiscal relations and resource allocations, especially focusing on the declining share of local governments in provincial revenue receipts.
- Explore mechanisms to increase the financial autonomy of the Karachi Metropolitan Corporation (KMC), ensuring it has the necessary resources for essential development projects.

K.2.13 Revise Provincial Finance Commission Awards:

- Engage in discussions to revise Provincial Finance Commission (PFC) Awards, considering historical trends and the evolving fiscal needs of local governments.
- Work towards a fair and equitable distribution of funds to local governments, reflecting their roles and responsibilities.

K.2.14 Strengthen Legal and Policy Frameworks:

- Pursue comprehensive reforms in legal and policy frameworks to empower local bodies and align powers with constitutional principles.
- Advocate for a more transparent and participatory decision-making process to enhance accountability in governance.

K.2.15 Promote Renewable Energy Initiatives:

- Encourage the development of a viable programmatic framework and a long-term strategy for transitioning to renewable energy in buildings.

- Support initiatives by entities like the Private Power and Infrastructure Board (PPIB) and the Alternative Energy Development Board (AEDB) for private power projects, including renewable energy.

K.2.16 Improve Solid Waste Management:

- Address challenges in solid waste management by fostering collaboration among public, NGOs, and private firms.
- Explore innovative solutions, including public-private partnerships, to overcome issues such as inadequate facilities and outdated vehicles.

K.2.17 Invest in Climate Education and Community Empowerment:

- Collaborate with entities like the Ministry of Climate Change (MoCC), ECC&CD, PDMA, and Sindh Education Department to enhance climate change education.
- Focus on community empowerment programs to increase awareness and resilience among citizens.

K.2.18 Address Water Security and Wastewater Management:

- Advocate for effective implementation of the Karachi Water & Sewerage Corporation Act, 2023, and the Greater Karachi Sewerage Plan (S-III).
- Work towards resolving governance issues, securing funding, and improving infrastructure to address ongoing water challenges.

K.2.19 Disaster Management and Climate Resilience:

- Strengthen disaster management capabilities by addressing coordination issues and resource constraints.
- Advocate for increased financial support, improved governance, technical skills, and leadership to manage coastal risks, stormwater, river systems, and flooding.

K.2.20 Collaborate for Next-Generation Mobility:

- Collaborate with the Department of Transport and Mass Transit, Sindh Infrastructure Development Company Limited (SIDCL), and other stakeholders for effective public transport solutions.
- Explore funding options and political support to implement low/zero-emission technologies in public transport.

K.2.21 Engage in Advocacy for Resource Mobilization:

- Advocate for increased federal grants and packages to address the estimated infrastructure gaps in Karachi.
- Engage in dialogue with federal and provincial entities to secure sustained financial support for Karachi's development projects.

These recommendations aim to address the identified weaknesses and capitalize on opportunities to enhance Karachi's city power and related capacity for effective climate action planning and implementation.

K.3 Climate Goals / Targets & Policy Context

K.3.1 Strengthen Internal Policy Implementation:

- Leverage well-established internal policies and plans (e.g., KHWMP, KSDP) to create a solid foundation for climate action planning in Karachi.
- Develop a comprehensive implementation strategy for internal policies, ensuring coordination across different sectors and regular updates based on evolving climate scenarios. Explore additional funding sources to supplement implementation efforts.

K.3.2 Enhance Collaboration with External Stakeholders:

- Strengthen collaboration with external stakeholders, including provinces, national bodies, and international partners. Explore public-private partnerships for local projects and leverage expertise for effective implementation.

K.3.3 Address Policy Context Weaknesses:

- Work towards addressing weaknesses by enhancing the specificity of policies, ensuring coordination mechanisms, and incorporating flexibility to adapt to local circumstances and city-specific needs.

K.3.4 Maximize Opportunities for Renewable Energy:

- Develop a comprehensive plan for renewable energy projects, ensuring alignment with national goals. Explore innovative financing models and engage in collaborative efforts to maximize the potential for renewable energy.

K.3.5 Integrate Climate Resilience Strategies:

- Integrate climate resilience strategies into the climate action plan, collaborating with stakeholders to implement measures that address uncertainties and events surpassing adaptation capacities.

K.3.6 Monitor and Evaluate Policy Compliance:

- Establish robust monitoring and evaluation mechanisms to ensure policy compliance. Collaborate with external organizations for technical support and explore avenues for continuous improvement.

K.3.7 Promote Public-Private Partnerships:

- Actively promote and engage in public-private partnerships to implement local projects, leveraging private sector expertise and resources for effective and sustainable outcomes.

K.3.8 Build Local Capacity and Awareness:

- Develop and implement strategies to build local capacity and awareness, ensuring active participation and support from diverse stakeholders.

K.3.9 Diversify Funding Sources:

- Develop a diversified funding strategy, including international collaborations, grants, and partnerships, to overcome budgetary constraints and ensure the successful implementation of climate actions.

K.3.10 Continuously Engage with National Policies:

- Continuously engage with national policies, advocating for alignment with local priorities and ensuring adaptation to changing circumstances. Regularly review the city's climate action plan to align with evolving national goals.

These recommendations aim to guide the design of an inclusive, evidence-based, and implementable climate action plan for Karachi, aligning with the CAP Framework and maximizing the synergies between internal and external policies.

K.4 City Context

K.4.1 Leverage Geographic Advantage:

Utilize Karachi's geographic location with sea access to influence climate-resilient urban planning practices, considering potential impacts on sea level rise.

K.4.2 Enhance Climate Monitoring:

- Strengthen monitoring systems for global climate patterns like El-Nino and Indian Ocean Dipole to improve understanding and preparedness for climate dynamics.

K.4.3 Invest in Climate-Resilient Urban Planning:

- Allocate resources and implement practices to address current and future vulnerabilities to extreme events like heatwaves and urban flooding, caused by poor urban planning, by focusing on adaptive infrastructure and sustainable land use.
- Explore technological solutions for climate monitoring and early warning systems.

K.4.4 Participate in Global Climate Action:

- Advocate for global climate policies that consider local vulnerabilities and emphasize the need for sustainable urbanization, and actively engage in global climate initiatives and collaborations to share knowledge, access resources, and enhance climate adaptation strategies for the city.

K.4.5 Public Health Measures for Heatwaves:

- Develop and implement public health measures to address the increasing intensity and frequency of heatwaves, protecting vulnerable populations and ensuring timely responses during extreme heat events.

K.4.6 Infrastructure Resilience for Urban Flooding:

- Enhance infrastructure resilience to cope with urban flooding resulting from heavy precipitation events, focusing on improving stormwater drainage systems and green infrastructure.

K.4.7 Strengthening Waste Management and Recycling:

- Implement a comprehensive and efficient waste management system, focusing on reducing open dumping and increasing recycling rates.
- Invest in formalized recycling infrastructure to bridge the gap in sustainable waste practices.
- Conduct awareness campaigns to educate the public on responsible waste disposal.

K.4.8 Enhancing Wastewater Treatment Infrastructure:

- Prioritize the expansion and improvement of wastewater treatment facilities to address the current high percentage of untreated wastewater.
- Invest in technology and innovation for advanced treatment processes to safeguard public health and environmental quality.
- Develop a robust monitoring system to ensure the effectiveness of wastewater treatment.

K.4.9 Expansion of Renewable Energy Sources:

- Accelerate the transition to renewable energy sources to reduce dependence on external energy and decrease the city's carbon footprint.
- Encourage private and public investments in solar, wind, and other sustainable energy projects.
- Develop policies that promote energy efficiency and conservation in residential and industrial sectors.

K.4.10 Improving Water Supply Infrastructure:

- Upgrade and expand water supply infrastructure to increase coverage and reduce water loss.
- Implement smart water management technologies to address chronic leakages and enhance overall efficiency.
- Explore innovative solutions for sustainable water sourcing and distribution.

K.4.11 Advancing Public Transportation Initiatives:

- Execute planned Bus Rapid Transit (BRT) lines and circular railways to improve public transportation accessibility.
- Encourage the use of high-capacity public transport to reduce traffic congestion, air pollution, and reliance on personal vehicles.
- Continuously assess and update the public transportation system to meet the evolving needs of the population.

K.4.12 Strengthening Environmental Conservation Efforts:

- Enhance conservation initiatives in protected areas and national parks to preserve biodiversity.
- Implement measures to counteract the impacts of climate change on coastal areas.

- Collaborate with local and international organizations for sustainable environmental management practices.

K.4.13 Inclusive Economic Growth and Diversification:

- Foster economic diversification and inclusive growth initiatives to reduce vulnerability to global market fluctuations.
- Promote sustainable business practices and support industries that align with environmental conservation.
- Explore technology-driven solutions to drive economic innovation and competitiveness.

K.4.14 Improved Healthcare Infrastructure and Disease Prevention:

- Invest in healthcare infrastructure to meet the growing population's needs, focusing on vulnerable areas like slums.
- Implement effective medical waste disposal systems to prevent the spread of diseases.
- Develop and execute public health campaigns to raise awareness about disease prevention.

K.4.15 Governance and Collaboration:

- Strengthen governance mechanisms for efficient urban planning, implementation, and monitoring of climate action initiatives.
- Foster collaboration among government agencies, private sector, civil society, and international partners for a coordinated and impactful approach.
- Utilize technological advancements for data-driven decision-making and monitoring progress.

These recommendations aim to guide Karachi's Climate Action Plan towards a sustainable, resilient, and inclusive future, considering the unique challenges and opportunities present in the city's socio-economic and environmental context.

K.5 Emissions Baseline & Trajectories

K.5.1 Enhance Air Quality Monitoring Infrastructure:

- Establish additional ground-based air quality monitoring stations in key areas of Karachi to fill data gaps and provide more comprehensive and accurate information.

K.5.2 Strengthen Regulatory Framework:

- Enforce and strengthen regulations for emission reduction, particularly for pollutants like carbon monoxide and particulate matter. Develop and implement stringent standards aligned with international benchmarks.

K.5.3 Public Awareness Campaigns:

- Launch public awareness campaigns on the health impacts of poor air quality to educate the community about the significance of adhering to air quality standards and the role they can play in reducing pollution.

K.5.4 Collaboration with Industries:

- Collaborate with industries to initiate emission reduction initiatives. Encourage the adoption of cleaner technologies and fuels through incentives and regulatory measures.

K.5.5 Integrated Urban Planning:

- Integrate air quality management with urban planning initiatives. Ensure that new developments and urban projects consider the environmental impact and prioritize sustainable practices.

K.5.6 Satellite Data Complemented by Ground-Based Monitoring:

- While utilizing satellite-based data for air quality assessments, invest in and rely on ground-based particulate matter monitoring infrastructure to validate and complement satellite data.

K.5.7 Policy Support for Sustainable Development:

- Provide policy support for sustainable urban development to reduce pollution. Implement measures that encourage sustainable transportation, waste management, and industrial practices.

K.5.8 International Collaborations:

- Collaborate with international organizations and neighboring regions to address regional air quality issues. Share best practices, technologies, and experiences to collectively improve air quality.

K.5.9 Stricter Emission Standards:

- Implement and regularly update stricter emission standards for various pollutants, taking into account the latest scientific research and technological advancements.

K.5.10 Financial Resource Allocation:

- Allocate financial resources for the implementation of emission reduction measures. Explore public-private partnerships to fund and execute projects aimed at improving air quality.

K.5.11 Climate Change Resilience:

- Develop strategies to address the impacts of climate change, considering more frequent and severe environmental hazards. This includes incorporating climate resilience measures in urban planning and infrastructure development.

K.5.12 Wastewater Treatment:

- Address water contamination issues by investing in wastewater treatment systems for industrial units.
- Ensure proper infrastructure maintenance and regular monitoring to prevent contaminants in water sources.

K.5.13 Policy Advocacy:

- Advocate for policies that support the transition to cleaner technologies and fuels. Work with policymakers to create an enabling environment for sustainable practices.

K.5.14 Community Engagement:

- Engage the community in decision-making processes related to climate action. Foster a sense of ownership and responsibility among residents for the success of emission reduction initiatives.

K.5.15 Regular Monitoring and Reporting:

- Establish a system for regular monitoring and reporting of air and water quality indicators. This will facilitate tracking progress, identifying areas for improvement, and ensuring accountability.

K.6 Climate Hazards, Risks & Impacts Baseline

K.6.1 Invest in Advanced Climate Modeling:

- Allocate resources to enhance climate hazard and risk assessment through advanced modeling technologies. This includes collaborating with scientific institutions and international organizations to improve predictions, especially for hazards with limited historical data.

K.6.2 Strengthen Infrastructure for Climate Resilience:

- Develop and implement comprehensive infrastructure projects to enhance the city's resilience to urban flooding and heatwaves. This includes upgrading stormwater drainage systems, improving green spaces, and adopting heat-resilient urban planning practices.

K.6.3 Community-Based Early Warning Systems:

- Establish community-based early warning systems, particularly for heatwaves and flash floods. Ensure that these systems are accessible and understandable to the general public, enabling timely evacuation and preparedness measures.

K.6.4 Capacity Building for Disaster Response:

- Invest in training and capacity building for local authorities and emergency responders to effectively manage and respond to climate-related disasters. This includes equipping them with the necessary skills and resources to handle diverse hazards.

K.6.5 Collaboration for Climate Resilience Projects:

- Foster collaboration with international organizations, research institutions, and NGOs to access expertise and funding for climate resilience projects. Leverage partnerships to implement large-scale adaptation measures that address vulnerabilities highlighted in the SWOT analysis.

K.6.6 Integrated Urban Planning:

- Integrate climate resilience into urban planning processes, focusing on sustainable development practices. This involves zoning regulations, land-use planning, and infrastructure design that consider climate risks and promote adaptive strategies.

K.6.7 Data Collection and Monitoring:

- Improve data collection mechanisms to monitor climate-related parameters, including rainfall, temperature, and stormwater drainage capacity. Regularly update this data to facilitate evidence-based decision-making and adaptive planning.

K.6.8 Public Awareness and Education:

- Launch public awareness campaigns to educate residents about climate hazards, risks, and adaptive measures. Promote community engagement in building resilience, emphasizing the role of individuals in reducing vulnerability.

K.6.9 Policy Advocacy for Climate Action:

- Advocate for robust climate policies at the local and national levels. Ensure that climate action plans are evidence-based, ambitious, and align with the Climate Action Planning (CAP) Framework, addressing both current vulnerabilities and future uncertainties.

K.6.10 Diversify Funding Sources:

- Explore diverse funding sources, including public-private partnerships and climate finance mechanisms, to overcome financial limitations. This will enable the implementation of long-term climate adaptation and resilience projects.

K.7 Climate Actions Baseline

K.7.1 Enhance Financial Transparency:

- Provide detailed and transparent information on the financing of climate initiatives, including sources, amounts, and allocation plans. This will help build confidence in the financial sustainability of projects.

K.7.2 City Commitment Strengthening:

- Strengthen city commitment to climate actions, particularly in projects where commitment is currently lacking. Clear and robust commitment from the city is crucial for the successful implementation and sustainability of climate initiatives.

K.7.3 Strengthen Public Engagement:

- Implement targeted awareness campaigns to enhance public understanding of climate issues and engage citizens in sustainable practices. Public support is crucial for the success of behavioral change initiatives.

K.7.4 Establish Clear Timelines:

- Ensure that ongoing initiatives have clear timelines for completion and regularly assess progress. This will help in effective monitoring and evaluation of the climate action plan.

K.7.5 Capacity Building for Project Implementation:

- Invest in capacity building at the city level to address administrative challenges and bureaucratic processes that may lead to delays in project implementation. This includes training programs for effective project management and coordination.

K.7.6 Promote Knowledge Sharing:

- Encourage collaboration and knowledge sharing among different levels of governance and stakeholders. Lessons learned from successful initiatives can be valuable for other regions in developing their climate action plans.

K.7.7 Conduct Regular Risk Assessments:

- Given the dynamic nature of climate change, conduct regular risk assessments to identify new threats and opportunities. This will enable the city to adapt its strategies and remain resilient in the face of evolving challenges.

K.7.8 Align with National Development Priorities:

- Ensure that climate actions are closely aligned with national development priorities and Nationally Determined Contributions (NDCs). This alignment will strengthen the integration of climate considerations into broader development agendas.

K.7.9 Explore Regional Collaborations:

- Explore opportunities for collaboration with neighboring cities and provinces to create a more cohesive and coordinated approach to climate action. Regional collaboration can lead to shared resources and collective impact.

K.7.10 Establish Clear Metrics and Targets:

- Define specific, measurable, and time-bound metrics and targets for each climate action initiative.
- Regularly monitor and evaluate progress against these metrics, adjusting strategies as needed to meet goals.

K.7.11 Integrate Lessons Learned:

- Integrate lessons learned from completed projects into the planning process for new initiatives. Continuous improvement based on past experiences will enhance the effectiveness of future climate actions.

K.7.12 Align with Global Agendas:

- Ensure that the climate action plan aligns with global agendas such as the Paris Agreement and Sustainable Development Goals. This alignment will enhance the city's credibility and support in accessing international funding.

K.7.13 Ensure Gender and Social Inclusivity:

- Integrate gender-responsive approaches and social inclusivity measures in climate actions.

- Consider the specific vulnerabilities of different groups and develop targeted strategies to address their needs, as exemplified by the Safe BRT Travel Program.

K.7.14 Improve Data Management and Reporting:

- Enhance the capacity for data management, ensuring that reliable and up-to-date information is available for decision-making and reporting.
- Establish a standardized reporting system for climate initiatives to streamline monitoring and evaluation processes.

These recommendations aim to address the weaknesses identified in the SWOT analysis, capitalize on opportunities, and enhance the overall effectiveness of Karachi's climate action baseline. Implementing these suggestions will contribute to the development of an inclusive, evidence-based, and implementable Climate Action Plan that aligns with the requirements of the CAP Framework.

K.8 Climate Financing Status Quo and Trends

K.8.1 Enhanced Financial Mapping:

- Conduct a comprehensive financial mapping exercise to identify existing climate-related funding sources, both internal and external.
- Create a detailed inventory of current and potential financial contributors, including government budgets, international grants, private sector investments, and philanthropic contributions.

K.8.2 Diversification of Funding Sources:

- Explore opportunities to diversify funding sources to reduce dependency on a single channel.
- Foster collaboration with multiple stakeholders, including public-private partnerships, international organizations, and climate-focused funds.

K.8.3 Climate Finance Training:

- Provide training programs for relevant government officials, financial experts, and project managers to enhance their understanding of climate finance mechanisms.
- Strengthen the capacity to access, manage, and report on climate finance, ensuring efficient utilization of available resources.

K.8.4 Innovative Financing Mechanisms:

- Explore and implement innovative financing mechanisms, such as green bonds, climate bonds, and impact investments, to attract additional funds for climate projects.
- Establish a platform to connect potential investors with climate projects, facilitating financial support for sustainable initiatives.

K.8.5 Mainstreaming Climate into Budgets:

- Integrate climate considerations into annual budgets at the city, provincial, and national levels.
- Advocate for the allocation of a specific portion of budgets to climate-related projects, ensuring sustained financial support for climate action.

K.8.6 International Climate Funds Access:

- Strengthen collaboration with international climate funds, such as the Green Climate Fund (GCF) and the Global Environment Facility (GEF), to access additional financial resources.
- Develop project proposals aligned with the criteria of these funds to enhance the city's eligibility and competitiveness.

K.8.7 Private Sector Engagement:

- Encourage private sector engagement in climate financing by offering incentives, tax breaks, or subsidies for investments in climate-resilient projects.
- Establish a dedicated platform for dialogue between the public and private sectors to explore mutually beneficial climate investment opportunities.

K.8.8 Community-Based Funding Initiatives:

- Explore community-based funding initiatives, crowdfunding platforms, and partnerships with local businesses to involve communities in financing and supporting small-scale climate projects.
- Empower communities to contribute financially to projects that directly impact their resilience and well-being.

K.8.9 Transparent Financial Reporting:

- Implement transparent financial reporting mechanisms to track the flow of climate finance and ensure accountability.
- Regularly update stakeholders and the public on the allocation and utilization of climate funds to maintain trust and support.

K.8.10 Climate Insurance Mechanisms:

- Investigate the potential for climate insurance mechanisms to mitigate the financial risks associated with climate-related events.
- Collaborate with insurance agencies and explore the development of customized insurance products tailored to the city's climate risks.

K.8.11 Monitoring and Evaluation of Financial Flows:

- Establish a robust system for monitoring and evaluating the impact of climate finance on the ground.
- Conduct periodic assessments to measure the effectiveness of financial allocations in achieving climate goals and adjust strategies accordingly.

K.8.12 Capacity Building for Project Design and Implementation:

- Provide capacity-building programs for local institutions and project developers to enhance their ability to design and implement climate projects.
- Ensure that project proposals align with international standards, making them more attractive to potential donors and investors.

By incorporating these recommendations into the design of Karachi's Climate Financing Strategy, the city can develop a resilient and sustainable financial framework that supports the implementation of an inclusive, evidence-based, and ambitious climate action plan. Regular reviews and adaptations will be essential to ensure the strategy remains responsive to evolving financial trends and the city's changing climate priorities.

K.9 Stakeholder Engagement Recommendations for the CAP

K.9.1 Stakeholder Engagement Strategy:

- Develop a comprehensive stakeholder engagement strategy based on the preliminary climate stakeholder mapping.
- Ensure inclusive participation, involving all relevant sectors, departments, and external entities to promote diverse perspectives and expertise.

K.9.2 Capacity Building:

- Prioritize capacity building programs for key stakeholders, especially at the local government and regulatory levels, to enhance their understanding of climate change and its implications.
- Facilitate knowledge exchange sessions with international organizations, research institutions, and experts to build local capacity.

K.9.3 Inter-Governmental Collaboration:

- Strengthen collaboration between the Karachi Metropolitan Corporation (KMC), the Government of Sindh, and the federal Government of Pakistan to streamline climate policies and actions at different governance levels.
- Establish a platform for regular communication and joint decision-making to address climate challenges effectively.

K.9.4 Climate-Resilient Urban Planning:

- Collaborate with land-owning, development, and management agencies, such as KDA and KPT, to integrate climate-resilient considerations into urban planning.
- Ensure that high-rise building developments adhere to climate-sensitive standards set by regulatory bodies like SBCA and SHDDB.

K.9.5 Private Sector Engagement:

- Encourage the private sector, including industries and businesses, to actively participate in climate actions.
- Create incentives for the adoption of cleaner technologies, low-carbon practices, and investments in climate-resilient development.

K.9.6 Data Processing and Analysis:

- Strengthen the capacity of disaster management authorities, including PDMA and climate data processing centers, to enhance data processing and analysis for climate events.

- Foster collaboration with international organizations for advanced technologies and expertise in weather forecasting and early warning systems.

K.9.7 Revenue Generation and Allocation:

- Collaborate with revenue collection departments to ensure a stable and sustainable source of funding for climate initiatives.
- Explore innovative financing mechanisms and partnerships with international organizations to enhance financial resources.

K.9.8 Citizen and Civil Society Involvement:

- Implement targeted awareness campaigns to engage citizens and civil society organizations in climate change interventions.
- Establish feedback mechanisms to ensure active participation, transparency, and accountability in climate actions.

K.9.9 Marginalized Groups Empowerment:

- Develop specific initiatives to address the needs of marginalized groups, including women, youth, persons with disabilities, and ethnic minorities.
- Ensure that climate solutions are inclusive, equitable, and prioritize vulnerable populations.

K.9.10 Academia and Research Collaboration:

- Foster collaboration with universities and research centers to leverage their knowledge, data, and expertise on climate change.
- Engage academia in research projects that contribute to evidence-based decision-making in the climate action planning process.

K.9.11 Regular SWOT Analysis and Adaptation:

- Conduct regular SWOT analyses to assess the strengths, weaknesses, opportunities, and threats in the climate action planning process.
- Use the findings to adapt and refine strategies, ensuring flexibility in response to changing circumstances and emerging challenges.

K.9.12 Communication and Advocacy:

- Establish effective communication channels to disseminate information about climate policies, actions, and progress to all stakeholders.
- Advocate for climate action at local, national, and international forums to garner support and promote Karachi as a leader in climate resilience.

By incorporating these recommendations into the design of Karachi's Climate Action Planning Process, the city can lay the foundation for an inclusive, evidence-based, ambitious, and implementable climate action plan. Regular monitoring, stakeholder engagement, and adaptation to evolving conditions will be key to the plan's success in addressing the complex and interconnected challenges posed by climate change.

K.10 Climate Change Monitoring & Evaluation Systems & Capacity

K.10.1 City-Specific Monitoring & Reporting Framework:

- Develop a dedicated Climate Change Monitoring and Evaluation (M&E) system tailored to Karachi's unique climate challenges, hazards, and vulnerabilities.
- Ensure that the framework aligns with international best practices while addressing the city's specific needs and goals.

K.10.2 Institutional Capacity Building:

- Invest in building the capacity of local institutions, including the KMC and the Karachi City Council, to independently monitor, evaluate, and report on climate actions.
- Establish training programs for relevant staff members on M&E methodologies, data collection, and reporting protocols.

K.10.3 Collaboration with Provincial & National Entities:

- Collaborate closely with provincial and national entities such as NDMA, PDMA, SUPARCO, NIO, Met Department, and ECC&CDD for data sharing, technical support, and expertise in climate monitoring.
- Ensure seamless coordination to avoid duplication of efforts and to leverage available resources effectively.

K.10.4 Data Generation Investment:

- Allocate resources for the generation of accurate and up-to-date climate-related data, including meteorological data, air quality indices, and emissions inventories.
- Invest in advanced technologies, such as satellite-based monitoring and remote sensing, for precise data collection.

K.10.5 Defining Clear Goals, Targets & Actions for M&E:

- Establish clear and measurable goals, targets, and actions for the M&E system, ensuring alignment with the broader climate action plan.
- Define key performance indicators (KPIs) to assess progress and success in meeting climate goals.

K.10.6 Integrated Framework with Climate Policy:

- Integrate the M&E framework seamlessly with the existing climate policies, including the Karachi Climate Action Plan (KCAP), to ensure consistency and coherence in reporting.
- Align M&E efforts with the goals outlined in the Sindh Climate Change Policy, 2022.

K.10.7 Regular Stakeholder Engagement:

- Facilitate regular engagement with key stakeholders, including UN agencies, local and international NGOs, development partners, and corporate entities, for collaborative data gathering and reporting.
- Establish a feedback mechanism to incorporate diverse perspectives and expertise.

K.10.8 Community Involvement in Data Collection:

- Encourage community involvement in data collection processes, particularly in vulnerable and high-risk areas.
- Establish community-based monitoring initiatives to enhance the accuracy and granularity of climate-related data.

K.10.9 Transparent Reporting Mechanisms:

- Implement transparent reporting mechanisms to share climate-related data with the public, ensuring accountability and building trust.
- Develop user-friendly platforms or dashboards for easy access to climate information by stakeholders and the general public.

K.10.10 Regular Progress Assessments:

- Conduct regular assessments of progress in meeting climate goals and targets.
- Periodically review and adjust the M&E system based on lessons learned and evolving climate priorities.

K.10.11 Climate Risk Mapping and Early Warning Systems:

- Develop climate risk mapping tools and early warning systems to enhance preparedness and response capabilities.
- Integrate these tools into the M&E framework for comprehensive climate risk management.

By implementing these recommendations, Karachi can establish a robust Climate Change Monitoring and Evaluation system that not only meets the requirements of the CAP Framework but also ensures informed decision-making, transparency, and accountability in the city's climate action efforts. Regular updates and refinements to the system will be crucial to adapt to changing climate scenarios and evolving monitoring technologies.

Annex 1: City Climate Governance & Powers Mapping Questionnaire & Tool

Table 13: City Climate Governance Questionnaire

Column 1 – Question	Column 2 - Answer	Column 3 – Question	Column 4 - Answer	Column 5 - Function (Authorising / Resourcing / Delivering Action) *
1. Overview of the climate governance structure(s) that exist in the city				
1.1(i) Is there a political platform/structure for championing or coordinating climate action in the city?	The City Council could be an effective forum for coordinating climate action in the city.	1.1(ii) Is this platform / structure well-capacitated, has the right level of buy-in, is stable and effective?	The Karachi City Council consists of 246 elected chairmen of union committees (UCs), who represent the Karachi Metropolitan Corporation (KMC) and elect the mayor and deputy mayor of Karachi[87]. It lacks resources, data, coordination, participation, and accountability. There is a position of Director (Environment) in KMC which is vacant. To coordinate climate action effectively and stably, the city council needs to improve its governance, institutional, and technological capacities, and collaborate and communicate better with other stakeholders.	Approves the budget and plans of the KMC, Makes rules and bye-laws for municipal affairs, Oversees the performance and accountability of the KMC departments and officers, Reviews and approves the policies and strategies for various urban sectors, and Represents the interests and grievances of the citizens and stakeholders of Karachi.
1.2(i) In which city unit / department(s) is the climate function located?	There is no specific city unit or department that is dedicated to the climate function in Karachi. The KMC, which is the main local government body for Karachi, is responsible for various urban services and also has a vacant Director (Environment) position, but it does not have a	1.2(ii) Is this an effective location that allows the function to mainstream climate action cross-sectorally?	Not at the moment, but KMC can play an integral role in mainstreaming climate action in coordination with the Directorate of Climate Change at Environment, Climate Change and Coastal Development Department (ECC&CDD).	KMC has the potential to deliver climate action, but it faces resource and capacity constraints. To overcome these, KMC must improve its governance, technology, and stakeholder engagement, and secure external support for its climate plan.

[87] DAWN, Three-tier municipal set-up of Karachi, January 17, 2023, Three-tier municipal set-up of Karachi - Newspaper - DAWN.COM

Column 1 – Question	Column 2 - Answer	Column 3 – Question	Column 4 - Answer	Column 5 - Function (Authorising / Resourcing / Delivering Action) *
	particular function related to climate change. The Environment, Climate Change and Coastal Development Department (ECC&CDD) is the lead provincial department in Sindh having a special Directorate of Climate Change which is responsible for coordinating and implementing the provincial climate change policy and action plan. Key actions of ECC&CDD include legislative reviews, adaptation of national policies, and the development of sector-specific operating procedures and guidelines[88]. The Federal Ministry of Climate Change is responsible for formulating and implementing policies and strategies for climate change mitigation and adaptation in Pakistan. It also coordinates with provincial and local governments, civil society organizations, and international partners on climate change matters[89].			

[88] https://environment.sindh.gov.pk/
[89] https://mocc.gov.pk/

Column 1 – Question	Column 2 - Answer	Column 3 – Question	Column 4 - Answer	Column 5 - Function (Authorising / Resourcing / Delivering Action) *
1.3(i) Does this climate function cover both climate mitigation and adaptation?	Currently, climate function is the responsibility of the provincial department. Directorate of Climate Change at Environment, Climate Change and Coastal Development Department (ECC&CDD). The directorate of provincial department have a made of climate function that covers both climate mitigation and adaptation. The role of KMC for climate function is yet to be defined.	1.3(ii) Is the climate function adequately resourced in terms of number of staff, skills, expertise and ability to drive climate action cross-sectorally?	The Directorate of Climate Change at ECC&CDD has a total of 64 gazetted positions with 17 positions above Grade 18. However, these are administrative position that requires staff with technical skills and expertise with an ability to drive climate action cross-sectorally. In case of KMC, there is only one position Director (Environment) which may act as a focal person for mainstreaming and implementing climate action, which is vacant at the moment due to its limited role defined in terms of environment and climate change.	The functions of Climate Change Directorate at ECC&CDD are as follows[90]; i. Formulate a province-specific policy presenting the full picture of the climate change situation in the province, its affects and provide for a robust set of solutions and implementation plans to mitigate the effects, keeping in view the National Climate Change Policy (October 2021) and Twelfth Five Year Plan (2018-23) of the Federal government that combines inclusive growth with green development. ii. Embed the concepts of Climate Compatible Development (CCD) and Sustainable Development Goals (SDGs) in order to improve the understanding and ensure water, food, energy, health & nutrition security for Sindh province in the face of a changing climate. iii. Ensure interests of vulnerable groups and that gender aspects are adequately addressed in climate development strategies and planning. iv. Develop bases to provide for the required human, financial and play technological resources and inter and intra coordination mechanisms and

[90] https://docc.sindh.gov.pk/functions

Column 1 – Question	Column 2 - Answer	Column 3 – Question	Column 4 - Answer	Column 5 - Function (Authorising / Resourcing / Delivering Action) *
				frameworks which are required to further the policy objectives and undertake necessary actions, in a clear, timely manner to mitigate the adverse effects of climate change v. Enhance awareness of the impacts of climate change among all stakeholders for necessary appropriate measures to combat and minimize these impacts.
1.4(i) Is there a platform / structure with representation across several city departments that acts to champion / coordinate climate action cross-sectorally in the city?	No, there is no platform or structure with representation across several city departments that acts to champion or coordinate climate action cross-sectorally in Karachi. The only local government body in Karachi is the KMC, which does not have representation across several city departments. The representation across several city departments lies in the provincial department of ECC&CDD, which is responsible for implementing the provincial climate change policy and action plan.	1.4(ii) Is this platform / structure well-capacitated, has the right representation and level of buy-in, is stable and effective?	KMC has limited power, budget, and land ownership, which affects its ability to address the city's challenges. The city's decentralization and fragmentation create obstacles for effective decision-making and coordination for climate action.	
1.5(i) Does the city have established processes, capacity or structures that it uses to communicate and / or engage regularly with non-city stakeholders	No, Karachi city does not have established processes, capacity or structures that it uses to communicate and engage regularly with non-city stakeholders around climate change. However, recently 2nd NDC implementation committee meeting	1.5(ii) Who are these stakeholders that are engaged – e.g. government, business, NGOs, academia, civil society?	The main actors involved in climate change policy development, implementation, or data gathering in Karachi are the provincial department of ECC&CDD, Regional Metrological Department (Karachi), SUPARCO for satellite-based assessment, the national ministry of MoCC, and various international and local partners, such as the	

Column 1 – Question	Column 2 - Answer	Column 3 – Question	Column 4 - Answer	Column 5 - Function (Authorising / Resourcing / Delivering Action) *
around climate change (e.g. for policy development, implementation, or data gathering)? If so explain how this works and what kinds of consultations / communications are undertaken.	was held on 12th December 2023, under the chairmanship of a worthy Secretary, ECC&CDD at provincial level.		World Bank[91], IUCN, UN-Habitat, and civil society organizations.	
2. Monitoring, evaluation and reporting				
2.1(i) Does the city have a Monitoring, Evaluation and Reporting System and function / structure that includes climate change mitigation and / or adaptation?	No, Karachi city does not have a Monitoring, Evaluation and Reporting System and function or structure that includes climate change mitigation and adaptation. The city relies on the provincial and national level departments, such as NDMA, PDMA, SUPARCO, NIO, Met Department, KW&SC, and ECC&CDD, to monitor, evaluate and report on the climate change impacts and actions in the city.	2.1(ii) Is the system being implemented effectively? If not, give reasons.	NA	

[91] Fact Sheet: World Bank's Engagement in Karachi

Column 1 – Question	Column 2 - Answer	Column 3 – Question	Column 4 - Answer	Column 5 - Function (Authorising / Resourcing / Delivering Action) *
2.2(i) Does the city have existing capacity to develop and / or maintain its greenhouse gas inventory, including collecting data for it?	No, Karachi City does not have the existing capacity to develop and maintain its greenhouse gas inventory, including collecting data for it. However, Karachi City has a Regional Meteorological Center (RMC Karachi) that provides climatological services through its Climate Data Processing Center (CDPC), such as weather forecasts, climate data analysis, climate risk assessment, and climate change education. RMC Karachi works with the Climate Change Division of the Federal Ministry of Climate Change; Environment, Climate Change & Coastal Development Department of the Sindh and Local Governments (i.e. KMC) to coordinate with provincial and federal governments on climate change policies and strategies[92].	2.2(ii) Explain any capacity gaps and whether there are existing plans in place to deal with these?	RMC Karachi provides climatological services but faces capacity gaps in equipment, staff, coordination, and awareness. The Pakistan Metrological Department (PMD), which oversees the RMC Karachi, has initiated a project to modernize its equipment and infrastructure, train its staff in the already established Climate Data Processing Center (CDPC), and enhance its collaboration with other stakeholders.	Functions of Climate Data Processing Center (CDPC) at Regional Meteorological Center (RMC Karachi)[9394]; i. CDPC has been established for the storage, processing, retrieval, printing, and supply of climatological and metrological data to numerous end users. ii. Involved in Meteorological research activities and the production of computer-aided statistical models e.g. Temperature and Climatic variations, rainfall variations during the past 60-80 years over the main cities of Pakistan. iii. The CDPC is also responsible for the production of 1961-90 Climatological Normals which was an international commitment and has been accomplished.
2.3(i) Does the city have existing capacity to monitor,	Karachi City lacks a clear and coherent framework and indicators for measuring and reporting its	2.3(ii) Explain any capacity gaps and whether there are	Karachi City does not have a dedicated department or institution that is responsible for collecting, compiling, and analyzing data	

[92] Services-Climatology (pmd.gov.pk)
[93] About - Climate Data Processing (pmd.gov.pk)
[94] http://www.pmdnmcc.net/aboutPMD.aspx

Column 1 – Question	Column 2 - Answer	Column 3 – Question	Column 4 - Answer	Column 5 - Function (Authorising / Resourcing / Delivering Action) *
evaluate and report on its climate adaptation actions and achievements?	progress and performance on climate adaptation.	existing plans in place to deal with these?	and information on climate adaptation actions and outcomes. Karachi city faces many challenges in accessing and using the available data and tools for climate adaptation monitoring and evaluation, such as technical, financial, institutional, and political barriers.	

* Defining the functions of different structures:

- Authorising action: setting priorities; demonstrating commitment; mandating institutional responsibilities.
- Resourcing action: making the case for climate action; reallocating budgets; accessing new sources of finance; allocating skilled staff for delivery.
- Delivering action: convening and co-ordinating across sectors; stakeholder engagement, mainstreaming climate action within sectors; monitoring, reporting and accountability.

Table 14: City Powers and Related Capacity Assessment Survey Sheet

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
1. Decarbonising the electricity grid				**Weighted Power Score (Col5XCol6) =**				**Weighted Capacity Score (Col9XCol10) =**	
1.1 (i) Who owns and is responsible for the bulk power supply / generation for the city?	Ownership and responsibility for the bulk power supply and generation for the Karachi city is shared between K-Electric (KE) and the National Transmission and Despatch Company (NTDC), under the supervision of NEPRA. The systems of NTDC and KE have two interconnections that allow for KE to import power from the national grid at	1.1 (ii) Does the city have the authority/mandate to influence, control, promote or implement the level of renewable energy that is used to supply bulk electricity to the city?	The Power Acquisition Programme outlines Karachi Electric's (KE) long-term planning for power supply from FY 2024 to FY 2030. The focus is on a minimum-cost strategy for the expansion of power generation, including indigenous fuel resources and renewable sources[96]. The Private Power and	2.5	0.5	1.1 (iii) Does the city have the capacity perform this role effectively? Explain.	Karachi has a unique competitive advantage to transition to renewable energy, given its access to various renewable resources. There is a need for more effective governance, capacity building, and strategic planning to address the city's energy crisis and promote renewable energy[99].	2	0.5

[96] NEPRA, n.d. POWER ACQUISITION PROGRAMME FY 2024 - FY 2030. [Online] Available at: https://nepra.org.pk/Admission%20Notices/2023/05%20May/PAP%20of%20K-Electric.pdf [Accessed 28 December 2023].
[99] haikh, Z., 2020. Tackling Karachi's energy crisis. *Tribune*, 11 March, pp. https://tribune.com.pk/article/94484/tackling-karachis-energy-crisis.

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
	the time of need[95].		Infrastructure Board (PPIB), recently merged with the Alternative Energy Development Board (AEDB), is a one-window facilitator for the development of private power projects, including conventional, alternative, and renewable energy projects[97]. The National Electric Power Regulatory Authority						

[95] Fariha Masroor, *etal.,*2021. *The Power Sector Of Pakistan; A Brief Review,* Karachi, https://ieec.neduet.edu.pk/2021/papers_2021/IEEC_2021_41.pdf: Research and development IEEE PES NEDUET BRANCH

[97] Private Power and Infrastructure Board (PPIB) , 2023, https://www.ppib.gov.pk/wp-content/uploads/2023/07/PPIB-Amendment-Act-2023-1.pdf. *PPIB Amendment Act 2023,* Islamabad: s.n. https://www.ppib.gov.pk/about/

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
			(NEPRA), which is an independent regulatory body that issues licenses and tariffs for the power sector, including renewable energy projects[98]. Sindh Energy Departments that deal with the matters related to energy, including renewable energy, in the Sindh.						
1.2 (i) Who owns and is responsible for electricity / energy distribution	K-Electric, a Pakistani investor-owned utility company based in Karachi. K-	1.2 (ii) Does the city have the authority / mandate to influence, control, promote or implement the level	As of now, the city does not possess the authority or regulatory framework to	2	0.5	1.2 (iii) Does the city have the capacity perform this role	The city's current capacity to perform a direct role in promoting or implementing renewable energy	1	0.5

[98] Farooqi, T. H., 2021. *Press Release: Barriers and Drivers of Solar Prosumage: A Case Study of Pakistan' launched NEPRA providing enabling regulatory environment for clean energy goals,* Islamabad: NATIONAL ELECTRIC POWER REGULATORY AUTHORITY (NEPRA), https://www.nepra.org.pk/Press%20Release/2021/Press%20Release%20Solar%20prosumage%20pdf.pdf.

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
systems in the city?	Electric supplies power to over 3.4 million customers across Karachi, Dhabeji and Gharo in Sindh, and Uthal, Vinder and Bela in Balochistan. K-Electric is regulated by NEPRA, which issues licenses and tariffs for the power sector, including renewable energy projects[100].	of renewable energy that is generated / used at household / business level (including distributed renewables)?	dictate specific renewable energy initiatives at the household or business level. The challenges faced by K-Electric, such as urbananization challenges, encroachments, and resistance to safety measures, highlight the complex environment within which the utility operates[101].			effectively? Explain.	initiatives at the local level is limited, and the authority primarily rests with the utility and regulatory bodies[102].		
2. Optimizing energy use in buildings				**Weighted Power Score (Col5XCol6) =**				**Weighted Capacity Score (Col9XCol10) =**	
2.1 (i) Who is responsible for promoting / ensuring energy	In Karachi, the specific entities involved might include	2.1 (ii) Does the city have the authority / mandate to influence, control,	Overall administration of the Energy Conservation	2	0.5	2.1 (iii) Does the city have the capacity perform this	The city faces a massive energy crisis, which needs to be tackled on	1	0.5

[100] Who we are - K-Electric (ke.com.pk)
[101] Khawaja, A. M. a. I., 2021. *URBAN RESILIENCE AND ITS IMPACT ON ELECTRICITY PROVISION in Karachi, Islamabad and Peshawar,* https://file.pide.org.pk/pdfpideresearch/um-06-urban-resilience-and-its-impact-on-electricity-provision.pdf: PAKISTAN INSTITUTE OF DEVELOPMENT ECONOMICS (PIDE).
[102] Ibid

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
efficiency in new buildings in the city (including both city-owned, other government and private buildings)?	provincial building control department like Sindh Building Control Authority (SBCA), and other relevant institutions working in coordination to uphold energy efficiency standards in new construction[103].	promote or implement the adoption of high energy efficiency standards for new buildings?	Building Code 2023 (ECBC-2023) at the national and provincial levels, emphasizing the roles of NEECA (National Energy Efficiency and Conservation Authority), Provincial Designated Agencies (PDAs), and other local bodies[104]. Sindh building control authority would likely play a role in influencing			role effectively? Explain.	an urgent basis. The city currently lacks a viable programmatic framework and a long-term strategy for the transition to renewable energy[105].		

[103] National Energy Efficiency and Conservation Authority (NEECA), 2023. *Energy Conservation Building Code - 2023 ,* https://neeca.gov.pk/SiteImage/Downloads/ecbc23.pdf: National Energy Efficiency and Conservation Authority (NEECA).
[104] Ibid
[105] Khawaja, A. M. a. I., 2021. *URBAN RESILIENCE AND ITS IMPACT ON ELECTRICITY PROVISION in Karachi, Islamabad and Peshawar,* https://file.pide.org.pk/pdfpideresearch/um-06-urban-resilience-and-its-impact-on-electricity-provision.pdf: PAKISTAN INSTITUTE OF DEVELOPMENT ECONOMICS (PIDE).

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
			and implementing energy efficiency standards within Karachi. Local governments can also make their building by-laws according to specific areas.						
2.2 (i) Who is responsible for implementing / controlling energy efficiency in existing buildings (including both city-owned, other government and private buildings)?	In Karachi, the primary responsibility for energy efficiency in existing buildings rests with building owners. The specific entities that might influence include provincial building control department like	2.2 (ii) Does the city have the authority / mandate to influence, control, promote or implement the adoption of high energy efficiency standards for existing buildings?	Overall administration of the Energy Conservation Building Code 2023 (ECBC-2023) at the national and provincial levels, emphasizing the roles of NEECA (National Energy Efficiency and	1.5	0.5	2.2 (iii) Does the city have the capacity perform this role effectively? Explain.	The city faces a massive energy crisis, which needs to be tackled on an urgent basis. The city currently lacks a viable programmatic framework and a long-term strategy for the transition to renewable energy[108].	1	0.5

[108] Khawaja, A. M. a. I., 2021. *URBAN RESILIENCE AND ITS IMPACT ON ELECTRICITY PROVISION in Karachi, Islamabad and Peshawar,* https://file.pide.org.pk/pdfpideresearch/um-06-urban-resilience-and-its-impact-on-electricity-provision.pdf: PAKISTAN INSTITUTE OF DEVELOPMENT ECONOMICS (PIDE).

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
	SBCA, and other relevant institutions working in coordination to uphold energy efficiency standards in buildings[106].		Conservation Authority), Provincial Designated Agencies (PDAs), and other local bodies[107]. Sindh building control authority would likely play a role in influencing and implementing energy efficiency standards within Karachi.						
3. Enabling next-generation mobility				**Weighted Power Score (Col5XCol6) =**				**Weighted Capacity Score (Col9XCol10) =**	
3.1 (i) Who owns and is responsible for transport infrastructure and transportation	Public transport, regulated by the Department of Transport and Mass Transit, involves private	3.1 (ii) Does the city have the authority / mandate to influence, control, promote or implement the	The JICA Master Plan of 2012 and the Karachi Urban Transport Master Plan	2.5	0.25	3.1 (iii) Does the city have the capacity perform this role	Despite all efforts cater to a fraction of the population, leaving the majority dependent on	2	0.25

[106] National Energy Efficiency and Conservation Authority (NEECA), 2023. *Energy Conservation Building Code - 2023 ,* https://neeca.gov.pk/SiteImage/Downloads/ecbc23.pdf: National Energy Efficiency and Conservation Authority (NEECA).
[107] Ibid

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
systems in the city?	sector participation[109]. The Sindh Infrastructural Development Company Limited (SIDCL) spearheads infrastructure projects, including the Bus Rapid Service[110].	implementation of mass transit, walking and cycling infrastructure?	(KUTMP 2030) identified key transportation projects, including Bus Rapid Transit (BRT) corridors. As of 2023, Karachi's public transport includes buses, minibuses, and the recent introduction of Bus Rapid Transit (BRT) lines and the People's Bus Service. The KCR, partially reactivated in 2020, attempts to address some of the challenges[111].			effectively? Explain.	minibuses and facing challenges like overcrowding, route irregularities, and inadequate infrastructure		
3.2 (i) Who is responsible for	Sindh Mass Transit	3.2 (ii) Does the city have the authority /	The JICA Master Plan of 2012	2.5	0.25	3.2 (iii) Does the city have	To effectively influence, control,	2	0.25

[109] https://smta.sindh.gov.pk/
[110] https://sidcl.com.pk/
[111] https://www.worldbank.org/en/news/press-release/2020/12/08/world-bank-announces-300-million-for-pakistan-to-build-resilience-to-natural-disasters-and-health-emergencies

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
spatial / development planning in the city?	Authority (SMTA) and Sindh Infrastructure Development Company Limited (SIDCL)	mandate to influence, control, promote or implement the implementation of transit-oriented development in the city?	and the Karachi Urban Transport Master Plan (KUTMP 2030) identified key transportation projects, including Bus Rapid Transit (BRT) corridors . As of 2023, Karachi's public transport includes buses, minibuses, and the recent introduction of Bus Rapid Transit (BRT) lines and the People's Bus Service. The KCR, partially reactivated in 2020, attempts to address			the capacity perform this role effectively? Explain.	promote, or implement transit-oriented development (TOD), Karachi needs comprehensive reforms. Strengthening institutional structures, fostering inter-agency collaboration, aligning political interests with sustainable urban development, and improving urban planning are essential steps for Karachi to regain the capacity for successful TOD implementation[113].		

[113] Farhan Anwar, F. F. a. N. P., 2018. *SUSTAINABLE URBAN MOBILITY FOR KARACHI - A STRATEGIC FRAMEWORK,* https://www.shehri.org/publications_html/SUSTAINABLE%20URBAN%20MOBILITY%20FOR%20KARACHI%20PAPER%20FINAL.pdf: Friedrich-Naumann-Stiftung für die Freiheit and Shehri-Citizens for a Better Environment.

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
			some of the challenges[112].						
3.3 (i) Who owns and is responsible for controlling the procurement / operation of public transport vehicles in the city?	Sindh Mass Transit Authority (SMTA)	3.3 (ii) Does the city have the authority / mandate to influence, control, promote or implement that public transport vehicles use low / zero emissions technologies?	Karachi city has the mandate to implement that public transport vehicles use low / zero emissions technologies, as part of its urban transport policy and its commitment to fight climate change. The city has been planning to launch a zero-emission Red Bus Rapid Transit (BRT) network, with 200 buses fueled by bio-methane, which is produced from cow dung and other	2	0.25	3.3 (iii) Does the city have the capacity perform this role effectively? Explain.	Karachi faces challenges in its transition to low/zero-emission technologies. Funding, coordination, capacity, and political will are hurdles, compounded by a complex governance structure and a lack of a clear regulatory framework. Despite these challenges, Karachi's commitment to a zero-emission public transport system by 2030, supported by international donors, reflects a	1.5	0.25

[112] https://www.worldbank.org/en/news/press-release/2020/12/08/world-bank-announces-300-million-for-pakistan-to-build-resilience-to-natural-disasters-and-health-emergencies

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
			organic waste. The city also intends to reach a goal of zero emissions for its public transport system by 2030, and to integrate the gender perspective in the "Safe BRT Travel Program"[114].				significant step toward sustainable urban development[115].		
3.4 (i) Who owns and is responsible for commercial freight systems in the city?	SMTA, National Highway Authority, Pakistan Railways[116], Pakistan Civil Aviation Authority and Karachi Port Trust, Provincial	3.4 (ii) Does the city have the authority / mandate to influence, control, promote or implement commercial freight optimization?	National Freight and Logistics Policy (NFLP) is a policy document that outlines the strategic directions and actions for the development of	2	0.25	3.4 (iii) Does the city have the capacity perform this role effectively? Explain.		1	0.25

[114] Fighting climate change in Pakistan: The case of Karachi, Jan 17, 2023, https://talkofthecities.iclei.org/fighting-climate-change-in-pakistan-the-case-of-karachi/
Karachi Bus Rapid Transit (BRT) (sindh.gov.pk)

[115] Farhan Anwar, F. F. a. N. P., 2018. *SUSTAINABLE URBAN MOBILITY FOR KARACHI - A STRATEGIC FRAMEWORK,* https://www.shehri.org/publications_html/SUSTAINABLE%20URBAN%20MOBILITY%20FOR%20KARACHI%20PAPER%20FINAL.pdf: Friedrich-Naumann-Stiftung für die Freiheit and Shehri-Citizens for a Better Environment.

[116] https://www.pc.gov.pk/uploads/plans/Ch27-Transport-logistics2.pdf

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
	Traffic Police, Sindh Government, Qasim Port Authority, Ministry of Maritime Affairs Motorways Police, Pakistan National Shipping Corporations[117].		Pakistan's freight and logistics sector[118]. The NFLP recognizes Karachi city as the main hub of the freight and logistics sector in Pakistan.						
4. Improving solid waste management				**Weighted Power Score (Col5XCol6) =**				**Weighted Capacity Score (Col9XCol10) =**	
4.1 (i) Who owns and is responsible for solid waste management infrastructure and operational systems in the city?	Sindh Solid Waste Management Board	4.1 (ii) Does the city have the authority / mandate to influence, control, promote or implement waste minimisation, re-use and recycling?	The Sindh Solid Waste Management Board (SSWMB), established in 2014, plays a pivotal role in waste operations. Despite its existence, challenges persist,	2.5	1	4.1 (iii) Does the city have the capacity perform this role effectively? Explain.	The Sindh Solid Waste Management Board (SSWMB), Town Administrators, and other entities contribute to Karachi's waste management. The formal system encounters challenges such as inadequate	2	1

[117] NATIONAL FREIGHT AND LOGISTICS POLICY, April 28, 2020, *Ministry of Communications, Government of Pakistan, https://communication.gov.pk/SiteImage/Misc/files/National%20Freight%20and%20Logistic%20Policy.pdf*

[118] NATIONAL FREIGHT AND LOGISTICS POLICY https://communication.gov.pk/SiteImage/Misc/files/National%20Freight%20and%20Logistic%20Policy.pdf

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
			pointing to issues in implementation and coordination. While policies and frameworks exist at the provincial level, such as the Sindh Solid Waste Management Act, 2021; Sindh Environmental Protection Act, 2014; and Sindh Sanitation Policy, 2017; the effective implementation of these measures remains a significant challenge[119].				facilities, outdated vehicles, and insufficient funds. The informal sector, represented by scavengers, adds complexity to the overall waste management landscape. Despite the involvement of various stakeholders, including public, NGOs, and private firms, Karachi's waste management system struggles due to a lack of political will, coordination, and effective policies. The system involves front-end collection, garbage transfer stations, and landfill sites,		

[119] Waseem. S, An Analysis of Solid Waste Management in Karachi, February 04, 2021, https://www.paradigmshift.com.pk/author/sameen-wasim/

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
							but inefficiencies persist[120].		
5. Enhancing resilience of drinking water & wastewater/sanitation systems				**Weighted Power Score (Col5XCol6) =**				**Weighted Capacity Score (Col9XCol10) =**	
5.1 (i) Who owns and is responsible for bulk and distributed potable water supply infrastructure in the city?	Karachi Water and Sewerage Corporation (KW&SC)	5.1 (ii) Does the city have the authority / mandate to influence, control, promote or implement enhanced water security under conditions of increased climate change risk?	The existing water management and policy framework in Karachi involve multiple stakeholders and policies, including the Karachi Water & Sewerage Board Act 1996 (Amended 2015), Karachi Water and Sewerage Corporation Act, 2023, Sindh Environmental Protection Act 2014, and various national and provincial	3	0.5	5.1 (iii) Does the city have the capacity perform this role effectively? Explain.	Karachi's water challenges stem from governance issues, financial constraints, underperforming infrastructure, delays in crucial projects, and contamination. The overstaffing issue at the Karachi Water and Sewerage Corporation, dependency on public financing, and delays in critical projects like the K-IV water supply scheme contribute to an ongoing and	2.5	0.5

[120] An overview of solid waste management systems in the city of Karachi: past and present By Saeeduddin Ahmed and Mansoor Ali https://www.lse.ac.uk/Cities/Assets/Documents/RRR/LSE-Cities-field-report-03-RRR.pdf

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
			policies. Sindh Environmental Protection Agency (SEPA) and Karachi Water and Sewerage Corporation (KWSC) play pivotal roles in regulation and water supply[121] The Greater Karachi Bulk Water Supply System, initiated in 1953, has played a crucial role, but challenges persist, including outdated infrastructure and irregular supply				exacerbated water shortage[122].		

[121] WWF, Situational Analysis of Water Resources of Karachi, 2019, https://d2ouvy59p0dg6k.cloudfront.net/downloads/report___situational_analysis_of_water_resources_of_karachi.pdf
[122] Ibid

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
5.2 (i) Who owns and is responsible for wastewater / sanitation infrastructure in the city?	Karachi Water and Sewerage Corporation (KW&SC)	5.2 (ii) Does the city have the authority / mandate to influence, control, promote or implement water conserving sanitation systems that reduce health and ecological risks?	Sindh province has environmental protection legislation such as the Sindh Environmental Protection Act (2014) and Sindh Sanitation Policies, 2017, but their effectiveness in addressing Karachi's waste issues is questionable[123]. The Greater Karachi Sewerage Plan (S-III) emerges as a comprehensive strategy to	3	0.5	5.2 (iii) Does the city have the capacity perform this role effectively? Explain.	Karachi city has a serious problem with wastewater and solid waste, which pollute the water bodies and pose health risks. The existing sewerage and drainage system is insufficient and outdated, and the regulations and treatment facilities are inadequate[124]. SEPA regulations struggle to control industrial wastewater impact, with many industries exceeding allowable standards. The lack of treatment facilities in	2.5	0.5

[123] An overview of solid waste management systems in the city of Karachi: past and present By Saeeduddin Ahmed and Mansoor Ali https://www.lse.ac.uk/Cities/Assets/Documents/RRR/LSE-Cities-field-report-03-RRR.pdf
[124] Ibid

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
			overhaul the sewerage system.				numerous industrial units leads to direct discharges, further compromising water quality.		
6. Managing disasters, risks & impacts of extreme weather events & sea level rise				**Weighted Power Score (Col5XCol6) =**				**Weighted Capacity Score (Col9XCol10) =**	
6.1 (i) Who is responsible for disaster management in the city?	Provincial Disaster Management Authority, Sindh	6.1 (ii) Does the city have the authority / mandate to influence, control, promote or implement enhanced capacity for disaster response under increased climate change risk?	Sindh Disaster Management Authority (SDMA) defines disasters arising from natural and man-made and prepares and implements disaster management plan that includes preparedness and response with provincial and district offices in Karachi.	2	0.25	6.1 (iii) Does the city have the capacity perform this role effectively? Explain.	Despite the comprehensive governance structure, challenges persist, such as coordination issues, resource constraints, and climate-induced risks. The three-tier governance structure faces challenges such as political interference, bureaucratic inefficiency, fiscal imbalance, and coordination issues[125].	1	0.25

[125] Karachi Strategic Development Plan 2020, https://www.shehri.org/2020.pdf

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
			The Sindh Climate Change Act of 2022 establishes the provincial framework. The Environment, Climate Change and Coastal Development Department (ECC&CD) leads climate initiatives in Sindh, and the Provincial Implementation Committees on Climate Change oversees policy and action plans. Karachi's climate governance is embedded in its local government structure. The Karachi Metropolitan Corporation						

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
			(KMC) serves as the main local government body responsible for various aspects, including urban planning and management, transport, water and sanitation, solid waste management, energy and climate change, disaster risk management, social development, and governance.						
6.2 (i) Who is responsible for coastal infrastructure and / or risk management? (if relevant to your city)	The Environment, Climate Change and Coastal Development Department (ECC&CD) and Sindh Coastal Development Authority (SCDA)	6.2 (ii) Does the city have the authority / mandate to influence, control, promote or implement approaches and infrastructure that mitigates increased coastal risks	The Sindh Coastal Development Authority (SCDA) is a provincial government agency that was established in 2018 to plan, coordinate, and	2	0.25	6.2 (iii) Does the city have the capacity perform this role effectively? Explain.	Karachi city has some capacity to influence, control, promote or implement approaches and infrastructure that mitigate increased coastal risks associated with climate change,	1.5	0.25

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
		associated with climate change?	implement coastal development projects in the Sindh province, including Karachi. The SCDA aims to protect and restore the coastal environment, enhance the resilience and adaptation of coastal communities, and promote the sustainable use of coastal resources[126]				but it also faces many challenges and gaps. The existence of projects that aim to improve coastal resilience, such as the Building Resilience of Coastal Ecological and Social Systems of Pakistan project. However, it also faces challenges such as rapid urbanization, lack of data, poor coordination, and low awareness and capacity among coastal communities. Karachi city needs to address these gaps and enhance its adaptive capacity and		

[126] https://scda.sindh.gov.pk/

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
							resilience through collaborative and holistic approaches[127].		
6.3 (i) Who is responsible for storm water and / or river system management in the city?	Sindh Irrigation Department and KW&SC, PDMA & KMC	6.3 (ii) Does the city have the authority / mandate to influence, control, promote or implement infrastructure that addresses increased flooding risks under conditions of climate change?	The city has been implementing various initiatives and projects to improve its flood preparedness, response, and recovery such as Karachi Heat Wave Management Plan[128] by KMC	2	0.25	6.3 (iii) Does the city have the capacity perform this role effectively? Explain.	Karachi city faces various challenges in addressing the increased flooding risks due to climate change, such as insufficient funding, poor coordination, low capacity, and weak political will. The city needs more financial support, better governance, higher technical and institutional skills, and stronger leadership to implement effective flood infrastructure projects[129].	1	0.25
6.4 (i) Who is responsible for	MoCC, The Environment,	6.4 (ii) Does the city have the authority /	No	1.5	0.25	6.4 (iii) Does the city have		1.5	0.25

[127] Nazeer. M. Coastline Vulnerability Assessment through Landsat and Cubesats in a Coastal Mega City, Remote Sens. 2020, 12(5), 749; https://doi.org/10.3390/rs12050749
[128] https://ghhin.org/wp-content/uploads/HeatwaveManagementPlan.pdf
[129] In Karachi, Flooding Lays Bare City's Governance Issues, October 13, 2020, https://www.usip.org/publications/2020/10/karachi-flooding-lays-bare-citys-governance-issues

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
educating and empowering citizens and businesses to becoming more resilient to the impacts of climate change, and respond effectively to extreme weather events?	Climate Change and Coastal Development Department (ECC&CD) and PDMA, Sindh Education Department, Pakistan Meteorology Department, National and Provincial Disaster Management Authorities, Department of Agriculture, government media agencies, private media agencies[130].	mandate to influence, control, promote or implement climate change education and community empowerment in terms of climate resilience and disaster readiness?				the capacity perform this role effectively? Explain.			
7. Enhancing the resilience of natural capital				**Weighted Power Score (Col5XCol6) =**				**Weighted Capacity Score (Col9XCol10) =**	
7.1 (i) Who is responsible for controlling or promoting /	Sindh Irrigation Department	7.1 (ii) Does the city have the authority / mandate to influence, control,	The authority and mandate for agricultural policies,	0.5	0.5	7.1 (iii) Does the city have the capacity perform this		0.5	0.5

[130] PAKISTAN National Climate Resilience and Adaptation Plan 2023-2030, https://docc.sindh.gov.pk/files/DoCC/Documents/NAP%20Final%20Draft-edited.pdf#page=111&zoom=100,56,650

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
supporting agricultural production the city?		promote or implement support to farmers to help address food security issues associated with climate change?	support to farmers, and addressing food security issues generally lie with provincial or regional governments. In the context provided, it's mentioned that the Sindh Water and Agriculture Transformation (SWAT) project is focused on Sindh, indicating that the provincial government of Sindh is responsible for implementing such initiatives[131].			role effectively? Explain.			
7.2 (i) Who is responsible for controlling or promoting /	Sindh Forest Department	7.2 (ii) Does the city have the authority / mandate to influence, control,	Pakistan National Conservation	1	0.5	7.2 (iii) Does the city have the capacity perform this	Karachi city has some capacity to manage ecosystems for	0.5	0.5

[131] SINDH WATER AND AGRICULTURE TRANSFORMATION PROJECT https://irrigation.sindh.gov.pk/pub_SWAT.aspx?AspxAutoDetectCookieSupport=1

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
supporting management of natural ecosystems and / or nature areas in the city?		promote or implement better management of ecosystems as an approach to adapting to the risks and impacts of climate change?	Strategy[132] Sindh Environmental Protection Act, 2014; Sindh Wildlife Protection, Preservation, Conservation and Management Act 2020; and The Sindh Forest Act, 1927 (Amended 2023) is responsible for development, conservation, protection, sustainable management, governance, trade of forest produce including carbon and the transit of forest-produce and the duty			role effectively? Explain.	climate adaptation, thanks to its legal and policy framework. However, it also faces challenges such as rapid urbanization, lack of data, poor coordination, and low awareness.		

[132] https://portals.iucn.org/library/efiles/documents/WCS-PK-029.pdf

Question	Answer	Question	Answer	Power score 0 – 3*	Weighting	Question	Answer	Capacity score 0-3**	Weighting
			leviable on timber and other forest-produce and regulation of forestry ecosystem services[133].						

* Power score (Column 5):

0 – City does not own or manage any part of the infrastructure / system, nor does it have any control or influence over it.
1 – City does not own or manage any part of the infrastructure / system, but is able to influence or promote a more climate responsible approach to how it is implemented or managed.
2 - City has a role in implementing, managing or controlling the infrastructure / system, or owns / manages part of the infrastructure / system.
3 – City owns the infrastructure / system and has control over how it is planned, implemented or operated.

** Capacity[134] score (Column 9):

0 – city has **no capacity** to exercise its authority and mandate, **nor to carry out any** of its responsibilities with respect to the infrastructure or operational system in question
1 – city has capacity to exercise **limited aspects** of its authority and mandate, and / or is able to carry out **only some** of its responsibilities with respect to the infrastructure or operational system in question
2 – city has capacity to exercise **most aspects** of its authority and mandate, and / or is able to carry out **most** of its responsibilities with respect to the infrastructure or operational system in question

[133] https://sindhforests.gov.pk/page-the-sindh-forest
[134] When assessing capacity, consider whether there are sufficient human and financial resources, skills and experience for the function to be performed effectively by the person / department / agency.

3 – city has capacity to exercise **all aspects** of its authority and mandate, and / or is able to carry out **all** of its responsibilities with respect to the infrastructure or operational system in question

Annex 2: Climate Policy Context Data Sheet & Analysis Tools

Table 15: Key Internal Policies, Plans or Programmes Data Sheet

Column 1 - Name of Policy, Plan or Programme	Column 2 - Policy Type	Column 3 - Key focus / intent / objectives of the policy	Column 4 - Relevance to the City's Climate Action Plan
Karachi City			
Karachi Heatwave Management Plan (KHWMP 2017)	Climate / Environment Sector	KHWMP provides strategies to prevent heat-related illness and death in Karachi and equip the public, particularly the most vulnerable residents, to take protective action. It focuses on provision of information on weather conditions and heat health, and, increased organizational capacities to respond according to their roles, and set out management actions.	KCAP takes the recommendations and policy interventions one step further to what has been recommended under the KHWMP.
Karachi Strategic Development Plan 2020[135]	Strategic / Cross-cutting	The KSDP broadly identifies the keys issues social, environment, economic and urban infrastructure sectors, and consequently sets out the strategic framework and development plan / action program which are linked with the GHG emission reductions.	The strategic directions and actions given in KSDP will be helpful in devising mitigation and adaptation measures for climate resilience.
Provincial Scale / Sindh			
Sindh Climate Change Policy 2022	Climate / Environment Sector	The policy provides specific measures with key focus on mitigation, adaptation and capacity development processes for different sectors and sub-sectors to steer province towards climate compatible development and fulfil national commitments under Paris agreement and other international obligations.	The policy emphasizes on three roles of cities in the climate change arena. (i) Reduce the risk of climate change; (ii) Develop vulnerability/impact assessment profiles;

[135] Around 7 master plans were proposed for Karachi city in the past, including two before independence (1922 - Approved and 1946 – Not Approved). The attempts were made in 1952 (Swedish firm Merz Randal Vatten Plan – Not Approved), 1958 (The Greater Karachi Resettlement Plan – Not Approved), 1974 (Karachi Development Plan 1974-1985 – Never officially notified), 1991 (Karachi Coastal Management Plan – Approved), 2000 (The Karachi Development Plan – Never officially notified), and 2020 (Karachi Strategic Development Plan Notified by City Council and Karachi Master Plan - Draft). Here the latest plan i.e. KSDP Karachi strategic Development Plan 2020 is considered for assessing the relevance with K-CAP.

Column 1 - Name of Policy, Plan or Programme	Column 2 - Policy Type	Column 3 - Key focus / intent / objectives of the policy	Column 4 - Relevance to the City's Climate Action Plan
		Adaptation Actions: socio-economic measures, human health, agriculture and livestock, fisheries, water resources, biodiversity, forestry, disaster preparedness, land and vulnerable ecosystems, coastal and marine ecosystems, rangelands, wetlands, and deserts. Mitigation Actions: energy sector, industries, transport, solid waste, forestry and wildlife, agriculture, livestock and fisheries, and urban planning.	(iii) Develop strategies and actions for managing climate change issues at micro scale. The Karachi-Climate Action Plan apropos to the principles of actions define in the provincial climate change policy.
Sindh Growth Strategy 2017	Strategic / Cross-cutting	The strategy recognizes the potential for accelerating energy efficiency efforts in Sindh, in order to support and match efforts at the national level. The strategy also focuses on climate-change adaptation for water and sanitation services; building resilience in agriculture and livestock sector; modify building codes and construction guideline for climate compatible development, and development of resilient infrastructure that can sustain shocks from various disasters and climate impacts	The KCAP adaptation and mitigation actions will address the measures and strategies, provided in the Sindh Growth Strategy, in relation to future climate projections.
Sindh Water Policy 2023	Water Sector	The policy considers the challenges of water supply to cities, particularly in Karachi and focuses on the policy directions and actions on water governance in relation to climate induced pressures, and resilience to floods and droughts. Concerning population growth and climate extremes, the policy emphasizes on development of short-run and long-run water resource plans need to be made for the main cities and towns in Sindh.	KCAP will assess the impacts on the water resources and provide mitigation and adaptation actions concerning future climate scenarios.
Sindh Urban Transport Policy (year)	Transport Sector	With a 20 year' horizon, the Sindh Urban Transport Policy recognizes the emission share of transport sector and focuses to create an environmentally friendly transport system to lower the	In order to develop a pathway to accelerate the delivery of an emissions neutral Karachi City by 2050, the KCAP considers transport as a leading sector for climate hazard impacts assessment,

Column 1 - Name of Policy, Plan or Programme	Column 2 - Policy Type	Column 3 - Key focus / intent / objectives of the policy	Column 4 - Relevance to the City's Climate Action Plan
		toxic emissions, lower carbon footprint and improve health and wellbeing of the residents.	emission inventory and mitigative and adaptative measures for net zero emissions in a longer run.
Sustainable Development Goals Framework for Mainstreaming, Sindh, 2022	Climate / Environment Sector	Under this framework, the Government of Sindh has approved six priority SDGs and three cross-cutting Goals; in which SDG 13 Climate Action for the immediate, medium and long-term acceleration measures, is also included. The framework specifically focuses on Target 13.1 of the goal 13 for Sindh as a medium-term priority action and underlines the need to strengthen resilience and adaptive capacity to climate-related hazards.	The KCAP is directly linked with the ultimate goal SDG 13, and its Target 13.1 to enhance resilience and adaptive capacity of Karachi city through (evidence-based) sound actions.
Sindh Strategy for Sustainable Development 2007	Strategic / Cross-cutting	This strategy focuses on undertaking research and studying the impacts of climate change on multiple sectors such as agriculture, water, coastal and marine ecosystems, forests, wetlands, and rangelands.	An evidence-based, inclusive mitigation and adaptation plan to improve climate resilience and sustainable development is the corner stone of the KCAP.
Sindh Sanitation Policy 2016	Waste Sector	The policy sets the target i.e. Implementation of integrated solid waste management with 100% coverage in urban areas (and 60% in rural areas) of Sindh by 2025.	The KCAP emphasized on the net zero GHG emissions from the treatment of waste generated within the city boundary.
Sindh Agriculture Policy (2018-2030), 2018	Economic Development Sector	The policy aims for creating a resilient and climate smart agriculture to reduce GHG emissions through a number of mitigative and adaptive measures.	The agriculture sector is one of the key components of the consumption-based emission inventory under KCAP and the action plans will be developed and prioritize according to the sectoral contributions in the city.

Table 16: Key External Climate Policies, Plans or Programmes Data Sheet

Name of Policy, Plan or Programme	Policy Type	Key focus / intent / objectives of the policy	Relevance to the City's Climate Action Plan
National Environmental Policy 2005	Climate / Environment Sector	In relation to climate change, the policy recommends development of climate action policies and plans to effectively address challenges posed by climate change and emphasize on renewable energy and cleaner technologies.	Provide some guidance on national level strategies and proposals for better environmental quality and wellbeing of the citizens.
National Transport Policy 2018	Transport Sector	Strengthening the resilience of transport infrastructure and services, as well as reducing the greenhouse gas emissions is a core of any future developments to adapt and mitigate climate change.	The KCAP aims for a climate neutral city through net zero GHG emissions from fuel consumption sectors, including transport.
National Electric Vehicle (EV) Policy, 2019	Transport Sector	The main objective of this policy is to mitigate climate change through emission reduction from transport sector	
Alternative & Renewable Energy Policy – ARE 2019	Energy Sector	The main focus of this policy is to safeguard the environment by increasing the share of "green" energy in the overall energy mix of the country. It considers alternative and renewable energy options such as biomass, geothermal, ocean /tidal wave energy, solar, wind, etc.	The KCAP focusing on 'transformational actions' related to decarbonising the electricity grid, optimising energy use in buildings leading to net zero emissions. It will seek guidance from these policy measures for prioritization of actions.
Updated Nationally Determined Contributions – NDCs 2021	Strategic / Cross-cutting	As per NDCs 2021, Pakistan intends to set a cumulative ambitious aim of conditional and voluntary contributions of overall 50% reduction of its projected emissions by 2030, with a 15% drop below business as usual (BAU) from the country's own resources, and an additional 35% drop below BAU subject to international financial support.	The targets defined in NDCs will be the cornerstone of KCAP in designing and prioritizing mitigation measures for emission reduction.
National Climate Change Policy – NCCP 2021	Climate / Environment Sector	The key focus of NCCP is to ensure that climate change is mainstreamed in the economically and socially vulnerable sectors of the economy and to steer Pakistan towards climate compatible development. It emphasizes on the development of GHG inventories and their continuous updation, and reliable	The interventions under KCAP will be aligned with the NCCP policy measures and will help in developing emission inventory for Karachi city, along with

Name of Policy, Plan or Programme	Policy Type	Key focus / intent / objectives of the policy	Relevance to the City's Climate Action Plan
		projections of climate changes scenarios, seasonal forecasts and inter- annual forecasts for different parts of Pakistan.	future climate scenarios for evidence-based climate action planning in the city.
National Hazardous Waste Management Policy 2022	Waste Sector	The policy aims for environmentally sound management of hazardous waste in Pakistan in keeping with the provisions of the relevant MEAs, to safeguard public health and the environment.	Safe disposal and effective waste management are integral part of the KCAP.
National Clean Air Policy – NCAP 2023	Climate / Environment Sector	The key focus of the policy is to improve air quality in the country through implementation of various strategic, technological, and management actions including monitoring of the air quality in a. Transport b. Industry c. Agricultural waste/Biomass d. Solid Waste e. Residential/Building sectors.	KCAP is directly linked with the policy objectives and strategic measures defined in NCAP.

Table 17: Goals / Targets / Objectives Alignment Review Sheet

Column 1 - Category 1. Emissions reductions goals / targets	Column 2 - National	Column 3 – Regional/Provincial	Column 4 - Local	Column 5 – Alignment with KCAP
2. Renewable Energy goals / targets	**National**	**Regional/Provincial**	**Local**	**Alignment?**
By 2030, 60 % of all energy produced in the country will be generated from renewable energy resources including hydropower.	NDCs 2021			Contributes to national targets
From 2020, new coal power plants are subject to a moratorium, and no generation of power through imported coal shall be allowed, shelving plans for two new coal fired power plants in favour of hydroelectric power and focusing on coal gasification and liquefaction for indigenous coal.	NDCs 2021			Contributes to national targets
By 2025, 20% renewable energy generation and at least 30% by 2030	ARE 2019			Contributes to national targets
3. Energy Demand Reduction goals / targets	**National**	**Regional/Provincial**	**Local**	**Alignment?**
4. Low Emissions Mobility / Transport goals / targets	**National**	**Regional/Provincial**	**Local**	**Alignment?**
By 2030, 30 % of all new vehicles sold in Pakistan in various categories will be Electric Vehicles (EVs).	NDCs 2021			Contributes to national targets
EV Penetration Targets:	Ev Policy, 2019			Contributes to national targets
By 2030, 30% of New Sales (Approximately 60,000) of Cars (including Vans, Jeeps and small Trucks) and 90% of New Sales by 2040				
By 2030, 50% of New Sales (Approximately 90,000) of Two and Three Wheelers and 90% of New Sales by 2040				

By 2030, 50% of New Sales of Buses and 90% of New Sales by 2040				
By 2030, 30% of New Sales of Trucks and 90% of New Sales by 2040				
5. Waste Emissions Reduction goals / targets	**National**	**Regional/Provincial**	**Local**	**Alignment?**
6. Climate Resilience / Adaptation goals / targets	**National**	**Regional/Provincial**	**Local**	**Alignment?**
By 2023, total protected areas in the country will be enhanced from 12% to 15% that will result in preserving rare fauna / flora, green job opportunities for 5,500 people, and promoting ecotourism.	NDCs 2021			Contributes to national targets

Annex 3: City Context Indicator Data Sheet

Table 18: City Context Indicator Data Sheet

Theme	Indicator	Indicator Data	Data (year, trend and source)	Notes
Climate	Climate type	BWh Climate (B = Arid, W= Desert h= hot Arid) or subtropical hot desert	Beck, H. E., Zimmermann, N. E., McVicar, T. R., Vergopolan, N., Berg, A., & Wood, E. F. (2018). Present and future Köppen-Geiger climate classification maps at 1-km resolution. Scientific data, 5, 180214. https://doi.org/10.1038/sdata.2018.214. https://www.karachi.climatemps.com/	
	Annual average temperature (Celsius)	Between 12.8℃ to 34.4℃	Aslam, B., Maqsoom, A., Khalid, N., Ullah, F., & Sepasgozar, S. (2021). Urban overheating assessment through prediction of surface temperatures: A case study of karachi, Pakistan. ISPRS International Journal of Geo-Information, 10(8), 539.	
	Average annual rain (mm)	278.6 millimetres	Pakistan Meterological Department https://web.archive.org/web/20100613053222/http://www.pakmet.com.pk/cdpc/Climate/Karachi_Climate_Data.txt	
	Average annual snowfall (cm)	N.A	N.A	
Administrative & Physical Geography	Average elevation above mean sea level	10cm (in last 100 years) and projected to rise by 60 cm (in next 100 years)	Chaudhry, Q-Z. (2017). Climate Change Profile of Pakistan. Asian Development Bank, Manila, Philippines.	
	Land area (Square kilometres)	3,527 sq. km	Muhammad Fahad Baqa, F. C. (2021). Monitoring and Modeling the Patterns and Trends of Urban Growth Using Urban Sprawl Matrix and CA-Markov Model: A Case Study of Karachi, Pakistan. MDPI, Land, 10(7), 700; https://doi.org/10.3390/land10070700.	
	Predominant land uses (percentage of total land area)	The size of the built-up area increased massively in Karachi 2000-2020, whereas the amount of open bare land declined by more	Baqa, M. F., Lu, L., Chen, F., Nawaz-ul-Huda, S., Pan, L., Tariq, A., ... & Li, Q. (2022). Characterizing spatiotemporal variations in the	

Theme	Indicator	Indicator Data	Data (year, trend and source)	Notes
		than 76.76% during----, and the area covered by vegetation increased by 68.35%	urban thermal environment related to land cover changes in Karachi, Pakistan, from 2000 to 2020. *Remote Sensing*, *14*(9), 2164.	
	Percentage of transformed land uses relative to total land area	In 1990, Bare Land (2663 km2), (2811 km2 in 2000), (2492 km2 in 2010), and (2156 km2 in 2020) with Change Rate % between 2010-2020 (-13.44%) Built Up Area in 1990 (221.1 km2), (3587 km2 in 2000), (424.3 km2 in 2010), and (573.9 km2 in 2020) with Change Rate % between 2010-2020 (35.25%) Cultivated Land in 1990 (112.2 km2), (159.3 km2 in 2000), (148.4 km2 in 2010), and 81.5 km2 in 2020) with Change rate % between 2010-2020 is (-45.08%) Grassland and Shrub Land in 1990 (534 km2), (370.5 km2 in 2000), (563 km2 in 2010), and (867.7 km2 in 2020 with Change rate % between 2010-2020 is 54.12 % Mangroves in 1990 (65.9 km2), (13.8 km2 in 2000), (14.2 km2 in 2010), and (17km2 in 2020) with Change rate % between 2010-2020 is 19.71 %. Water bodies in 1990 (23.8 km2), (46.5 km2 in 2000), (54 km2 in 2010), and (56.8 km2 in 2020) with Change rate % between 2010-2020 is 5.18%.	Between 1990 and 2020, the area covered by built-up area and grassland and shrubland expanded, while the area occupied by agricultural land, mangroves, and open bare ground declined. Muhammad Fahad Baqa, F. C. (2021). Monitoring and Modeling the Patterns and Trends of Urban Growth Using Urban Sprawl Matrix and CA-Markov Model: A Case Study of Karachi, Pakistan. MDPI, Land, 10(7), 700; https://doi.org/10.3390/land10070700.	
	Length of coastline	In Karachi Master Plan 2020 / Karachi Strategic Development Plan 2020[136], Karachi Coast Line is 135 km. in length from Ras Muari to Clifton beaches consist of low rocky cliffs and sandy beaches of almost equal length.	Sheeba Afsar, H. M. (2013). Monitoring of the Shoreline Change and Its Impact on Mangroves Using Remote Sensing and GIS: A Case Study of Karachi Coast, Pakistan. International Journal of Biology and Biotechnology, 10 (2): 237-246 https://www.researchgate.net/publication/299657115	

[136] https://www.shehri.org/2020.pdf

Theme	Indicator	Indicator Data	Data (year, trend and source)	Notes
	Total water surface area (wetlands, dams, deltas, rivers, estuaries) (Square km)	Total surface water within city boundary its 94.7 km2. **Main Surface Water Resources** Haleji Lake, Keenjhar Lake and River Hub are main surface water resources of Karachi on which the city relies. • Lake Haleji: 17.04 km2 • Lake Keenjhar: 98.42 km2 • Hub Dam: 272.19 km2 The basin of Karachi is drained by the three major rivers, i.e., Hab, Malir, and Lyari Rivers and their tributaries. The Malir River and Lyari River contributed the most of the stormwater because they are located within the city, while the Hab River lies in western part of Karachi city which ultimately drained in the Arabian Sea, at the western border of Karachi city distric **Surface Storm Water Resources** The basin of Karachi is drained by the three major rivers, Hab, Malir, and Lyari Rivers and their tributaries. • River Malir Basin Area: 2254 km2 • River Lyari Basin Area: 578 km2 • The catchment of Hab River is located in thenorth of Karachi in Balochistan province of Pakistan, spread-ing over 8832 km2	M. Ali Khan, R. Z. (2006). QUALITY OF DRINKING WATER IN HUB RIVER CATCHMENT AREA, SINDH. *International Journal and Biology and Biotechnology*, 3 (1): 161-167 . (Hub Dam Area) WWF. (2019). *Situational Analysis of Water Resources of Karachi*. https://d2ouvy59p0dg6k.cloudfront.net/downloads/report___situational_analysis_of_water_resources_of_karachi.pdf: European Union and WWF. Muhammad Irfan, S. J. (2018). Sustainable harnessing of the surface water resources for Karachi:a geographic review. *Arabian Journal of Geosciences* , 11:24 https://doi.org/10.1007/s12517-017-3365-6. https://www.researchgate.net/publication/322391697_Sustainable_harnessing_of_the_surface_water_resources_for_Karachi_a_geographic_review (Hub River and Storm Water Resources) (Need to add wetlands and other water bodies – Urban Unit team)	
Environmental Quality	City Biodiversity Index			
	Percentage of area under formal conservation	According to Biodiversity Action Plan for Pakistan, 2000, there is a network of 225 Protected Areas comprising 14 National Parks, 99 Wildlife Sanctuaries, 96 Game Reserves, and 16 unclassified	Mehmet, S. A. (2009). Review of Protected Areas System in Pakistan: Present Status and Problems Concerning Future Development: Pakistan 'Daki Korunan Alanlar Sisteminin Değerlendirilmesi: Mevcut Durum ve Gelecekteki Gelişm. *Ankara*	

Theme	Indicator	Indicator Data	Data (year, trend and source)	Notes
		(private, proposed or recommended) in Pakistan. The total area covered by these categories is 9,170,121 ha which makes 10.4% of the total land area. Summary of Protected Areas in Sindh, • National Park: 1 • Wildlife Sanctuaries 35 • Game reserves: 14 • Unclassified 4 • And Total Protected Areas: 54 • Total Area Conserved (ha) 1,307,575 • Percentage of Total Land Area Protected 9.27% **National Kirthar Park:** 73, 000 ha and 20% Hub Dam, 27, 219, Karachi/Balochistan (Important Habitat for Grey and Black Partridges. Sandrouses, Houbara Bustard, Water birds)	*Üniversitesi Çevrebilimleri Dergisi*, DOI:10.1501/Csaum_0000000010. https://dergipark.org.tr/en/download/article-file/565571 WWF. (2019). *Situational Analysis of Water Resources of Karachi*. https://d2ouvy59p0dg6k.cloudfront.net/downloads/report___situational_analysis_of_water_resources_of_karachi.pdf: European Union and WWF. (National Kirthar Park Area)	
	Fine Particulate Matter (PM2.5) concentration	Annually 37.03 µg/m^3 in 2023 and 43.92 µg/m^3 in 2019 The peak in concentration in 2021 is consistent with the findings of the report published by Clean Air Asia. A comparison of average annual air quality in 31 major cities of the world from 2018 to 2021, shows that the increase in $PM_{2.5}$ concentrations in Karachi i.e. 53.70 µg/m^3	Annual Average PM2.5 Concentration (2019-2023) US Consulate Karachi Continous AQMS Beta-Attenuation Monitor (BAM) CleanAir Asia. (2022). China's 10-Year Path Toward Clean Air: An Asian Perspective. China Air Special issue 2022.	
	Particulate Matter (PM10) concentration	Average Monthly value of PM10 is 45.76 µg/m^3 (March 2022 to October 2023)	Air Quality at Kemari, Karachi, Purple Air Sensor. https://aqicn.org/station/pakistan-keamari-kmi_064/	
	NO_2 (nitrogen dioxide) concentration	Annual Average Concentration of NO2 in 2022 was 156x10^-6 mol/m^2 (highest in city center) and 63x10^-6 mol/m^2 (lowest in outskirts)	Data Analysis of Sentinel 5P, by the Urban Unit	

Theme	Indicator	Indicator Data	Data (year, trend and source)	Notes
	SO_2 (sulphur dioxide) concentration	Annual Average Concentration of SO2 in 2022 was 237x10^-6 mol/m² (highest) and -24x10^-6 mol/m² (lowest)	Data Analysis of Sentinel 5P, by the Urban Unit	
	Greenhouse gas emissions measured in tonnes per capita (include trend)			
Solid Waste Management	Percentage of city population with regular solid waste collection (residential)	75 to 80 percent of the Solid Waste is collected and transported to dumpsites.	Updated Environmental and Social Management Framework, Solid Waste Emergency and Efficiency Project (The World Bank), March 2023 Ali, S. A. (2022). *An overview of solid waste management systems in the city of Karachi: past and present.* https://www.lse.ac.uk/Cities/Assets/Documents/RRR/LSE-Cities-field-report-03-RRR.pdf: Rubbish, Resources and Residues - Field Report 03, London School of Economics and Political Science (LSE Cities).	
	Total collected municipal solid waste per capita	According to the estimates of SSWMB, indigenous waste lying open at the landfill sites of Karachi is 54% organic in nature, while the remaining waste comprises recyclable waste including paper (11.5%), plastic (10%), glass (7%), metal (4.5%) and other inorganic waste (10%), while hazardous waste constitutes about 2% of Karachi's solid waste.	Ahmed, S., Ali, M., & Basti, A. (2022). An overview of solid waste management systems in the city of Karachi: past and present. Rubbish, Resources and Residues: waste and well-being in Ethiopia and Pakistan.	
	Percentage of the city's solid waste that is recycled	As per this article only 1000 tons per day is recycled (which is 8.3 percent) of the garbage is re-utilized that too only by way of the scavengers.	Tackling Karachi's garbage crisis | Heinrich-Böll-Stiftung Afghanistan/Pakistan (boell.org)	
	Percentage of the city's solid waste that is disposed of in a sanitary landfill	None of the waste is disposed off in the sanitary landfill site.	Updated Environmental and Social Management Framework, Solid Waste Emergency and Efficiency Project (The World Bank), March 2023	

Theme	Indicator	Indicator Data	Data (year, trend and source)	Notes
	Percentage of the city's solid waste that is disposed of in an incinerator	20% of hospital waste (200-250 tons/day) is incinerated	World Bank. (2018). Transforming Karachi into a Livable and Competitive Megacity: A City Diagnostic and Transformation Strategy. Washington, DC. 'Feasibility Study – Integrated Medical Hazardous Waste Management, Karachi' SSWMB	
	Percentage of the city's solid waste that is burned openly	30% of the uncollected waste is openly burned	Iqbal, A., Abdullah, Y., Nizami, A. S., Sultan, I. A., & Sharif, F. (2022). Assessment of solid waste management system in Pakistan and sustainable model from environmental and economic perspective. Sustainability, 14(19), 12680.	
	Percentage of the city's solid waste that is disposed of in an open dump	It is estimated that out of the amount of 12000 tons/ day, only up to 10,000 TPD of solid waste is collected and the remainder is dumped into open spaces such as roadsides, rainwater drains, pavements and empty plots.	https://www.lse.ac.uk/Cities/Assets/Documents/RRR/LSE-Cities-field-report-03-RRR.pdf https://www.mdpi.com/2673-4591/12/1/19	
	Percentage of the city's solid waste that is disposed of by other means	None		
	Hazardous waste generation per capita	It is estimated total of 200 to 250 ton hospital waste and clinical waste is generated daily in Karachi city. Term Medical Waste, Hospital Waste, Healthcare Waste, Medical Hazardous waste is interchangeably used to denote the waste generated in hospitals, health centres, clinics, blood banks and laboratories. The country generates hospital waste at a rate of about 0.667 kilograms per hospital bed per day, on average (Ali, Wang, and Chaudhry 2016). About 10%–25% of this waste (Hashmi and Varma 2019) is infectious, and hence hazardous.	Request for Proposal for Hiring of Consulting Firm For 'Feasibility Study – Integrated Medical Hazardous Waste Management, Karachi' SSWMB Solid Waste Management Sector in Pakistan, A Reform Road Map for Policy Makers, Asian Development Bank, March 2022.	

Theme	Indicator	Indicator Data	Data (year, trend and source)	Notes
	Percentage of city's hazardous waste that is recycled	None		
Energy	Total residential electrical energy use per capita (kWh/ year)	3032 KWh (8041 million KWh/2651527 domestic consumers) 2,267 megawatts and an additional 1,162 MW from external sources	https://sbos.sindh.gov.pk/files/SBOS/Development%20Statistics/SINDH%20STATISTICS%202022-04092023.pdf	
	Percentage of city population with authorized electrical service			
	Energy consumption of public buildings per year (kWh/m²)			
	Percentage of total energy derived from renewable sources, as a share of the city's total energy consumption	20.32%	https://www.ke.com.pk/our-business/generation/	
	Total electrical energy use per capita (kWh/year)	5045 KWh (16070 million KWh/3185332 consumers)	https://sbos.sindh.gov.pk/files/SBOS/Development%20Statistics/SINDH%20STATISTICS%202022-04092023.pdf	
	Average number of electrical interruptions per customer per year			
	Average length of electrical interruptions (in hours)			

Theme	Indicator	Indicator Data	Data (year, trend and source)	Notes
Disaster Management	Number of firefighters / disaster management staff per 100 000 population			
	Number of volunteer and part- time firefighters / disaster management volunteers per 100 000 population			
	Number of natural disaster related deaths per 100 000 population per year			
Transportation	Kilometres of high capacity pubic transport system per 100 000 population	Operational BRT Green Line – 22 km – 100,000 passengers per day BRT Orange Line – 3.88 km – 50,000 passengers per day Planned till 2030; Red Line – 29 km Blue Line – 10.1 km Yellow Line – 26 km Karachi Circular Railways – 43.13 km – expected 550,000 passengers/day	Mass Transit Projects in Karachi. (2018). Transport and Mass Transit Department Government of Sindh. https://www.c40.org/wpcontent/static/other_uploads/images/2251_Presentation_KMTP.original.pdf?1560523481	
	Kilometres of light passenger public transport system per 100 000 population	Average per trip length for Qingqis – 12.87 km – 8 passengers per trip Average per trip length for Minibuses – 49 km – 28 passengers per trip Average per trip length for Buses – 24 km – 60 passengers per trip	Noman, S. M., Ahmed, A., & Ali, M. S. (2020). Comparative analysis of public transport modes available in Karachi, Pakistan. *SN Applied Sciences*, *2*, 1-13.	

Theme	Indicator	Indicator Data	Data (year, trend and source)	Notes
	Annual number of public transport trips per capita	There are more 24.2 million person trips generated in Karachi every day, out of which at least 60 per cent are realised through the existing system of public transport. An approximate 60 per cent of those trips are made by students in various categories.	Karachi transport conundrum. The Transport Conundrum (tribune.com.pk)	
	Number of personal automobiles per capita	24,000 motorbikes and 7,500 private cars are monthly registered0.046 per capita ownership of personal automobiles using the number of vehicles on road (938,010) in Karachi	Mass Transit Projects in Karachi. (2018). Transport and Mass Transit Department Government of Sindh. (Available Sindh Development Statistics 2022	
	Percentage of commuters using a travel mode other than a personal vehicle	The URC research of the year 2014 mentions that out of more than 3.6 million vehicles, public transport is 4.5 per cent and carries 42 of the total load of commutation	Karachi transport conundrum. The Transport Conundrum (tribune.com.pk)	
	Kilometres of bicycle paths and lanes per 100 000 population			
Water and Sanitation	Percentage of city population served by wastewater collection / access to improved sanitation	The sewerage network provides coverage to 60% of the city	World Bank. (2018). Transforming Karachi into a Livable and Competitive Megacity: A City Diagnostic and Transformation Strategy. Directions in Development. Washington, DC: World Bank. doi:10.1596/978-1-4648-1211-8.	
	Percentage of the city's wastewater that has received no treatment	67.1%	Karachi Master Plan 2020/ Karachi Strategic Development Plan 2020[137]	
	Percentage of city population with potable water supply service /	85%	https://www.kwssip.gos.pk/wp-content/uploads/2021/11/Environmental-Management-Framework.pdf	

[137] https://www.shehri.org/2020.pdf

Theme	Indicator	Indicator Data	Data (year, trend and source)	Notes
	access to an improved water source			
	Total domestic water consumption per capita (litres/day)	54 gallon/capita which is equals to 245.5 liters/capita/day assumed by KWSB	https://www.researchgate.net/publication/374284342_Quantifying_Household_Water_Use_and_Its_Determinants_in_Low-Income_Water-Scarce_Households_in_Karachi	
	Percentage of water loss (unaccounted for water)	About 30-35% of water supplied to the city is lost due to obscure and rusty infrastructure and chronic leakages	Alamgir, A., Khan, M. A., Iftikhar, T., & Shaukat, S. S. (2021). Public health assessment and water quality index of tanker water available in Karachi City. International Journal of Biology and Biotechnology, 18(2), 281-297.	
Economy	Average household income (USD)	PKR 56,000	State of Pakistani Cities, UN Habitat State-of-Pakistani-Cities-SPC-report.pdf (unhabitat.org.pk)	
	Annual inflation rate based on average of last 5 years	Annual inflation rate based on average of last 5 years – 17.2% Inflation Rate per year in 2021 – 10.7% Inflation Rate per year in 2021 – 8.9% Inflation Rate per year in 2022 – 12.2% Inflation Rate per year in 2023 – 29.2% Inflation Rate per year in 2024 – 25% (forecasted)	Asian Development Bank. 2023. https://www.adb.org/where-we-work/pakistan/economy	
	Cost of living	The average cost of living in Karachi is $362, which is in the top 3% of the least expensive cities in the world (bottom 6th rank in Cost-of-Living Index Report 2022)	Estimations of Economic Research Institute (ERI) https://livingcost.org/cost/pakistan/karachi Worldwide Cost of Living 2022 https://bluesyemre.files.wordpress.com/2022/12/worldwide-cost-of-living-2022-summary.pdf	
	Income distribution (Gini Coefficient)	29.6 (2018)	World Bank: https://data.worldbank.org/indicator/SI.POV.GINI?end=2018&locations=PK&start=1987&view=chart	

Theme	Indicator	Indicator Data	Data (year, trend and source)	Notes
	Country's GDP (USD)	374.7 billion USD (2022)	World Bank: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=PK	
	Country's GDP per capita (USD)	1588.9 USD (2022)	World Bank: https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=PK	
	City GDP (USD)	USD 176.2 billion USD 449 million per day	C40: https://www.c40.org/cities/karachi/ https://www.nation.com.pk/01-Sep-2020/karachi-the-backbone-of-pakistan	
	City GDP per capita (USD)			
	City GDP as a percentage of Country's GDP	20 - 25%	20% - World Bank https://www.wbgkggtf.org/node/3338 25% - https://www.nation.com.pk/01-Sep-2020/karachi-the-backbone-of-pakistan; United States Institute of Peace https://www.usip.org/sites/default/files/PW82-Conflict%20Dynamics%20in%20Karachi.pdf	
	City unemployment rate	11.2%	Gallup Pakistan and Policy Research, Innovation, Development and Education https://www.dawn.com/news/1759476 https://www.gallup.com.pk/ https://gnnhd.tv/news/21279/karachis-youth-unemployment-rate-reaches-112	
	Country unemployment rate	6.3%	Pakistan Labor Force Survey (2020-21) https://www.pbs.gov.pk/sites/default/files/labour_force/publications/lfs2020_21/LFS_2020-21_Report.pdf	

Theme	Indicator	Indicator Data	Data (year, trend and source)	Notes
	City employment percentage change based on the last 5 years			
People	Total city population	20.3 million	National Digital Census 2023	
	Languages spoken	42.3% Urdu speakers, 19.4% Pashtuns, 10.7% Punjabis, 10.7% Sindhis, 4.0% Balochis, 5.0% Saraikis, and 0.39% Kashmiris. Others, comprising foreigners and illegal immigrants, constitute 2% of the population	The 2017 Census	
	Population density (per square kilometre)	The city's density also increased from 2,794.53 persons per square kilometre to 4,543.49 persons per square kilometre	Pakistan Population Census 2017 https://urckarachi.org/2022/08/17/what-the-census-tells-us-about-karachi/)	
	Percentage of country's population	8.4% of country's population	Pakistan Population census 2023	
	Percentage of population that are children (0-14)	35.6% (Under 16 population)	Pakistan Population census 2017 https://www.pbs.gov.pk/sites/default/files/population/2017/tables/sindh/Table05p.pdf	
	Percentage of population that are youth (15-24)	20.03	Pakistan Population census 2017 https://www.pbs.gov.pk/sites/default/files/population/2017/tables/sindh/Table05p.pdf	
	Percentage of population that are adult (25-64)			
	Percentage of population that are senior citizens (65+)	3.48	Pakistan Population Census 2017 https://www.pbs.gov.pk/sites/default/files/population/2017/tables/sindh/Table05p.pdf	

Theme	Indicator	Indicator Data	Data (year, trend and source)	Notes
	Male to female ratio (number of males per 100 females)	110	Pakistan Population Census 2017 https://www.pbs.gov.pk/sites/default/files/population/2017/tables/sindh/Table05p.pdf	
	Annual population change	4.10	Pakistan Population census 2023 https://www.pbs.gov.pk/sites/default/files/population/2023/Sindh.pdf	
	Population dependency ratio			
	Percentage of population that are foreign born			
	Percentage of population that are new immigrants			
	Percentage of residents who are not citizens			
Housing	Total number of households	3,439,220	Pakistan Population census 2023 https://www.pbs.gov.pk/sites/default/files/population/2023/Sindh.pdf	
	Total number of occupied dwelling units (owned & rented)	60.12% Owned dwelling units and 34.6% Rented dwelling units in Karachi	Pakistan Population census 2017 WHAT THE CENSUS TELLS US ABOUT KARACHI – Urban Resource Centre (urckarachi.org)	
	Persons per unit	5.93	Pakistan Population census 2023	

Theme	Indicator	Indicator Data	Data (year, trend and source)	Notes
			https://www.pbs.gov.pk/sites/default/files/population/2023/Sindh.pdf	
	Average dwelling density (per square kilometre)	Total Households of Karachi is 3,439,220 as per Pakistan Population Census, 2023	Pakistan Population census 2023 https://www.pbs.gov.pk/sites/default/files/population/2023/Sindh.pdf	
	Percentage of city population living in slums	In Karachi, 64 per cent of the population live in 986 Katchi Abadis, 562 of which are regularised by the government and the remaining 424 are non-regularised, hence without the security of tenure.	UN-Habitat helps Pakistan to lower greenhouse gas emissions in slums | UN-Habitat (unhabitat.org)	
Government	Type of government (e.g. local, metro, regional, county)	Local Government (Karachi Metropolitan Corporation)		
	Gross operating budget (USD)	114 million USD (Total Budget 2022-23)	Wahab presents KMC budget (tribune.com.pk)	
	Gross operating budget per capita (USD)			
	Gross capital budget (USD)			
	Gross capital budget per capita (USD)			

Annex 4: Climate Actions Baseline Data Sheet

Table 19: Climate Actions Baseline Data Sheet

Sector	Mitigation / adaptation focus	Project Name	Brief description	Current status	Financing / Funding of actions	City Commitment
Transport	Mitigation	Bus Rapid Transit (BRT) Red Line Project[138]	Improved the public transport system through reduced journey time, efficient and safe connectivity and affordability	Under construction	Funded by the Asian Development Bank and the Green Climate Fund	Reported to the CDP-ICLEI Track and committed to Race to Zero
	Adaptation	Safe BRT Travel Program, Karachi[139]	Trained staff, put up anti-harassment posters with reporting numbers/helplines, have separate stations for males and females and have installed recording mechanisms in place to ensure safety	Ongoing		
	Adaptation and Mitigation	Karachi Mobility Project[140]	Improved access to jobs, mobility, and safety through a Bus Rapid Transit system along the 21-km Yellow Corridor, with a key focus area on providing safe and secure transport for women's mobility. The thematic area 'Environment and Natural Resource Management' focuses heavily on the mitigation aspects (emission reduction) of Karachi City.	Ongoing	Funded by the World Bank	Not specified.
	Mitigation	Green BRT Karachi Project (2020 - 2024)	Build a zero-emissions bus rapid transit (BRT) system for Karachi. Innovative features for improved livability and reduced emissions.	Ongoing	GCF	Yes
Forestry	Adaptation	Miyawaki Forests in Karachi[141]	Planted small forests in different parts of the city to increase its green cover	Ongoing	Funded by the KMC	Reported to the CDP-ICLEI Track and committed to Race to Zero

[138] Pakistan: Karachi Bus Rapid Transit Red Line Project, https://www.adb.org/projects/47279-002/main
[139] https://talkofthecities.iclei.org/fighting-climate-change-in-pakistan-the-case-of-karachi/
[140] World Bank. (2019). Karachi Mobility Project. https://projects.worldbank.org/en/projects-operations/project-detail/P166732
[141] Ibid

Sector	Mitigation / adaptation focus	Project Name	Brief description	Current status	Financing / Funding of actions	City Commitment
	Adaptation and Mitigation	Green Pakistan Upscaling Programme Phase-1/Ten-Billion Tree Tsunami Project[142]	A number of plantation activities (block plantation, linear plantation, nurseries, and Assisted Natural Regeneration (ANR)	Ongoing (Phase-I)	Government of Pakistan through MoCC	Not Specified
	Adaptation and Mitigation	Clifton Urban Forest[143]	Urban forest initiative using Miyawaki Method for cooling and biodiversity	Ongoing, expanded since 2015	Funded by Sugi Projects, Rotary Club, crowdfunding, and corporations	Initiative by Shahzad Qureshi in Karachi
	Adaptation and Mitigation	Delta Blue Carbon (DBC-1) and DBC-2 projects	Focused on restoring and planting mangrove forests in the Indus Delta. The DBC-1 project has generated 3.1 million carbon credits to date, worth around $40 million.[144]	Ongoing (DBC 2)	Indus Delta Capital	Not specified
Waste management	Adaptation	Solid Waste Emergency and Efficiency Project, Karachi[145]	Constructed new sanitary disposal cells, upgraded transfer stations, acquired new equipment and developed a long-term waste solution plan for Karachi	Ongoing	Funded by the World Bank	Reported to the CDP-ICLEI Track and committed to Race to Zero
Renewable energy	Mitigation	Power Acquisition Programme, Karachi[146]	Outlined Karachi Electric's long-term planning for power supply from FY 2024 to FY 2030, with a focus on indigenous fuel resources and renewable sources	In progress	Funded by Karachi Electric	Aligned with Pakistan's NDC plan under the Paris Agreement
Urban development	Adaptation	UN-Habitat project[147]	Strengthened the capacities of the national government, local institutions, and local communities in promoting climate change mitigation and	Ongoing	Funded by UN-Habitat and the Ministry of	Aligned with Pakistan's NDC plan

[142] https://tbttp.gov.pk/map/
[143] https://una.city/nbs/karachi/clifton-urban-forest
[144] https://www.cpdi-pakistan.org/wp-content/uploads/2023/12/CPDI-Policy-Brief-Carbon-Markets-in-Pakistan.pdf
[145] Solid Waste Emergency and Efficiency Project, 2021, https://projects.worldbank.org/en/projects-operations/project-detail/P173021
[146] NEPRA, Power Acquisition Programme (2024 –2030), https://www.nepra.org.pk/Admission%20Notices/2023/10%20Oct/PAP%20of%20K-Electric%20dated%20September%2018,%202023.pdf
[147] UN-Habitat Regional Office for Asia and Pacific Fukuoka, https://fukuoka.unhabitat.org/en/projects/2646/

Sector	Mitigation / adaptation focus	Project Name	Brief description	Current status	Financing / Funding of actions	City Commitment
			adaptation, especially by developing an enabling environment for low emission development and the carbon market, with a focus on environment and living condition upgrading in an urban slum or Katchi abadis or squatter settlements in Karachi		Climate Change in collaboration with Korea Land and Housing Corporation	under the Paris Agreement
Climate Change and Disaster Risk Management	Adaptation	Karachi Heatwave Management Plan[148]	Outlined what should happen before, during and after periods of extreme heat in Karachi, and set out strategies that government and non-government agencies will adopt to prevent heat-related illnesses and deaths in Karachi and capacitate the public, particularly the most vulnerable residents, to take protective action	Implemented	Funded by the Climate and Development Knowledge Network	Reported to the CDP-ICLEI Track and committed to Race to Zero
	Adaptation and Mitigation	NDRMF & Government of Sindh Project[149]	Restoration of Riverine, Inland, Mangroves, Dry-land, and Urban Ecosystems in Sindh	Inaugurated in June 2022	NDRMF grant financing, international, bilateral, and multilateral resources	Karachi commitment by Senator Sherry Rehman
	Adaptation and Mitigation	Sindh Resilience Project (SRP)[150]	The SRP aims to mitigate flood and drought risks in selected areas of Sindh in order to strengthen the natural disaster management capacity. The project focuses on increasing disaster and climate risk management, operational systems and capacities at the districts and provincial scales, as well as better fiscal resilience through strengthening financial capacity and risk financing mechanisms, and	Under Way	Funded by the World Bank	No Provincial Scale adaptation and mitigation measures

[148] Commissioner Karachi, Karachi Heatwave Management Plan: A Guide to Planning and Response, 2023, *Climate and Development Knowledge Network (CDKN)* https://ghhin.org/wp-content/uploads/HeatwaveManagementPlan.pdf

[149] https://ndrmf.pk/media-gallary/restoration-of-riverine-karachi/

[150] Pakistan - Sindh Resilience Project (English). Washington, D.C. : World Bank Group. http://documents.worldbank.org/curated/en/180721468187768824/Pakistan-Sindh-Resilience-Project

Sector	Mitigation / adaptation focus	Project Name	Brief description	Current status	Financing / Funding of actions	City Commitment
			mainstream disaster risk reduction in development planning and budgeting processes.			
Climate-Resilient Urban Development	Adaptation and Mitigation	Competitive and Liveable City of Karachi Project[151]	Improved urban management, service delivery and the business environment, and modernized the urban property tax system, incentivized private sector participation in service delivery, enhanced ease of doing business, and improved solid waste management	Ongoing	Funded by the World Bank	Reported to the CDP-ICLEI Track and committed to Race to Zero
	Adaptation	Enabling environment for low emission development and supporting NDC plan under the Paris Agreement[152]	Focuses on environment and living condition upgrading in urban slum areas- Karachi, Pakistan Aims to strengthen the capacities of the national government, local institutions, and local communities in promoting climate change mitigation and adaptation, especially by developing an enabling environment for low emission development and the carbon market.	Ongoing	Korea Land and Housing Corporation	Yes
	Adaptation and Mitigation	Karachi Neighbourhood Improvement Project (KNIP)[153]	The mitigation component includes investments for reorganizing traffic patterns and pedestrianizing selected street segments to lower -traffic congestion and increased walkability that will reduce vehicular emissions and a push towards using urban mass transit. In terms of adaptation, the investments Focuses on flood management through rehabilitating stormwater drainage along the roads and streets.	Ongoing	Funded by the World Bank	Not Specified. Intermediate Results Indicators include the target of achieving 75 hector public spaces at the end of the project.

[151] World Bank. (2019). Competitive and Livable City of Karachi Project, Washington, D.C. https://projects.worldbank.org/en/projects-operations/project-detail/P161402 https://lgdsindh.gov.pk/wp/attached-depts/click-project/

[152] https://fukuoka.unhabitat.org/en/projects/2646/

[153] World Bank. (2017). Karachi Neighbourhood Improvement Project. Washington, D.C. https://documents1.worldbank.org/curated/en/397431561946455682/pdf/Pakistan-Competitive-and-Livable-City-of-Karachi-Project.pdf

Sector	Mitigation / adaptation focus	Project Name	Brief description	Current status	Financing / Funding of actions	City Commitment
Water and sanitation	Adaptation and Mitigation	Karachi Water and Sewerage Services Improvement Project[154]	Supported an ambitious reform program aiming to improve the Karachi Water and Sewerage Board's efficiency and sustainability to provide clean drinking water and sanitation services to the citizens of Karachi, and rehabilitated water supply and sewage networks in at least three informal settlements	Ongoing	Funded by the World Bank	Yes
Ecological Restoration	Adaptation	Living River Initiative - Ecological Restoration of the Indus River Basin for a Climate-Resilient Future[155]	The project aims to address the threats posed to the Indus River Basin by climate change, environmental degradation, population pressure, and pollution. The goal is to develop a Master Plan in consultation with stakeholders to conserve the resource base, use it wisely, and restore the ecosystem. The plan will unite existing initiatives, cover gaps, identify frameworks for climate financing, and develop a national communication strategy.	To be assigned by MPTFO (Multinational Project Task Force Office)	Not Specified	No
	Adaptation	Building Resilience of Coastal Ecological and Social Systems of Pakistan Project[156]	Enhance resilience in Jiwani Coastal Wetland, Miani Lagoon, and Indus Delta, including Karachi	Launched on September 1, 2023	Funded by Prince Albert II of Monaco Foundation	Collaboration between IUCN Pakistan and Prince Albert II of Monaco Foundation
	Adaptation	Recharge Pakistan: Building Resilience to Climate Change (2019 – 29)	Utilize ecosystem-based adaptation strategies to enhance climate resilience and water security.	Ongoing (Aug 2019 to ten years)	GCF	No

[154] World Bank. (2019). Karachi Water and Sewerage Services Improvement Project. Washington, D.C. http://documents.worldbank.org/curated/en/695091561946580138/Pakistan-Karachi-Water-and-Sewerage-Services-Improvement-Projecthttps://www.kwssip.gos.pk/
https://projects.worldbank.org/en/projects-operations/project-detail/P164704

[155] Living River Initiative- ECOLOGICAL RESTORATION OF THE INDUS RIVER BASIN FOR A CLIMATE RESILIENT FUTURE, https://mptf.undp.org/sites/default/files/documents/2022-12/joint_project_proposal_unrco_unfao_signed_copy_redacted.pdf

[156] Charting a resilient future: Coastal ecosystem restoration project commences in Karachi, Sep 05, 2023, https://www.iucn.org/news/202309/charting-resilient-future-coastal-ecosystem-restoration-project-commences-karachi

Sector	Mitigation / adaptation focus	Project Name	Brief description	Current status	Financing / Funding of actions	City Commitment
Energy	Adaptation and Mitigation	Sindh Solar Energy Project	Increase solar power generation and access to electricity in Sindh Province.	Ongoing (since 2018)	Funded by the World Bank	No

Annex 5: SWOT Analysis Tools

Table 20: SWOT Analysis Table per Strategic CAP Appraisal component

Column 1 – Component		INTERNAL		EXTERNAL	
		Column 2 – Strengths	**Column 3 - Weaknesses**	**Column 4 - Opportunities**	**Column 5- Threats**
A	Vision & Commitment, Governance & Powers Review	**Long Term City Vision & Political Commitment** • Political commitment from Mayor Karachi • Participation of professionals, academics, civil society, and other leaders in the planning exercise.	**Long Term City Vision & Political Commitment** • Limited quantified targets in Karachi Master Plan 2020/ Karachi Strategic Development Plan 2020[157] • Partial representation of climate change measures • Limited transformative actions in key sectors • Limited historical capacity of urban management and regulation. • Challenges in coordination and budget of climate-related plans.	**Long Term City Vision & Political Commitment** • Alignment with C40 CAP Framework objectives • Initiation of Greater Karachi Region Plan 2047 • Commitment to Paris Agreement and NDCs • Focus on climate resilience in coastal areas • Long-term coastal resiliency through habitat protection and restoration initiatives. • Increasing awareness and urgency about climate change impacts.	**Long Term City Vision & Political Commitment** • Limited city-level plan/policy development and coordination with provincial directives. • Challenges in implementing waste-to-energy projects and waste disposal initiatives. • Limited compliance of decision making with climate agenda. • Limited follow-up on policy decisions related to waste-to-energy and waste disposal • Resistance to urban governance reforms and resource allocation issues.
		City Climate Governance • Existence of the Karachi City Council as a potential political platform for	**City Climate Governance** • Limited resources, data, coordination, participation,	**City Climate Governance** • Capacity-building initiatives for the Karachi City Council to enhance	**City Climate Governance** • Decentralization and fragmentation creating obstacles to decision-making for climate action.

[157] https://www.shehri.org/2020.pdf

		climate action coordination. • National and provincial-level governance frameworks and policies addressing climate change issues. • Established provincial and national-level institutions (MoCC, ECC&CD) guiding climate initiatives. • Presence of international organizations like UNDP, C40, World Bank, etc., for potential collaboration and resource mobilization. • Presence of active civil society organizations contributing to climate resilience (e.g., Shehri-Citizens for a Better Environment) • Initiatives like the Sindh Climate Change Policy and NDCs providing a framework for climate monitoring and reporting at the provincial level.	and accountability within the City Council • Limited power, budget, and land ownership of the KMC. • Fragmentation and inefficiency in the governance structure due to multiple federal, provincial, and local bodies involved in municipal functions. • Challenges in revenue generation and fiscal autonomy for KMC and Fiscal Dependency of KMC on provincial government. • Erosion of capacity and financial conflicts within the Sindh Local Government. • Absence of a specific climate function and vacant key position of Director (Environment) within KMC. • Fragmentation and decentralization obstruct effective decision-making and coordination for climate action. • No dedicated city-level Monitoring, Evaluation, and Reporting System for climate action, relying on provincial and national entities.	governance and coordination. • Transformation of KMC's Director (Environment) position into a focal point for comprehensive climate action. • Collaboration between KMC and Directorate of Climate Change at ECC&CDD for effective cross-sectoral climate coordination. • Engagement with international organizations and funding sources for additional support. • External support for KMC to enhance its role in mainstreaming climate action. • Alignment of city-level initiatives with national and provincial frameworks and goals and policies for climate change. • Leveraging support from active civil society organizations for city-level initiatives. • Development of a proper framework for monitoring	• Limited financial resources and conflicts impeding resourcing of climate action. • Technical challenges, including the absence of a greenhouse gas inventory and climate adaptation monitoring. • Climate-induced risks and vulnerabilities impacting the effectiveness of climate initiatives. • Limited authority and resources for local governments like KMC, hindering their ability to address climate challenges. • Political interference, bureaucratic inefficiency, fiscal imbalance, and coordination issues. • Challenges in intergovernmental relations impacting effective policy implementation. • Absence of a structured engagement framework for regular communication with non-city stakeholders. • Lack of representation and integration across multiple city departments crucial for a holistic climate strategy.

			• Challenges in collaboration and communication between city, provincial, and national governments. • Limited engagement processes with non-city stakeholders and collaboration challenges. • Capacity gaps in RMC Karachi and challenges in developing a greenhouse gas inventory. • Challenges in governance and institutional framework requiring reform strategies.	and reporting of Climate Action for Karachi City. • Institutional reforms within key sectors for addressing technical and procedural challenges.	
		City Power and Related Capacity • Presence of regulatory bodies for environmental protection (SEPA), SBCA and high-density development (SHDDB).	**City Power and Related Capacity** • Overlapping functions and conflicts in the three-tiered governance system. • Control over key departments by the Local Government Department • Historical changes impacting local governance autonomy. • Recentralization of powers to provincial entities impacting local governance • Challenges in waste management infrastructure and coordination.	**City Power and Related Capacity** • Amendments in local government structure in 2023 empowering mayors and chairman altering structure, roles and revenue collection powers and impacting balance of power between local and provincial authorities. • Initiatives for renewable energy projects and transition towards renewables. • Long-term power acquisition plans focusing	**City Power and Related Capacity** • Challenges in governance, capacity building, and strategic planning for energy crisis • Governance issues, funding, and political will for renewables. • Decline in actual transfers from provincial government to local governments. • Deficit in transfers compared to Karachi's share in revenue receipts and fiscal challenges faced by Karachi's local government. • Infrastructure gaps due to limited federal support post-18th Amendment.

			• Inadequate infrastructure, sanitation issues, and water supply concerns due to weakened governance structure • Lack of viable programmatic • framework and long-term strategy for renewable energy in buildings	on renewable sources in Karachi • Competitive advantage in transitioning to renewable energy • Regulatory framework for building compliance and urban development standards and green building certifications • Opportunities for public-private partnerships and investments in infrastructure. • Potential for reforms in fiscal autonomy. • Increasing revenue receipts of Sindh and Federal grants and packages for Karachi's infrastructure development. • Opportunities for implementing low/zero-emission technologies in public transport • Increasing awareness and commitment to climate change mitigation.	• Political interference impacting disaster management. • Risks associated with extreme weather events and sea level rise.

B	Goals / Targets & Policy Context Review	**Goals and Targets** • National focus on renewable energy aligns with global sustainability objectives. • Regional contributions can strengthen the overall achievement of national targets • National focus on electric vehicles (EVs) aligns with global trends towards sustainable transport • National focus on protected areas aligns with biodiversity preservation and job creation. **Policy Context** **Internal Policies** • Well-established internal policies provide a solid foundation for climate action planning in Karachi. • Comprehensive internal policies and plans (e.g., KHWMP, KSDP) addressing city-specific challenges.	Policy Context Internal Policies • Limited specific actions or details regarding implementation strategies in some policies. • Potential challenges in coordinating actions and aligning priorities across different sectors. • Limited provisions for regular updates or adjustments based on evolving climate scenarios. **External Policies** • Limited integration of local context in national policies, requiring adaptation to local circumstances. • Lack of mechanisms for adapting policies to rapidly changing climate conditions. • Potential mismatches between national targets and city-specific needs. • Some policies may lack specificity in terms of direct implementation strategies at the city level. • Insufficient mechanisms for implementation and	**Goals and Targets** • Opportunities for attracting international investments and expertise in renewable energy projects. • Collaboration with provinces for diverse renewable energy sources and projects. • Opportunities for international collaborations and investments in EV infrastructure. • Collaborations with neighboring regions for efficient and interconnected low-emission transport systems. • Opportunities for public-private partnerships in local low-emission transport projects. • Opportunities for collaborative research and innovation in climate resilience technologies.	Policy Context Internal Policies • Potential resistance or lack of buy-in from stakeholders in implementing climate-related measures. • Budgetary constraints and resource limitations may hinder the effective implementation of ambitious actions. • Climate-related uncertainties and events could outpace the adaptation capacity outlined in policies. **External Policies** • Potential conflicts between national policies and local priorities may hinder effective implementation. • Dependence on national policies may expose the city to changing national priorities. • Political changes or shifts in national priorities may affect the continuity and support for climate policies. • External factors, such as global economic downturns, may impact the availability of international funding for climate projects. • Inadequate enforcement mechanisms may lead to challenges in achieving emission reduction targets and policy compliance.

		• Integration of climate considerations in various sectors such as water, transport, and agriculture. • Alignment with Sustainable Development Goals and other strategic frameworks for a holistic approach. External Policies • National policies provide a strong foundation for climate action, offering guidance and support. • National policies emphasize renewable energy, aligning with KCAP goals. • Ambitious targets in national policies (e.g., NDCs) provide a clear direction for mitigation efforts. • NCAP 2023 focuses on air quality, complementing KCAP goals. • National Transport Policy 2018 focuses on reducing greenhouse gas emissions, supporting	monitoring of national policies at the city level.	**Policy Context** **Internal Policies** • Enhance collaboration with provincial and national bodies to strengthen policy implementation. • Explore additional funding sources to supplement policy implementation efforts at the city level. • Establish mechanisms for regular reviews and updates of policies based on the latest climate science. External Policies • Alignment with national policies provides opportunities for financial and technical support to implement climate actions. • Policy frameworks offer platforms for collaborative efforts with national stakeholders. • National policies open avenues for international collaboration and funding. • Seek partnerships with external organizations and experts to enhance the	

		KCAP's net-zero emission goal. • Alignment of policies with climate resilience and sustainability objectives.		effectiveness of policy implementation.	
C	City Context	Current Climate & Environmental Quality within the City • Geographic location with sea access influences the city's climate. • Global climate patterns, such as El-Nino and Indian Ocean Dipole, influence Karachi's climate dynamics. • Seasonal variations, including monsoon rains, contribute to the city's climate diversity. • The city's climate is classified as arid, which can influence planning and adaptation strategies. **City Socio-economic Context & Key Future Trends** • Diverse and dynamic urban landscape	Current Climate & Environmental Quality within the City • Vulnerability to extreme events like heatwaves and urban flooding due to poor urban planning. • Limited local control over global climate drivers, such as El-Nino and Indian Ocean Dipole, affecting climate variability. • Lack of resilience to climate change impacts, exacerbated by rapid urbanization. • Limited natural barriers expose the city to the impacts of climate-related hazards, such as tropical cyclones. **City Socio-economic Context & Key Future Trends** • Open dumping of solid waste and lack of efficient recycling system • Untreated wastewater constitutes 67.1% of total,	• Current Climate & Environmental Quality within the City • Implement climate-resilient urban planning practices to mitigate vulnerabilities. • Leverage global climate initiatives and collaborations for enhanced understanding and adaptation strategies. • Promote green infrastructure to reduce urban heat island effects and improve climate resilience • Explore opportunities for sustainable and climate-friendly urban development. **City Socio-economic Context & Key Future Trends** • Implementation of sustainable waste management practices	Current Climate & Environmental Quality within the City • Increasing intensity and frequency of heatwaves pose risks to public health and well-being. • Rising global temperatures and climate change may exacerbate local vulnerabilities and impact the city's climate. • Urban flooding due to heavy precipitation events poses threats to infrastructure and livelihoods. • The city is vulnerable to external climate events, such as cyclones, which may result in severe impacts. **City Socio-economic Context & Key Future Trends** • - Air pollution from open burning of solid waste and inadequate waste disposal • Increasing intensity and frequency of heatwaves pose risks to public health • Risks associated with untreated wastewater

		• Commitment to environmental conservation • Robust electrical infrastructure • Presence of protected areas and national parks • Growing energy generation capacity • Access to potable water supply for 85% of the population • Plans for expansion in public transportation • Positive trends in air quality • Existing sewerage network covering 60% of the city • Diverse linguistic and cultural composition • Youthful population with balanced age structure • Presence of major healthcare facilities (165 with 14,350 beds) • High literacy rate (87%)	posing health and environmental risks • Limited coverage in sewerage network • High water loss due to infrastructure issues • Challenges in solid waste management with only 8.3% of garbage being recycled • Vulnerability to sea-level rise and climate change impacts • Presence of hazardous waste and inadequate disposal mechanisms for medical waste • Reliance on external sources for energy generation • Inadequate water infrastructure and chronic leakages in the water supply system • Evolving land use patterns impacting environmental resilience • Exposure to average inflation rate of 17% over the last 5 years • Population density challenges and strain on resources	• Strengthening wastewater treatment infrastructure for improved public health • Expansion of renewable energy sources and reduction of carbon footprint • Enhancing water supply infrastructure for increased coverage • Enhancement of public transportation system with planned BRT lines and circular railways • Strategic urban planning to mitigate the impacts of climate change • Improved governance for efficient urban planning and management • Utilizing technological advancements for environmental monitoring and conservation • Strengthening conservation initiatives in protected areas and national parks • Competitive cost of living ($362)	• Urban flooding and infrastructure threats • Potential spread of diseases from inadequate medical waste disposal • Vulnerability to external climate events, such as cyclones • Water scarcity due to high loss in water supply and chronic leakages • Environmental and health Risks associated with unregulated waste disposal practices. • Traffic congestion and air pollution due to reliance on personal vehicles. • Global economic uncertainties affecting GDP growth • Dependency on external factors for economic stability • Vulnerability to global market fluctuations • Social implications of rapid urbanization • Vulnerability to disease outbreaks due to insufficient healthcare infrastructure • Climate change impacts affecting coastal areas

		• Majority of children attending private schools (74%) -	• High prevalence of slums (64% of the population) • Housing disparities between regularized and non-regularized settlements • Low doctor-to-patient ratio (1:3,029) • Gender gap in literacy rates in katchi abadis (76% for males, 66% for females) • Disparities in adult literacy and primary enrollment rates in katchi abadis • Governance challenges in managing a rapidly growing urban population	• Cosmopolitan ambiance due to diverse foreign population • Economic diversification and inclusive growth initiatives	
D	Emissions Baseline & Trajectories Status	• Increased awareness and recognition of climate change issues in Karachi. • Implementation of targeted measures to reduce emissions from various sources. • Availability of satellite-based data for air quality assessments. • Advancements in satellite-based monitoring technologies	• Limited number of air quality monitoring stations leading to data gaps. • Dependency on satellite-based data for certain assessments. • Inadequate ground-based particulate matter monitoring infrastructure. • Challenges in enforcing regulations for emission reduction.	• Public awareness campaigns on the health impacts of poor air quality. • Presence of quality standards for ambient air. • Collaboration with industries for emission reduction initiatives. • Development of ground-based monitoring infrastructure for more comprehensive data	• Inadequate enforcement of air quality regulations and standards. • Lack of financial resources for implementing emission reduction measures. • Increasing urbanization and industrialization without proper control measures. • Climate change impacts leading to more frequent and severe environmental hazards. • Resistance to policy changes and adoption of cleaner technologies.

		for more accurate measurements. • Implementation of mass rapid transit projects focusing on efficient fuels. • Integration of air quality management with urban planning initiatives. • Identification of key emission sources through studies like "Cleaning Karachi's Air."	• Reliance on satellite data for carbon monoxide concentration assessments. • Lack of stringent regulations and enforcement for certain pollutants. • Limited public awareness on the significance of air quality standards. • Seasonal variations and meteorological conditions impacting air quality. • Continued use of polluting fuels without proper control. • Pollution from industries and domestic sources contributing to water contamination. • Lack of treatment systems in numerous industrial units • Presence of toxic metals in wastewater raising health concerns. • Inadequate sewage treatment capacity and malfunctioning infrastructure. • Contaminants such as toxic metals and high coliform content reported in the water.	• Implementation of cleaner technologies and fuels to reduce emissions. • Integration of air quality management with climate action plans. • Implementation of stricter standards for various pollutants. • Adoption of cleaner technologies and fuels to reduce emissions. • Policy support for sustainable urban development to reduce pollution. • Public-private partnerships for emission reduction initiatives. • International collaborations to address regional air quality issues.	• Political and economic challenges affecting air quality management efforts. • Limited regulatory measures for certain pollutants like carbon monoxide. • Continued reliance on conventional and polluting industrial practices. •

E	Climate Hazards, Risks & Impacts Baseline Status	• Understanding of climate hazards and risks through assessments. • Knowledge of district-wise vulnerability ranking based on climate-related risks.	• High vulnerability ranking of Karachi district to multiple climate disasters. • Limited historical data on hazards like earthquakes, making future predictions challenging. • Lack of comprehensive infrastructure to cope with urban flooding and heatwaves.	• Opportunities for advanced climate modeling and impact assessment technologies. • Collaboration with international organizations for climate resilience projects.	• Increased frequency and intensity of climate hazards due to global climate change. • Urbanization and population increase contributing to greater susceptibility to climate impacts. • Potential for catastrophic events like severe heatwaves and urban flooding causing widespread damage. • Limited resources for implementing large-scale climate adaptation measures.
F	Climate Actions Baseline	• Comprehensive National Climate Actions. • Diverse portfolio of projects covering multiple sectors. • Proactive engagement in renewable energy projects (Power Acquisition Programme, Wind Power Projects). • Behavioral Change & Institutional Strengthening (Clean Green Pakistan Movement). • Successful completion of various projects (Forest	• Limited information on the current status of certain projects. • Lack of detailed financing information for some projects. • Limited city commitment for some projects (Public Expenditure and Institutional Review). • Lack of data on certain ongoing projects (e.g., current status of Climate Change Reporting Unit).	• Potential for upscaling successful initiatives to other cities and provinces. • Collaboration with international organizations and funds for additional support. • Opportunities for knowledge exchange and best practices from global climate initiatives. • Integration of climate actions with national development priorities and NDCs.	• Dependence on external funding may lead to vulnerabilities if not sustained. • Potential delays in project implementation due to bureaucratic processes and administrative challenges. • Climate change uncertainties and evolving risks may impact the effectiveness of planned actions. • Economic and political changes may affect the prioritization and allocation of resources for climate actions.

		Management, Zigzag Kiln Technology). • Ongoing initiatives for gender-responsive climate action (Development of National Climate Change Gender Action Plan).		• Funding opportunities from Green Climate Fund (GCF), UNDP, World Bank, and other international sources.	
G	Stakeholder Mapping	• KMC has a central role in delivering essential services and managing various aspects of urban life. • Government of Sindh formulates and implements policies related to environmental and climate issues, providing vital support to the city government. • The federal government, a signatory to international climate agreements, offers strategic guidance and coordinates climate actions among provincial and city governments. • **Regional Meteorological Centre:** Local weather monitoring and forecasts contribute to climate	**Land Owning, Development, and Management Agencies:** • **Karachi Development Authority (KDA), LDA, MDA, and others:** The integration of climate-resilient urban planning may face bureaucratic challenges and administrative hurdles. • **Karachi Port Trust (KPT):** Land development may lack adequate climate considerations, posing risks to the city's overall resilience. • **Board of Revenue (BoR) Sindh:** Regulatory processes related to land management may lack efficiency, affecting overall climate responsiveness. • **Sindh High Density Development Board (SHDDB)**: Oversight on high-	• KMC has a Potential for strategic partnerships with international organizations and other tiers of government to enhance service delivery. • **GOS:** Opportunities for collaborative projects and knowledge exchange with other provinces and regions. • **GoP:** Potential for accessing global expertise, funding, and support for climate initiatives. • Collaboration with international partners through the Ministry of Climate Change for effective climate policy implementation and provision technical assistance, funding, and	• **Karachi Development Authority (KDA), LDA, MDA, and others:** Potential delays in project implementation due to bureaucratic processes and administrative challenges. • **Karachi Port Trust (KPT):** Climate-induced risks, such as extreme weather events, may impact land development and infrastructure projects. • **Board of Revenue (BoR) Sindh:** Economic and political changes may affect land-related affairs, impacting climate-resilient initiatives. • Economic fluctuations and external shocks may impact the revenue collection, affecting funding for climate initiatives. • **Sindh High Density Development Board (SHDDB)**: Vulnerability to climate-related challenges may impact high-rise building projects negatively.

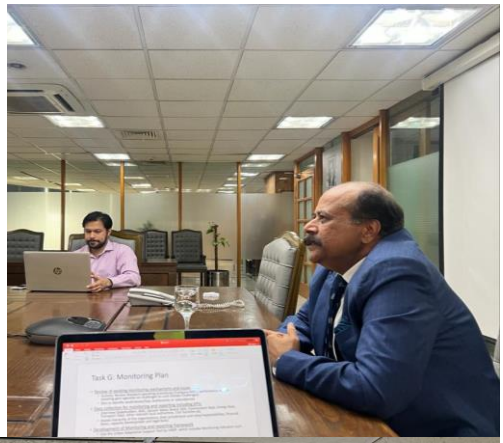
		resilience and preparedness in the city. • **Various Companies and Industries (SITE, KCCI, ABAD)**: Corporate organizations and trade bodies influence land policies, economic development, and commerce in Karachi. • Universities, Research Centers provides knowledge, data, and expertise on climate change, educating future climate leaders and professionals. • Various Civil Society Organizations, NGOs, CBOs, etc. active participation in and benefit from climate change interventions. • **Marginalized Groups and Minorities:** Representation of vulnerable segments of society, voicing their needs and concerns • Sectoral Experts related to Environment, Urban Planning, etc.provide scientific and technical	rise building developments may lack comprehensive climate considerations. • **Industries, Factories, Businesses**, etc. contribute to GHG emissions and environmental degradation	global expertise in climate-related projects. • **Provincial Disaster Management Authority (PDMA):** Collaborative opportunities with international organizations for advanced data processing and analysis. • **Regional Meteorological Centre:** Integration of advanced technologies and collaborations for improved weather forecasting and early warning systems. • **Private sector** engagement can enhance innovation, investment, and implementation of climate-resilient technologies and practices • **Various Companies and Industries (SITE, KCCI, ABAD)**: Opportunities for the private sector to invest in low-carbon practices, adopt climate-resilient technologies, and contribute to the city's economy while reducing emissions. • Collaboration with research institutions can	• **Industries, Factories, Businesses**, Pressure to meet economic demands may pose challenges in adopting cleaner technologies and investing in low-carbon practices.

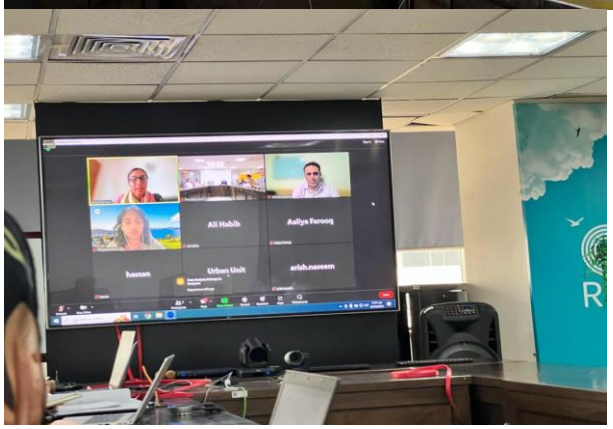
		knowledge, data, and analysis.		lead to innovative solutions, knowledge exchange, and informed decision-making in climate actions. • **Citizen** engagement can be leveraged for raising awareness, advocating for climate action, and monitoring and evaluating the impacts of climate initiatives. • Inclusive and equitable climate solutions can be developed by actively involving and addressing the needs of marginalized groups • **Expert** advice can contribute to the development of effective climate change mitigation and adaptation strategies.	

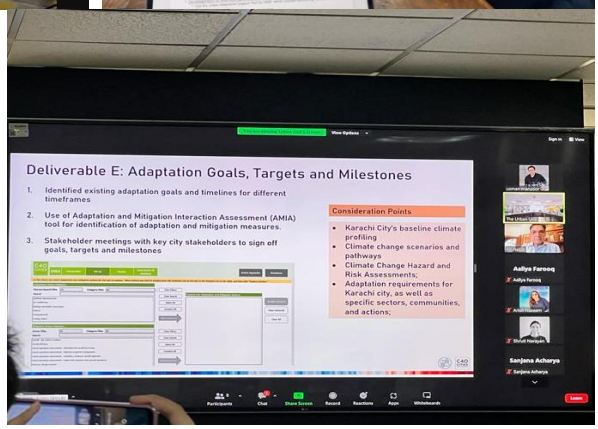
Annex 6: Other Data Sheets

Annex 6 - A: Pictures of consultation / engagements undertaken during the Strategic CAP Appraisal process

Meeting 1:
Kick-off Meeting - Virtual
24th October 2023







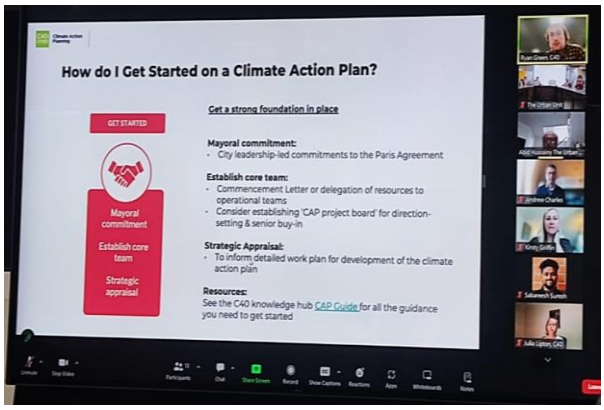
Meeting 2:
Meeting with Environment Protection Entities
3rd November 2023

Meeting 3:
Meeting at KMC, Mayor Office
3rd November 2023


Meeting 4 & 5:
Meeting with Urban Resource Center (URC) and Climate Action Center (CAC), Karachi
3rd November 2023


Meeting 6:
Meeting with WWF Regional Office, Karachi
4th November 2023

Meeting 7:
Meeting with the C40 Team – Virtual
15th November 2023



Meeting 8:
Mayoral Briefing
22nd November 2023

Meeting 9:
Meeting with Sr. Director Karachi Metropolitan Corporation (KMC) at Mayor Office, Karachi
24th November 2023

Annex 6 - B: Rapid Strategic Appraisal and Visioning Workshop










AVARI TOWERS

Group Photo: Workshop 1 – Stakeholders from Government Departments

Group Photo: Workshop 2 – Stakeholders from CSOs, and Private Sectors

Vision Development Group Activity


Deteriorating
Air Quality
Habitat Loss
Climate Extremes
Sea level Rise


Deteriorating
Air Quality
Habitat Loss
Climate Extremes
Sea level Rise


Deteriorating


KEY ISSUES AND CHALLENGES
KARACHI CLIMATE ACTION PLAN (K-CAP)
Inadequate City Planning
Deteriorating
Capacity Constraints
Climate Extremes
Unplanned Industrial
Random Reclamation of Land
Fossil Fuel Dependency
Lack of Resources
Data Constraints
Sea level Rise


Capacity Constraints
Poverty
Urban Ecology
Depleting Natural Resources
Encroachments
Climate Extremes
Unplanned Industrialization
Environmental Awareness
Absence of planned land fills
Fuel Dependency
Municipal Infrastructure

Issues and Challenges Priority Map based on Group Activities


KARACHI CLIMATE ACTION PLAN
K-CAP