



Cities^{and} Climate Change Initiative

ABRIDGED REPORT

Islamabad
Pakistan

Climate Change
Vulnerability Assessment

UNHABITAT
FOR A BETTER URBAN FUTURE

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Vulnerability Assessment



UN HABITAT
UNITED NATIONS HUMAN SETTLEMENTS PROGRAMME

Islamabad, Pakistan - Climate Change Vulnerability Assessment

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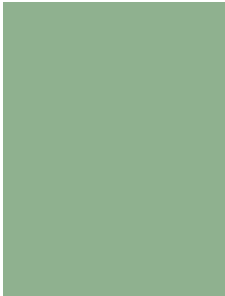
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Principal Author:	Jawed Ali Khan
Contributing Author:	Liam Fee
Reviewers:	Bernhard Barth, Bella Evidente, Sarmad Khan
Coordinators:	Bernhard Barth, Ilija Gubic
Summarised by:	Rowan Fraser
Editor:	Rowan Fraser
Design and Layout:	Deepanjana Chakravarti



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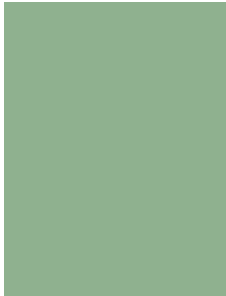
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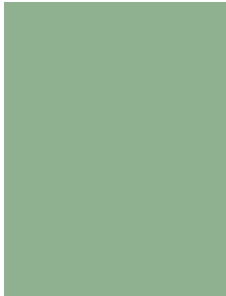
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istration Development Division (CADD). In particular, we would like to thank the nominated focal persons of these agencies who provided timely and quality data, analysis and advice. Our appreciation in this respect goes to Mr Muhammad Munir Sheikh, Chief Climatology Unit of GCISC and his team members Mr Shahbaz Mehmood and Mr Naeem Manzoor; Mr Rahmat Ullah Jilani, Director, Earth Sciences, and Dr Hussain H. Razvi, SUPARCO; Mr Muhammad Aleemul Hassan Ramay, Deputy Director, National Weather Forecasting Centre; Dr. Muhammad Afzaal, Deputy Director, PMD; Mr Ali Kazim Syed, Director Disaster Risk Reduction, CDA; Mr Shafique Ali Siddiqui, former Director Planning, CDA; and Dr Muhammad Amjad Malik, Deputy Director, ICTA; and Mr Rafique Tahir, Joint Secretary/Joint Education Advisor, CADD. The contributions of Mr Ahmad Kamal, Member Disaster Risk Reduction of the National Disaster Management Authority (NDMA) are also deeply acknowledged.

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Foreword

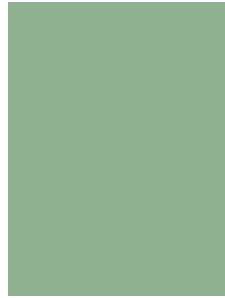
Climate change is severely impacting many countries around the world and Pakistan is no exception. With its largely arid geographical profile and resource scarcity the country is particularly vulnerable. From 1929-2005, the return period of disasters has become shorter, reducing from 56 years in 1929 to only 5 years in 2005. The country is susceptible to a wide range of hazards including landslides, floods, droughts and cyclones. The Global Climate Change Vulnerability Index (CCVI) compiled by Maplecroft ranked Pakistan as the 29th most vulnerable country over 2009-2010, and the 16th most vulnerable over 2010-11.

The Federal Cabinet, headed by the Prime Minister of Pakistan, instructed the Climate Change Division (CCD), Government of Pakistan, to undertake an assessment of climate change vulnerability factors. The decision first required a pilot assessment for Islamabad, to be followed by other cities. With the support of UN-Habitat, the CCD set up a system to assess Islamabad's vulnerability to climate change and determine how improved planning could support climate-resilient development. Through the Cities and Climate Change Initiative, operating in over 30 cities in 15 countries in Asia and the Pacific, UN-Habitat has gathered experience in climate-resilient urban planning. The Cities and Climate Change Initiative seeks to develop, adapt and provide methodologies for urban resilience to city managers and practitioners.

The Climate Change Division established a steering committee to oversee the initiative. For guidance and advice, a 6-member technical working group (TWG) was established consisting of officials from the Capital Development Authority (CDA), Islamabad Capital Territory Administration (ICTA), the Capital Administration Development Division (CADD), Global Change Impact Studies Centre, Upper Space Atmospheric Research Commission, Pakistan Meteorological Department. We are grateful to the members of the steering committee and the TWG for providing excellent general and technical oversight to the development of the vulnerability assessment. We have separately acknowledged the excellent work of the steering committee, the TWG and colleagues from CCD working on this initiative.

The Climate Change Vulnerability Assessment Study is in your hands. The next steps of mainstreaming the identified project as a result of the assessment are now being undertaken. We are grateful to the heads of CDA, ICTA and CADD for supporting this climate-smart planning initiative and contributing to a climate-resilient Islamabad. We hope that city managers, planners, academics and members of civil society will all find this study useful for understanding the causes of climate change and its implications for coming generations in Islamabad, as well as for other cities in Pakistan. We also hope that the city managers of CDA, ICTA and CADD will work with continued zeal and dedication to address climate change in their planning and implementation of development projects.

*Rukshana Saleem
Secretary to the Government of Pakistan
Climate Change Division
Islamabad*



Foreword

Through its Climate Change Division (CCD), the Government of Pakistan has undertaken an excellent initiative to assess climate change vulnerability in Islamabad and the Islamabad Capital Territory (ICT). The city authorities of Islamabad Capital Development Authority (CDA), Islamabad Capital Territory Administration (ICTA) and Capital Administration and Development Division (CADD) have admirably supported the implementation of this new initiative.

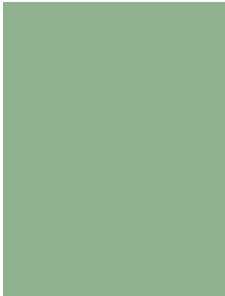
This study are largely based on secondary data and information gathered from a range of sources. The work of Pakistan Space and Upper Atmosphere Research Commission, Global Change Impact Studies Centre and Pakistan Meteorological Department was critical to the success of this study and the support of these organisations through their focal persons is commendable. In order to produce the study, vulnerability assessment tools first tested in Sorsogon, Philippines, have been utilized in Islamabad. The coordinated effort of all six participating Pakistani institutions and this outcome study is a significant achievement for the country.

The main findings of the assessment reveal marked changes in the intensity, frequency and variability of temperature,

precipitation and floods. In response to these findings, the study proposes 14 planning interventions for improving the climate-resilience of Islamabad. The study also provides recommendations for institutional arrangements which support coordinated and effective implementation of the 14 planning interventions. We hope the analyses and recommendations which this study contains will provide a foundation for the city authorities of CDA, ICTA and CADD in advancing climate-resilient planning and in creating a climate-resilient Islamabad.

UN-Habitat sincerely appreciates the leadership and support provided by CCD, especially Mr Raja Hasan Abbas, Secretary, CCD, in initiating this Climate Change Vulnerability Assessment in Islamabad and ICTA. Similarly, UN-Habitat appreciates the effort of Mr Jawed Ali Khan, CCCI Specialist, who spearheaded the effort from UN-Habitat Pakistan. UN-Habitat is proud to present this study jointly with CCD for city planners and decisions makers. We hope that it will enable city authorities in Islamabad to lead the way in climate-resilient planning in Islamabad city. We also hope that city managers and planners from other Pakistani cities which are vulnerable to climate change will find this a replicable model of city-level climate change assessment and adaptive planning.

Bella Evidente
Country Programme Manager a.i.
UN-Habitat Pakistan



Glossary

Adaptive capacity

Adaptive capacity is the degree to which people, places, institutions and sectors are able to adapt and become more resilient to climate change impacts. It also identifies the extent to which the responsible institutions are capable of handling an emergency situation and the time they take to respond to a disaster situation. As defined by the IPCC, adaptive capacity describes the ability of a system to adjust to actual or expected climate stresses, or to cope with the consequences.

Exposure

Exposure relates to the degree of climate stress on a particular unit of analysis. It may be represented as either long-term change in climate conditions, or by changes in climate variability, including the magnitude and frequency of extreme events. It considers both current and projected changes based on a review of historic and current climate information (precipitation, temperature, extreme weather events) and projected climate scenarios. It also identifies primary impacts (increased precipitation, temperature, frequency and intensity of storms) and secondary impacts (flooding, ground water depletion, landslides and slope failures) including their current and future magnitude and frequency.

Heat wave

The World Meteorological Organization defines a heat wave as five or more consecutive days during which the temperature exceeds the average maximum temperature by 5° centigrade. The average maximum temperature is measured in reference to the period 1961–1990.

Sensitivity

Sensitivity is the degree to which exposed people, places, institutions and sectors are impacted by climate change today and the degree to which they could be impacted in the future. As with exposure, impacts could be primary (change in city water supply due to decreases in precipitation as a result of climate change) or secondary (slope failure and landslides due to more intense and longer precipitation events). Sensitivity refers to the degree to which a system is affected, either adversely or beneficially, by climate-related stimuli.

Smog

Smog is the suspension of particulate matter in air, intensified by smoke or other atmospheric pollutants. In Islamabad, pollutants are usually emitted from brick kilns, factories, transport systems, and power plants. Smog is produced through a complex set of photochemical reactions involving volatile organic compounds and nitrogen oxides that result in the production of ozone.

Urban heat island

An urban heat island occurs when a metropolitan area becomes significantly warmer than its surrounding rural area. This is due primarily to human activities pursued in the metropolitan area. As urban areas develop, changes occur in their landscape: buildings, roads, and other infrastructure replace open land and vegetation and surfaces that were once permeable and moist become impermeable and dry. These changes cause urban regions to become warmer than their rural surroundings, forming an island of higher temperatures as compared to the surrounding landscape.

Vulnerability

Refers to the degree to which people, places, institutions and sectors are susceptible to and unable to cope with climate change impacts and hazards. Vulnerability is generally understood as a function of a range of biophysical and socio-economic factors, commonly aggregated into three components that include an estimate of the above elements namely (adaptive) capacity, sensitivity, and exposure to climate variability and change.

Introduction

1.1 Cities and Climate Change

The population of urban areas around the world continues to rise. In 2008, for the first time in history, the percentage of the global human population residing in urban areas passed 50 per cent. Urbanisation brings many benefits such as increased job and education opportunities, economic diversification and cultural activity. However, unplanned urban growth is also leading to challenges. In many cities, public services and infrastructure are heavily strained, urban ecosystems are polluted, streets are congested and informal settlements are widespread.

In many urban areas, climate change is already exacerbating and compounding existing inequalities, vulnerabilities and socio-economic development challenges, and highlighting the need for proactive climate change adaptation. Already the frequency and intensity of urban floods is increasing, due to higher and more intense rainfall as well as poor drainage and degraded or destroyed waterways in urban areas. As climate change continues, increasingly serious floods are expected. Similarly, droughts are affecting food production in rural areas, which impacts urban populations, especially poorer and marginalised communities. Coastal cities are especially threatened by mean sea level rise. In this way, climate change is already affecting millions of people worldwide.

1.2 UN-Habitat's Cities and Climate Change Initiative

It is in response to this that the United Nations Human Settlements Programme (UN-Habitat) established the Cities and Climate Change Initiative (CCCI). The CCCI is a global programme that aims to promote climate change mitigation and adaptation in urban areas in developing countries. It supports pro-poor innovative approaches to climate change policies and strategies. As such it builds on UN-Habitat's skills and experience in promoting sustainable urban development.

In Asia-Pacific, the CCCI has three key objectives. These are:

- To build the capacities of at least 50 cities in at least 15 countries in the region and to prepare and implement comprehensive climate change strategies and action plans;
- To integrate good climate responsive urban development practices into national policies, strategies and legislative reform;
- To establish a CCCI regional partners' advocacy, knowledge management, capacity building and networking platform.

Islamabad is the first city in Pakistan where CCCI is active. This report is based on a comprehensive document entitled: Climate Change Vulnerability Assessment of Islamabad.

Overview of the City

2.1 Introduction to Islamabad and Islamabad Capital Territory

Islamabad is the capital city of Pakistan. It is located in the northeast of the country, on the Potohar Plateau and ranges of between 457-610 m above sea level. Unlike other cities in Pakistan, Islamabad is a planned

city. The site for the city was designated in 1959 and the city was 'opened' in 1963.

Islamabad itself is made up of 505 km² of urban land and 401 km² of rural land. The city is located within the wider Islamabad Capital Territory which includes the 906 km² of Islamabad as well as a further 3626 km² of land known as the 'Specified Area'. The Specified Area includes the Margalla Hills to the north and northeast, much of which is a national park.

Table 1. Key facts of Islamabad Capital Territory

Population 1998 (last census)	805,235
Population 2011 (last projection)	1.7 million
Area	
<i>Urban</i>	505 km ²
<i>Rural</i>	401 km ²
<i>Total</i>	906 km ²
Sex ratio (males per 100 females)	117
Average household size	6.2 persons
Literacy rate	62.5 %
<i>Male</i>	75.1 %
<i>Female</i>	48.8 %
Average annual growth rate (1981-98)	5.2 %
Total housing units	219,076
Number of registered vehicles	520,000
Mauzas	132

Source: UN-Habitat

2.2 Government and Planning

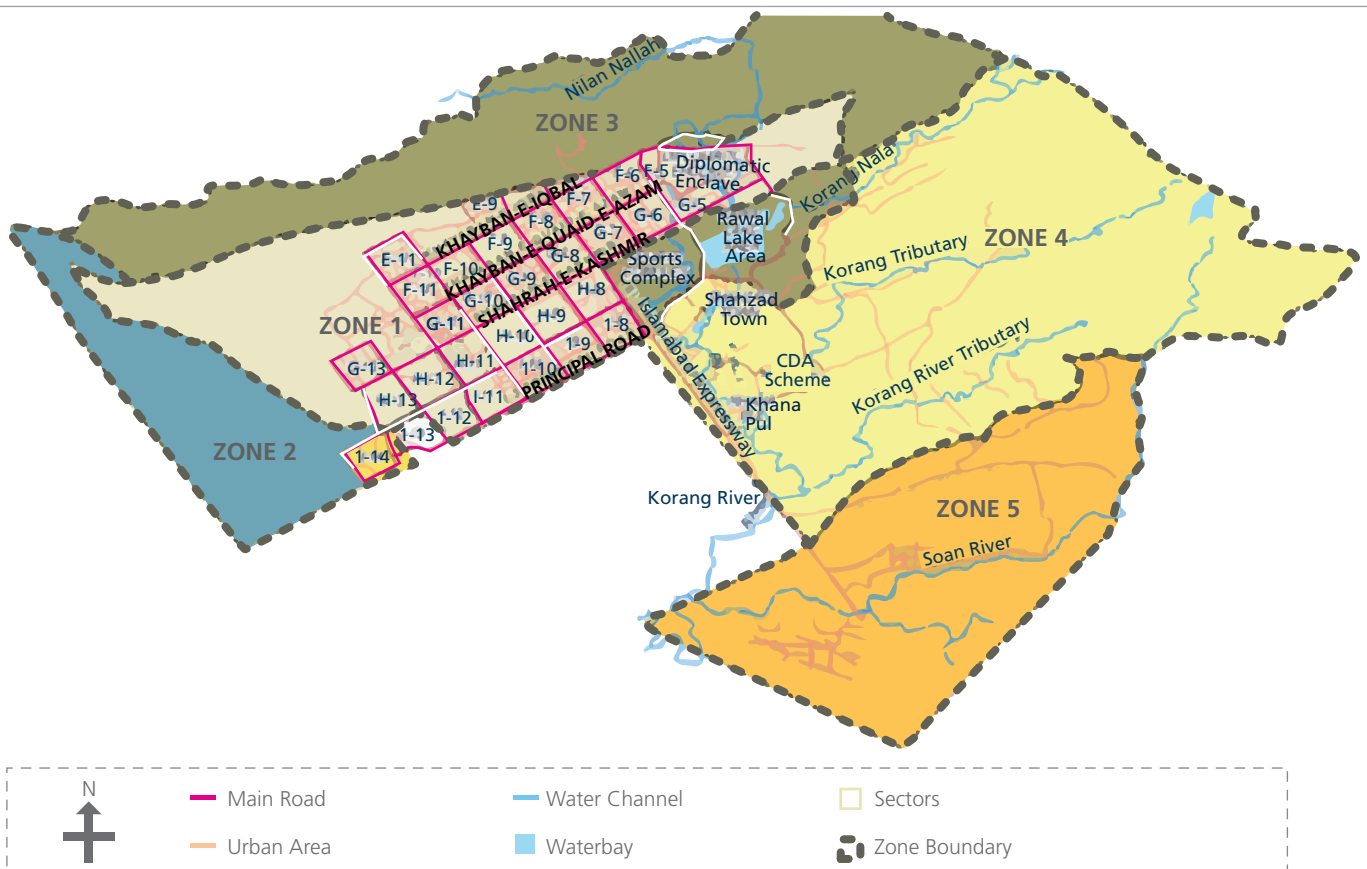
Upon choosing Islamabad as the site of the new capital city in 1959, the government commissioned Doxiadis Associates, a Greek firm, to prepare the master plan for the new city. The master plan sought to ensure that the city would develop in harmony with its surrounding area. The master plan divides the metropolitan region into three zones: Islamabad itself (Zone 1); the national park area (Zone 2); and Rawalpindi and its surrounding cantonment (Zone 3). The Margalla Hills National Park is intended to act as a limit to the northward extension of the city.

Further to this, Islamabad city itself is also divided into

zones (see Figure 1 below). Zone IV is the largest in area while Zone I is the principal residential area covering 222 km². Each residential sector within Zone I is identified by a letter of the alphabet and a number and covers an area of approximately 4 km². Zone II covers 40 km² and consists of the under-developed residential sectors. Zone III covers 204 km², Zone IV covers 283 km² and Zone V covers 158 km²

Under the master plan, Islamabad was designed as a linear city with a grid arrangement of sectors and straight, intersecting roads. Each sector was expected to be a 'human community' and provided with self-sufficient utilities and amenities at the neighbourhood level. The master plan also provides a network of service centres with decentralised activities at neighbourhood and sector levels. Similarly, the plan provides a range of open spaces for leisure, recreational

Figure 1. Master plan of Islamabad Capital Territory



Source: UN-Habitat

farming and model villages. The largest of these open spaces is the protected Margalla Hills National Park, which contains diverse flora and fauna.

The administrative boundaries of the city and district were set by the Capital Development Authority Ordinance of 1960. This same ordinance also assigned the management of the capital area, including the nearby city of Rawalpindi, to the Capital Development Authority. However, subsequent legislation has seen the creation of new managing institutions, meaning there are currently three main agencies charged with some aspect of development administration in Islamabad:

- *Capital Development Authority*

Under the Capital Development Authority Ordinance 1960, the Capital Development Authority has the power to perform all functions required to implement the master plan. The Capital Development Authority works under the Cabinet Division of the national government and is mainly tasked with land management, development control and the provision of municipal services.

- *Islamabad Capital Territory Administration*

In 1980, the Islamabad Capital Territory Order created the Islamabad Capital Territory Administration in 1981 as a provincial government tasked with the administration of the overall Islamabad Capital Territory area, which includes Islamabad. Management of rural areas was transferred from the Capital Development Authority to the Islamabad Capital Territory Administration. In this way, Islamabad Capital Territory Administration manages the majority of the rural areas and Capital Development Authority continues to manage the urban area. However, there is still substantial jurisdictional overlap and as a result, policy implementation and zoning enforcement have deteriorated and illegal encroachments and incompatible land-uses proliferated. The Islamabad Capital Territory Administration is mandated to administer matters relating to land, revenues, food, law and order, civil defence, co-operatives, transportation, population, housing, women's development, labour, social security and some infrastructure, mainly in rural areas.

- *Capital Administration and Development Division*

A new division named Capital Administration and Development Division was created in March 2011,

following a Constitutional Amendment. The division was vested with the mandate to execute, within the jurisdiction of the Islamabad Capital Territory, all such functions handled by the abolished ministries and divisions and such other functions as allocated to it from time to time. As such, the Capital Administration and Development Division was conceived to be the sole administrative agency for service delivery in education, health and special education sectors within Islamabad Capital Territory.

2.3 Population

In 1998, the year of the last census, Islamabad's population was 805,235 with 434,239 men and 370,996 women. The urban population of the city was 529,180 while the rural population was 276,055. The average annual population growth rate from 1981-1989 was 5.2 per cent. In 2011, the population was projected to have reached 1.7 million. Ethnically, Islamabad is the most diverse metropolis in the country with communities from all of Pakistan's major ethnic groups.

Based on 1998 data, almost 60 per cent of the population is aged 15–64. About 3 per cent of the population is above 65 years old and almost 38 per cent is younger than 15. Islamabad has the highest literacy rate in Pakistan at 73 per cent. The city has a labour pool of about 185,000 people, while the unemployment rate at the household level is 12 per cent. Population density is around 889 people per km². The city has the largest foreign population in the country. The city is also growing as a business and commercial centre, which attracts a large highly-skilled workforce from other major cities including Karachi, Lahore and Quetta. All of the country's diplomatic ties are maintained and exercised from Islamabad, as all major embassies, consulates, missions and Pakistan's Foreign Office operate from the city.

2.4 Climate and Natural Environment

Islamabad has hot, humid summers followed by monsoon and severe winters. The weather varies greatly across seasons. Winter typically runs from December to March with some rainfall. Cold temperatures of around 4.5°C are common over the coldest months of December to February. Summer runs from April to September producing hot temperatures averaging around 35°C. Extremes of temperature, as high as 46°C, have been recorded during these months. Summers are accompanied by a monsoon season beginning in June or July and running through to September. Winds are predominantly from the southwest, except during the monsoon season when winds come from the southeast. The average annual rainfall is about 1150 mm. Some 65 per cent of this falls over June to September. Average yearly humidity is 55 per cent.

The geology of the Potohar Plateau is sedimentary, mainly comprising sandstone, limestone and shale. Limestone is suitable for the construction of buildings, bridges and other structures. Limestone mining and stone crushing contribute to a number of environmental issues, including ecosystem degradation in the Margalla Hills National Park and air pollution through Islamabad. Sandstone is produced through deposits in levees, crevasse channels, splays, floodplain channels

and large sheet floods. Laminated mudstone is found in the floodplain and lacustrine deposits.

Soil in Islamabad and the surrounding area is shallow and has a clay composition. The alluvial lands and terraces in the area tend to have low agricultural productivity and in the southern and western parts of the Potohar Plateau, the soil is thin and infertile. Streams and ravines cut the loose plain and cause erosion and steep slopes. This land is generally unsuitable for cultivation. However, large patches of deep, fertile soil are found in the depressions and sheltered parts of the plateau and these support small forests and agriculture.

The Kurang and Soan Rivers pass through the outskirts of Islamabad and Rawalpindi. The Kurang River runs from north to south through the eastern suburbs of Islamabad and Rawalpindi and joins the Soan River, which passes through the southern periphery of Rawalpindi. In addition, the Nullah Lai is an extensive stream system that flows through parts of Islamabad and Rawalpindi. The Nullah Lai has three tributaries (i.e. Saidpur Kas, Tenawali Kas and Bedarawali Kas) all of which originate in the Margalla Hills and pass through Islamabad to join the Nullah Lai. Below Khat-tarian Bridge, the Nullah Lai enters Rawalpindi and passes through the central city before joining the Soan River. Many drainage and sewerage channels also join the Nullah Lai as it passes through Rawalpindi.



Green corridors in Islamabad
Photo © UN-Habitat

Vulnerability Assessment

3.1 Methodology

This assessment used a participatory process to examine Islamabad's exposure, sensitivity and adaptive capacity in terms of climate change. It utilised projected climate scenarios, as well as data and community accounts of past extreme climate events. In line with the Intergovernmental Panel on Climate Change Fourth Assessment Report, in this assessment exposure is defined as the degree of climate stress and is characterized as a change in climate conditions or variability, including the magnitude and frequency of extreme events. Sensitivity is defined by the extent to which a system is affected, either positively or negatively, by climate stimuli. Adaptive capacity relates to the ability of a system to alter itself to adapt to actual or predicted climate stresses, or the ability to cope with the consequences. Vulnerability is therefore a function of exposure + sensitivity - adaptive capacity.

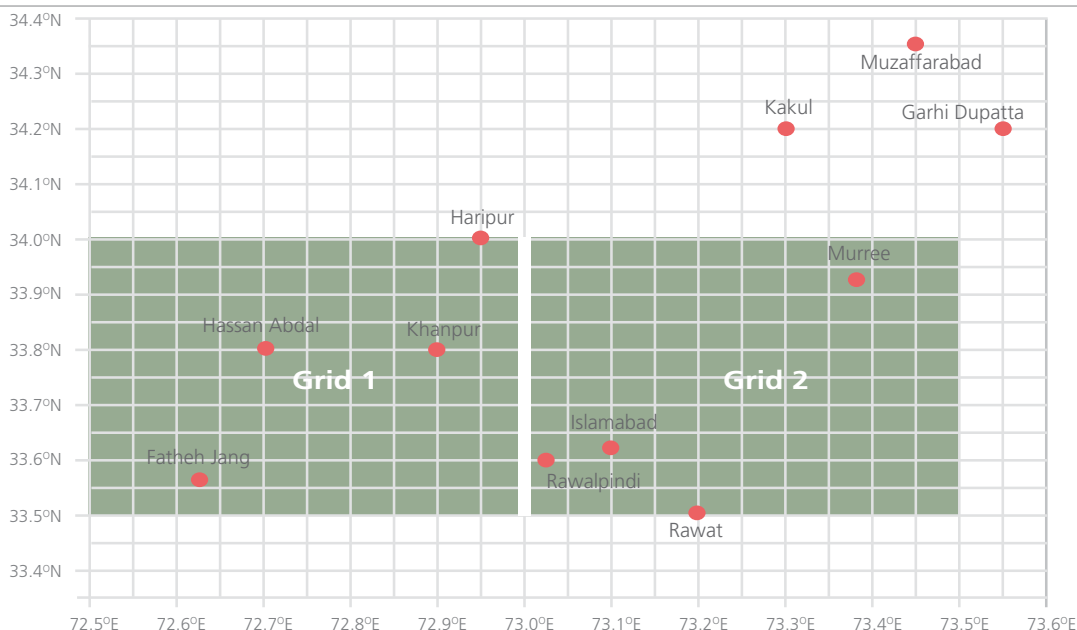
Figure 2: Assessment framework



Source: UN-Habitat

The vulnerability assessment segmented the Islamabad Capital Territory area into two large grids (see Figure 3 below). Grid I corresponds to 33.5–34.0° N 72.5–73.0° E and Grid II corresponds to 33.5–34.0° N 73.0–73.5° E. Islamabad and Rawalpindi are located within Grid II.

Figure 3. Spatial segmentation of the Islamabad Capital Territory



3.2 Exposure

The assessment of Islamabad's exposure focuses on temperature and rainfall. In general, over 1991-2010, temperatures across the Islamabad Capital Territory rose at almost double the average global rate. Future temperatures are expected to increase and become

more variable. Over recent decades, rainfall also increased in Islamabad Capital Territory, though not uniformly due to increasing variability of hydro-meteorological events. Similarly, the frequency and intensity of hydro-meteorological events are expected to increase over upcoming decades. These trends can be seen in Table 2 below.

Table 2. Mean temperature and precipitation in Islamabad Capital Territory

Period	Season	Temperature (mean °C)		Rainfall (total mm)	
		1961 – 1990	1961 – 2010	1961 – 1990	1961 – 2010
Jun - Sep	Monsoon	29.1	29.1	737.3	781.8
Oct - Nov	Post-monsoon	19.4	19.6	47.1	45.8
Dec - Mar	Winter	12.7	13	251.9	253.6
Apr - May	Pre-monsoon	25	25.4	101.1	95.2
Year average		21.3	21.6	1142.1	1176.3

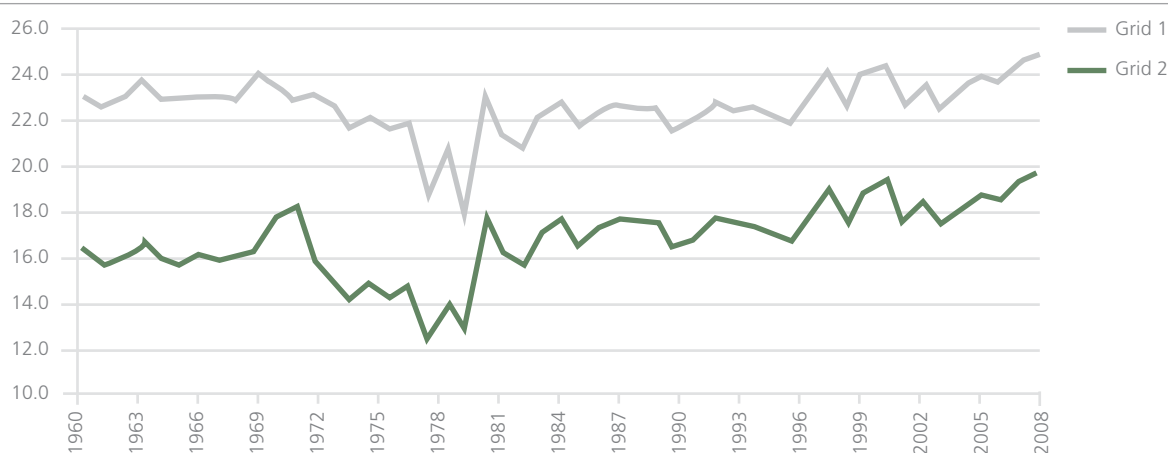
Source: UN-Habitat

3.2.1 Trends in Temperature

Comparing temperatures over 1961-90 and 1990-2010, it is clear that the Islamabad Capital Territory has become warmer. This is particularly the case for Grid II. While temperatures in both Grid I and Grid II have warmed since the base period 1961-1990, Grid II

has warmed more (see Figure 4 below). Over the time period in the dataset, the average temperature has increased by about 1° centigrade in Grid I and by more than 3° centigrade in Grid II. The average temperature for both grids shows a notable decline leading up to 1990 followed by a significant rise between 1990 and 2010.

Figure 4. Change in annual average temperature in Islamabad 1961-2010



Source: UN-Habitat

3.2.2 Trends in Precipitation

During the period from 1961 to 2010, quantities of rainfall also increased. Over 1961-1990, rainfall increased markedly in both grids, both in terms of annual average and across almost all seasons in both grids (with the exception of summer in Grid I). However, over 1990-2010 the rate of increase in rainfall slowed

and in some cases even decreased slightly. In this way, while the overall pattern is one of a moderate increase in rain, the recent trend has been towards decreasing rain. In addition, variability has increased significantly in recent years. This means that within the context of a slight overall increase in precipitation there can be both extended dry spells, leading to droughts, and more intense rainfall, which can lead to flood.

Table 3. Precipitation in both grids over 1961-2010

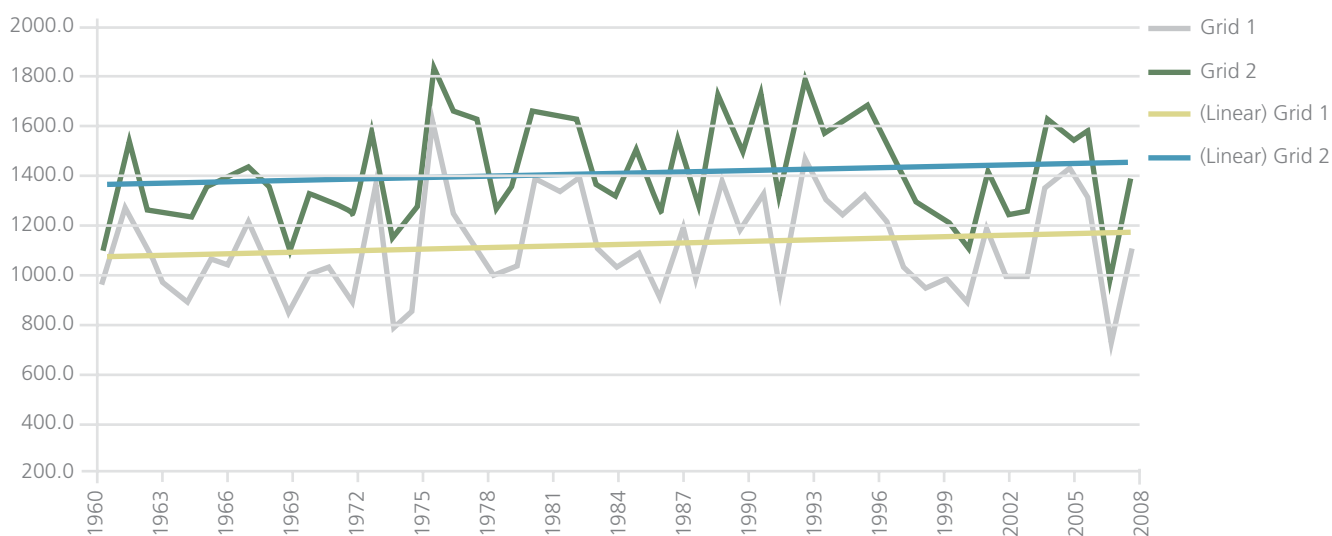
Grid 1					Grid 2			
Annual	Annual Monsoon (JJAS)	Annual Winter (DJFM)	Annual Summer (AM)	Annual Post-monsoon (ON)	Annual Monsoon (JJAS)	Annual Winter (DJFM)	Annual Summer (AM)	Annual Post-monsoon (ON)
1961-1990								
169.3	124.4	67.0	-57.6	5.8	146.2	101.2	61.5	8.2
1961-2010								
99.1	114.3	36.4	-46.2	-4.3	73.3	48.2	48.9	-48.9

Source: UN-Habitat

Total annual rainfall shows an increase of around 99 mm for Grid 1, and 58.6 mm for Grid II. The highest recorded precipitation was 1557 mm in 1976, and

the lowest was 582 mm in 2009. This means that the level of rainfall is highly unpredictable and can vary greatly from year to year.

Figure 5. Average annual precipitation in both grids over 1960-2010



Source: UN-Habitat

3.2.3 Projected Change in Temperature 2010-2099

Temperatures are projected to continue to increase. Both Grid I and II show almost identical projected temperature change over the short and long-term future. Over the short-term (until 2039), a temperature change of 0.7°C and continued substantial deviation

around the mean are clearly identifiable. Over the longer-term (until 2069), the projected temperature change reaches 2.2°C. This is higher than the 2°C limit that the Intergovernmental Panel on Climate Change has identified as the point beyond which ecological systems (and human systems by extension) may become severely disrupted.

Table 4. Projected temperature changes for both grids 2020s-2080s

	Grid 1			Grid 2		
A2 emissions Scenario*	2020s (2010-2039)	2050s (2040-2069)	2080s (2070-2099)	2020s (2010-2039)	2050s (2040-2069)	2080s (2070-2099)
Annual mean temperature trend in degrees centigrade	0.7	2.2	1.8	0.7	2.2	1.7

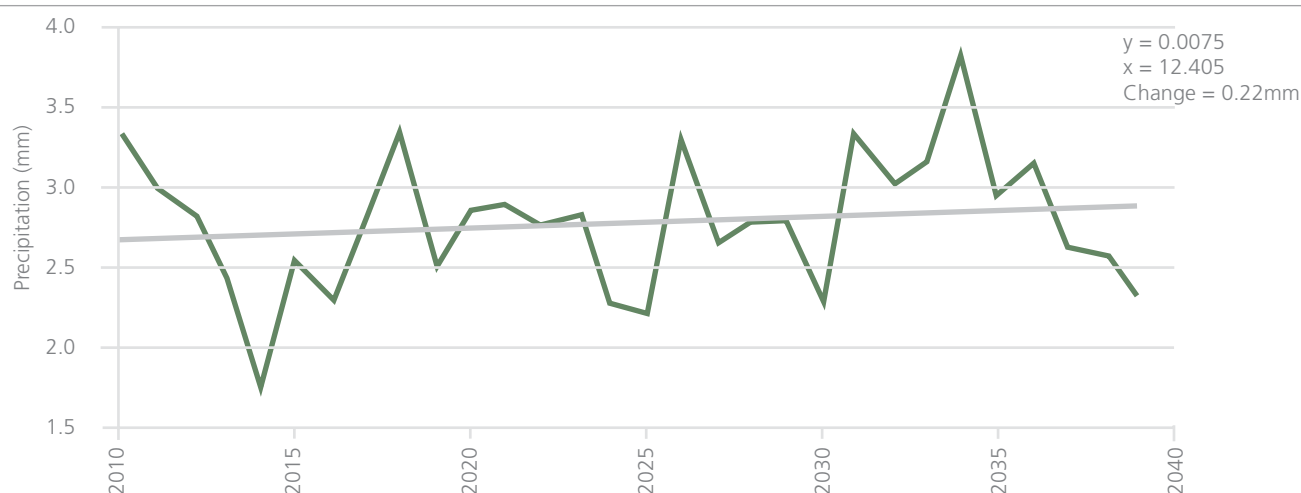
Source: UN-Habitat

3.2.4 Projected Change in Precipitation

Rainfall projections for both grids show a slight annual increases through to 2040. Projections also show increasing variability. Projections through to 2100 show a levelling off and possibly a slight decline in rainfall

relative to 2040 levels. The overall increase in average rainfall, even if minimal, when coupled with increasing variability and broader patterns of urban growth, mean that urban flooding is likely to become an increasingly severe problem.

Figure 6. Projected precipitation in Grid II through to 2040*



Source: UN-Habitat

3.2.5 Climate Extremes

Islamabad is also exposed to extremes of climate, both in terms of temperature and rainfall. On 23 July, 2001, Islamabad received 620 mm of rainfall in 10

hours - the heaviest rainfall in 24 hours anywhere in Pakistan during the past 100 years. Over 2001-2012, there have been 7 days when over 100 mm of rain fell (see Table 5).

Table 5. Days of more than 100 mm of rain in Islamabad 2001-2012

Date	Rainfall (mm)
24 July, 2001	620
18 February, 2003	105
4 September, 2003	169
7 August, 2004	135
6 July, 2008	128
3 September, 2012	161
13 July, 2006	138

Source: UN-Habitat

Similarly, there have been months of extreme rain fall. The ten months of maximum rainfall over 2001-2012 are shown in Table 6.

Table 6. Ten months of maximum rainfall over 2001-2012 in Islamabad

Month	Rainfall (mm)	Month	Rainfall (mm)
July 2001	1039	August 2007	38
July 2008	531	August 2002	360
July 2006	510	September 2012	355
August 2006	416	August 2004	313
July 2003	407	July 2007	295

Source: UN-Habitat

Along with rainfall, there have been extremes of temperature. Over 1961-1990, the hottest temperature recorded was 46°C in June 2005. Over 1993-2012, there were eleven days when the temperature exceeded 44°C.

Table 7. Days when the temperature exceeded 44° centigrade in Islamabad

Date	Rainfall (mm)
24 June, 2005	46.6
17 June, 2007	46.1
12 May, 2001	45.7
16 June, 2007	45.3
9 June, 2002	45.0
22 June, 2005	45.0
28 June, 2009	44.6
23 June, 2005	44.5
22 June, 2012	44.5
7 May, 2005	44.4
21 June, 2010	44.2

Source: UN-Habitat

3.3 Sensitivity

Islamabad’s sensitivity to climate change is linked to a number of factors. These are:

3.3.1 Groundwater Level

Groundwater in Islamabad is being depleted. This is linked to the unsustainable use of water, increased ground water extraction and reduced water percolation in soil due to urban expansion and increases in population. On average, groundwater is depleting at the rate of 1.7 metres per year. A maximum 20 metres

drop in groundwater level was noticed in Gulshanabad Mohallah. The drop in groundwater level correlates positively with the density of the distribution of wells in the area.

This not only makes groundwater harder to extract but also decreases the ability of ecosystems in and around Islamabad and the Islamabad Capital Territory to utilise groundwater for their survival. Meanwhile, an extended dry season, especially coupled with increasingly rapid extraction (and thus greater depth) of groundwater means that ecosystems may struggle to survive.

3.3.2 Economic Systems and Livelihoods

Due to substandard housing and a lack of basic urban services, the urban poor are greatly affected by extreme climate events linked to climate change. Also, wage labourers and vendors find the duration of their working day reduced during extreme weather events. Similarly, collecting fuel (wood) and water for daily use is made more difficult in extreme weather conditions. The urban poor in Islamabad share common characteristics which render them especially sensitive to climate change. These include:

- Living in marginal areas and slums such as the French Colony, and settlements along streams and natural drains such as those in sectors F-6, F-7, Bari Imam and Saidpur Village;
- Inhabiting temporary settlements and transit camps formed of internally displaced persons and refugees. A total of 81,000 individuals live in slums, informal settlements and transit camps in Islamabad;
- Commonly residing in areas without proper drinking water and sanitation facilities.

A number of climate change hazards affect agricultural production, which in turn has a negative impact on wealth and livelihoods. About 50 per cent of the rural population of Islamabad Capital Territory earn their livelihood from livestock and dairy farming. Other sources of livelihood include the service sector, daily wage earners and real estate. Islamabad does not have an irrigation network which means that farming is dependent on rain. As a result, the rural population of Islamabad Capital Territory practices subsistence farming. This population will be the most severely and immediately impacted by floods, droughts, heat stress and declining air quality as all these hazards prevent crops from growing and can kill existing crops and livestock. Such impacts on agricultural production have a secondary impact on food prices in the urban area, as decreased supply of food results in higher prices, adversely impacting the poor, women and daily wage earners. Similarly, cottage industries around Islamabad, which range from honeybee keeping to embroidery and mainly employ the urban poor, are adversely affected by electricity shortages. Education and health facilities are also affected by extreme climate events.

3.3.3 Infrastructure and Urban Basic Services

The quality and capacity of infrastructure and basic services affect the sensitivity of people, communities and institutions to climate change. Elements include:

- *Drinking water supply*
The quality of drinking water in Islamabad Capital Territory varies greatly. In some areas drinking water is contaminated by industrial and hospital waste. Many drinking water sources are unfit for human consumption.
- *Drainage*
The city has long relied on natural waterways, such as streams, to provide drainage. However, because waterways are increasingly disturbed and/or covered over, drainage becomes an increasingly critical issue. The frequency and intensity of floods is likely to increase because streams in the catchment area of the Nullah Lai are being disrupted by commercial and residential development.
- *Sanitation*
Sanitation in the urban areas of Islamabad is better than in the rural areas. However, sanitation in the slums and transit camps located in Zones I and II is poor and worsens during the monsoon.
- *Solid waste*
More than 80 per cent of municipal solid waste is collected by the Capital Development Authority. A significant proportion of the city's solid waste is collected and sold to the cement industry for use as fuel.
- *Transportation*
Land in Sector I8 was originally designated as the site for a central transport terminal, including rail and road transportation and warehousing, has been consumed for residential purposes. This has deprived the city of an essential transportation facility. As a result, the city lacks a mass transit system and is totally dependent on private vehicles, taxis and minivans. However, government plans are currently underway to build an elevated bus rapid transit system.
- *Housing*
Housing in slums, temporary settlements and other informal densely-populated areas is particularly sen-

sitive to flooding. In many cases, the poor are driven to areas that are likely to flood because these areas are cheap or unoccupied. However, in severe floods, such as that of 2001, even residents of planned urban areas within and outside the Nullah Lai's immediate lower basin are likely to be affected.

3.3.4 Health and Education

The increasing number of respiratory, skin and eye diseases, as well as water-borne diseases, such as diarrhoea, malaria and dengue, in Islamabad suggest the increasing impact of climate change on human health. Areas with weak health infrastructure (such as the rural periphery of Islamabad) are often the most seriously affected. Similarly, extremes of temperature are increasing the incidence of health problems like heat stroke and dehydration leading to death and an increased social and economic burden on the poor. Increases in the frequency and severity of extreme weather events such as storms increase the risk of dangerous flooding, mostly in the Nullah Lai and its basin areas as far as Rawalpindi.

The impacts of climate change on human health depend on many factors. These include the effectiveness of a community's public health and safety programmes; the behaviour, age, gender, and economic status of the individuals affected; the sensitivity of populations; the extent and length of exposure to climate change hazards; and society's overall ability to adapt to change. Extreme weather events are causing injury and in some cases death. During a heat wave, children, the elderly, persons with disabilities and the poor are most at risk. Climate extremes are also leading to a reduction in the availability of fresh food and water. Further, extreme climate events are interrupting communication, utility, and health care services.

In education, schools in slums and poor settlements lack resilient buildings and proper infrastructure. During extreme weather events, teaching is disrupted and children are not able to complete the curriculum and courses as planned. As a result, educational development is likely to be affected especially in the poorest and most flood-prone areas. This is due to a number of factors – access to school and scheduled classes being the most obvious, but also increased rates of disease, poorer nutrition and lower family livelihoods also affect educational attainment.

3.4 Adaptive Capacity

While significant gaps in adaptive capacity remain, people and institutions in Islamabad have effectively adopted some adaptation measures to protect themselves against the adverse effects of extreme climate events and climate change more generally. These are outlined below.

3.4.1. Adaptive Capacity of Municipal and Local Development Institutions

At the institutional level, different development management agencies exhibit a range of adaptive needs including:

- Capital Administration Development Division is a newly established institution. Currently, the agency's staff lack the required capacity to deal with the effects, impacts and adaptation and mitigation measures of climate change. There is no unit within the agency dedicated to climate change.
- Capital Development Authority does not have a section addressing the impacts and effects of climate change. However, following the 2005 earthquake and Marriot fire, the Emergency and Disaster Management Directorate was established in 2008. The Directorate seeks to be a fully equipped, proactive disaster mitigation and response unit. The Capital Development Authority has also recently launched a sophisticated Urban Search and Rescue team. The Capital Development Authority staff have not been properly trained to address climate change in Islamabad. Similarly, Capital Development Authority legislation, such as building bylaws and planning regulations, do not consider climate change.
- Islamabad Capital Territory Administration lacks a technical unit dedicated to climate change issues and environmental management more broadly. The major institutional challenges which Islamabad Capital Territory Administration faces include a lack of technical capacity to develop and enforce building controls and town planning regulations and a lack of technical capacity to deal with climate change and environmental challenges.

3.4.2 Adaptive Capacity at the Household and Community Level

A number of non-governmental organisations (NGOs) in Islamabad work with communities to create community-based organisations (CBOs) which are tasked with specific activities. One such NGO, the National Rural Support Programme, has formed 7,600 CBOs. These CBOs train local communities on issues relating to natural resource management, including water management. They also develop drinking water supply schemes such as hand pumps and tube wells

for domestic use and irrigation. However, CBOs and NGOs have had less involvement in public health issues and capacity to adapt in this area remains limited due to a lack of healthcare facilities. In this way, local communities have the capacity to form groups to monitor water level in the Nullah Lai.

Six indicators can be used to further understand the adaptive capacity of households and communities, as set out in Table 8.

Table 8. Adaptive capacity at the household level in Islamabad

Indicator	Characteristics
Wealth	21 per cent of Islamabad's population live below poverty line - Access to finance is limited
Technology	72 per cent of households have access to mobile phones - Geographic Information Systems (GIS) software is used in limited cases for urban planning and natural resources management
Information	86 per cent of Islamabad's population are literate - Regular monitoring of water levels of relevant waterways - Dissemination of information through formal and informal channels - Community groups have limited access to formal information
Infrastructure	54 per cent of households have access to piped water - Lack of flood management infrastructure in place - Limited transport and road infrastructure in place, especially in informal settlements
Institutions	- Some early warning systems in place 7,600 CBOs in operation - Some information exchange between government institutions and CBOs - Lack of widespread understanding of climate change amongst civil society
Social	80 per cent of women are literate - Some public health provided via mobile clinics, especially in rural areas - Women's groups play an important role in flood response efforts
Environment	- Poor general quality of natural environment - Increased erosion along the banks of waterways

Source: UN-Habitat

04

Hotspots

This section synthesises the preceding exposure, sensitivity and adaptive capacity sections by identifying the most climate vulnerable locations in Islamabad and Rawalpindi. It does this by pinpointing the locations that are the most exposed to climate hazards, have the highest sensitivity and lowest adaptive capacity. While the hotspot section considers all hazards, it focuses on flood-prone areas along the Nullah Lai and its tributaries.

4.1 Major Hotspots in Islamabad

In Islamabad, major hotspots are mainly located in unplanned settlements which have developed along streams that are prone to flooding. Most houses built in unplanned settlements – mainly slums – from local materials such as mud, stone and wooden logs. However, the number of houses constructed from brick is increasing. Slums are severely impacted during flood events. Heavy rains and floods damage slum houses and cause injury and death. Along the Nullah Lai, population density can exceed 4,400 people/km². Four major hotspots have been identified, as follows:

- Mera Jaffar is the largest slum in Islamabad. There are 24 slums across Islamabad, totalling 81,000 residents; 28,500 of these live in the Mera Jaffar slum. The slum is located downstream of Jodh Kas, one of the Nullah Lai's major tributary streams.
- Muslim Colony is a slum of labourers working on Islamabad's largest hospital construction project (Pakistan Institute of Medical Sciences). Muslim Colony is situated near streams feeding into Rawal Lake,

the primary source of drinking water for the residents of Rawalpindi. Muslim Colony is the second largest slum in Islamabad with 15,000 residents.

- 100 Quarters is a slum which had developed around 100 quarters built by the Capital Development Authority for low-paid employees. It is located along the Saidpur Kas stream, which feeds into the Nullah Lai. The settlement has over 6000 residents.
- French Colony is a slum built for Christian labourers at the Pakistan Institute of Medical Sciences construction site. It is located on the banks of the Kani-tawali Kas, a stream which feeds into the Nullah Lai. It has a population of 6,000 residents.

4.2 Major Hotspots in Rawalpindi

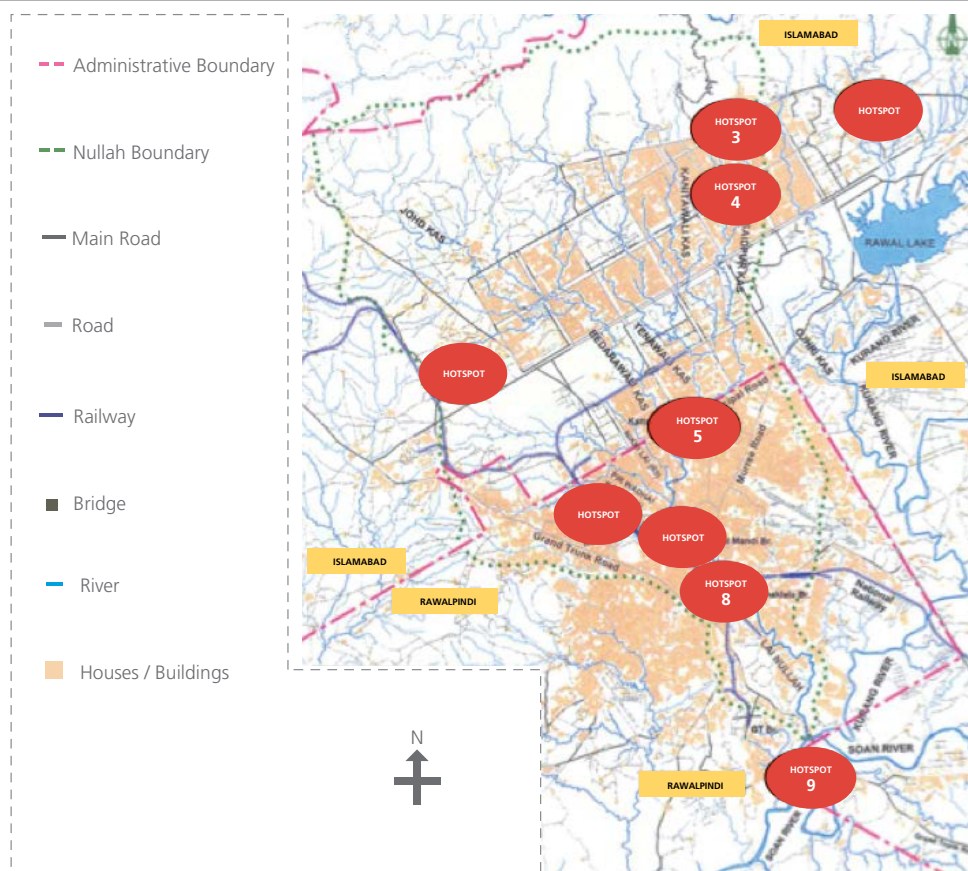
Rawalpindi is located in the downstream catchment basin of the Nullah Lai. Rawalpindi's population density around the Nullah Lai is about 4,200 people per km² (2012). Due to land scarcity, people have even constructed their houses on the bed of Nullah Lai. Floods start when water levels of the Nullah Lai exceed 5.5 metres. The Tehsil Municipal Administration sounds a siren over low-lying areas when the water level reaches the alert level of 4.8 metres. Those most affected by flooding in Rawalpindi live in slum and low-lying areas. Annually, some 400,000 people are affected by floods in the city. Five major hotspots have been identified as follows:

- Katarian Bridge is located at the administrative boundary between Rawalpindi and Islamabad and is

the place where the Nullah Lai tributaries of Saidpur Kasi, Kanitwali, Badarwali Kasi and Tenawali Kasi enter Rawalpindi. In 2011 the Nullah Lai at Karian Bridge burst its banks when floodwater exceeded 5.1 metres. In 2012, the streambed was deepened by 3 metres by the authorities to reduce flood risk. Part of the problem is that solid waste and illegally built houses have reduced the width of the Nullah Lai.

- Ratta Amral Bridge is a bridge near the point where Dhok Ratta Nullah meets the Nullah Lai. The surrounding area regularly floods, in part due to a tributary stream which flows to Bhoosa Godown Ratta.
- Gawalmandi Market is located near Gwal Mandi. It is a commercial area of Rawalpindi with many car workshops and shops selling car parts and batteries. Harmful lubricants and electronic waste pollute the waters of the Nullah Lai from this site. Serious flood events affect commercial activities in the area.
- Aryan Muhalla is an area where serious floods occur. It is located between Gunj Mandi Bridge and Railway Bridge. The tributaries of Arya Nullah, Dhok Rata, Nullah Lai and Dhok Charaghdin pass through the area. At this point the force of flood water increases substantially due to the convergence of a number of streams with the Nullah Lai. In 2001, the flood waters were so high that they breached the third floor of some nearby buildings.
- Soan Camp is located at the confluence of the Nullah Lai and Soan River, which carries water from three major tributaries, namely the Nikki Lai, Pir Wadhai Kas and Dhok Ratta Nullah, as well as six further drainage and sewage channels. In addition, the Nullah Lai carries raw sewage and untreated effluents which poses a significant health risk. In this way, the Soan River becomes heavily contaminated, despite being used downstream for irrigation and drinking purposes.

Figure 7. Climate change hotspots in Islamabad and Rawalpindi



Source: UN-Habitat

Conclusion - Proposed Adaptation Projects

The findings of this report demonstrate that Islamabad faces both short and long term challenges as a result of hydro-meteorological hazards that are being made worse by climate change. These challenges are both primary impacts, such as damages and threats to life that occur as a result of flooding, and more secondary, knock-on effects, such as a threats to food security and nutrition as a result of changing conditions in surrounding agricultural areas.

The following is a list of possible actions that can be undertaken in Islamabad and the Islamabad Capital Territory. This list is not definitive, and because no single action can increase resilience to climate change, the actions presented here need to be seen as part of a programmatic response to the challenges posed by climate change. Inevitably however, resource constraints will mean that not all of these priority actions can be undertaken, so a prioritisation exercise is necessary and should be the next major step after this assessment. Where possible, the actions presented in this report are 'no-regret' or 'low-regret', meaning that, if implemented, they will still benefit the city even if no change in climatic conditions were to occur. In addition, the adaptation options presented here are designed to avoid 'mal-adaptation', whereby resilience to climate change is not increased or vulnerability is shifted from one location or group of people to another.

The actions presented here are based on the findings of the assessment and have been discussed with city level stakeholders. However, the report does not suggest that the projects need to be implemented in the form that they are presented here; city officials may wish to break down the projects and implement their component parts. Ideally a more comprehensive Climate Change Action Plan is developed.

5.1 Proposed Projects for Waste, Sanitation, Rainwater and Carbon Sequestration

Project 1: Solid waste management in urban and rural areas

Implementing agency: Capital Development Authority

Description: The project seeks to develop effective systems for the effective management of domestic, hospital and industrial waste. This objective would be achieved by collecting solid waste from urban and rural areas and segregating it into organic and inorganic waste components, developing an integrated site for the segregation of waste, and using biogas technology and composting for waste processing.

Project 2: Community-level sanitation in rural areas

Implementing agency: Islamabad Capital Territory Administration

Description: The project aims at proper management of domestic waste water based on bio-remediation and sand filter methods at the community level. The project will ensure that wastewater is managed by a) collecting grey water from the village in a stabilisation pond; b) transferring the water from the stabilisation pond to a series of ponds through sand filters; c) purification of water in the ponds using fungi and other

bio-remedial measures; and d) piping the purified water from the ponds to agricultural land for irrigation purposes.

Project 3: Bio-engineered recycling and reuse of grey water

Implementing agencies: Capital Development Authority and Islamabad Capital Territory Administration

Description: The project seeks to activate the currently dysfunctional effluent treatment plants, as well as install new plants for discharging and treating semi-treated water from hospitals and laboratories before it passes into the Nullah Lai. The project will also aim at the recycling and reuse of grey water from residential, commercial and industrial sources.

Project 4: Rainwater harvesting and ecosystem management

Implementing agencies: Capital Development Authority and Islamabad Capital Territory Administration

Description: This project seeks to harvest rainwater for better ecosystem management. Under this project catchment ponds would be built at suitable places such as in Sector F9 park, the natural depressions found in the greenbelt and other green spaces for the retention of water. Inverted wells and surface ponds could be built. Rainwater harvesting systems in residential, commercial and public buildings would be established and the water would be used mostly for growing plants and other domestic uses.

Project 5: Study of carbon sequestration in Margalla Hills National Park

Implementing agencies: Capital Development Authority, Islamabad Capital Territory Administration and Climate Change Division

Description: Further to a initial study of carbon sequestration in the national park undertaken by the Government of Pakistan in conjunction with UN-Habitat, additional research is required. It is recommended that the following issues and parameters are also studied: carbon and nitrogen concentration, ergosterole and fungal biomass, carbon storage, humus morphology and meso-fauna biodiversity. The final results of this project may provide information regarding the

impact of soil conditions on carbon sequestration. This is an essential component of any strategy to mitigate the emissions of greenhouse gases.

5.2 Proposed Projects for Energy Conservation

Project 6: Energy conservation of buildings

Implementing agencies: Capital Development Authority, Islamabad Capital Territory Administration, Climate Change Division and National Energy Conservation Centre

Description: The project seeks to decrease energy consumption in domestic, commercial and public buildings. This will be achieved by implementing a range of energy conservation measures such as reviewing and updating building bylaws in order to introduce energy conservation measures, undertaking energy audits and retrofit large buildings and promoting the use of energy saving light bulbs in buildings and street lights.

Project 7: Energy conservation in tube wells

Implementing agencies: Capital Development Authority, Islamabad Capital Territory Administration and National Energy Conservation Centre

Description: The project seeks to conserve energy in tube wells. The components of the proposed project include: a) undertake energy audits and retrofit tube wells; b) put in place photovoltaic cells and biogas for water pumping; c) install new energy efficiency tube wells; and d) introduce a pro-poor water metering system.

Project 8: Energy conservation in industrial sector

Implementing agencies: Capital Development Authority, Islamabad Capital Territory Administration and National Energy Conservation Centre

Description: The project seeks to promote energy conservation measures in the industrial sector. The project includes the following components: a) under-

take energy audits for boilers, compressors, chillers, steam systems, ovens, dryers, kilns, furnaces, electric systems; b) retrofit these facilities for energy conservation; c) undertake power factor improvement in the industrial sector; d) promote energy-efficient industrial units including brick kilns; and e) build combined effluent treatment and industrial plants and use the organic waste for energy generation.

Project 9: Energy conservation in energy transmission systems

Implementing agencies: Capital Development Authority, Islamabad Capital Territory Administration and National Energy Conservation Centre and Islamabad Electric Supply Company

Description: The project seeks to reduce transmission losses of electricity and natural gas. The project components include a) efficient transmission of electricity and reduction of transportation losses; b) power factor improvement; and c) reduction of natural gas leakage.

Project 10: Energy conservation in the transport sector

Implementing agencies: Capital Development Authority, Islamabad Capital Territory Administration and Islamabad Electric Supply Company

Description: The project seeks to promote energy conservation measures in the transport sector. The project components include

- a) introducing multi-buses, a circular railway and/or a rapid or mass transit system;
- b) introducing bike lanes;
- c) promoting computerised vehicle maintenance and reconditioning;
- d) providing training and equipment for vehicle emissions testing and road worthiness and certification;
- e) introducing hybrid vehicles;
- f) building parking stories for plazas;
- g) introducing tracker technology for effective traffic management; and
- h) introducing scientific methods for traffic management.

5.3 Proposed Projects for Planning, Institutions and Policy

Project 11: Streamlined planning at the federal, district and local levels

Implementing Agencies: Climate Change Division and provincial planning and development departments

Description: The project seeks to improve planning and coordination on climate change between federal, district and local levels. The project would achieve enhanced planning at local levels and would enable all levels of government to translate national climate change and climate change-related policy directives into local action. Possible actions could include a) training for local officials; b) further planning exercises conducted in new target areas; and c) creating climate change offices or departments at subnational levels of government with dedicated officers to ensure that adaptation and resilience building measures are mainstreamed into all local government planning.

Project 12: Certification and registration of real-estate developers and enforcement of building codes

Implementing agencies: Capital Development Authority, Pakistan Council for Architects and Town Planners and Pakistan Engineering Council

Description: The project seeks to achieve climate-smart construction practices in Islamabad. The project would be achieved by

- a) updating the building code and strengthening its enforcement;
- b) creating a registry of real-estate developers (for residential, commercial and industrial buildings); and
- c) certifying real-estate developers who build according to international green and resilient standards, such as 'LEED'.

Project 13: Supporting the development of public-private partnerships (PPP)

Implementing Agencies: Capital Development Authority

Description: The project seeks to improve basic urban services through the implementation of PPPs. This would require a regulatory framework that supports and encourages the development of PPPs in a transparent manner. Once completed, pilot PPPs would be implemented in selected areas in key service sectors such as waste management.

5.4 Proposed Projects in Other Sectors

Project 14: Ecosystem based adaptation and management for Islamabad

Implementing Agencies: Capital Development Authority, Islamabad Capital Territory Administration and Capital Administration Development Division

Description: The project seeks to improve ecosystem health in Islamabad, Islamabad Capital Territory and the Margalla Hills National Park. The project would be large in scope and have a number of different components, in recognition of the challenges of ecosystem management and preservation that Islamabad faces. A number of activities should be considered including protecting remaining natural vegetation in Islamabad and the Islamabad Capital Territory through regulation and effective and enforced planning and protecting existing ecosystems, including Zone III and the Margalla Hills National Park so that they retain their character and biodiversity and continue to provide ecosystem services, including the acquisition and protection of land, where necessary, as well as other measures.

Project 15: Reducing pollution from brick kilns

Implementing Agencies: Capital Development Authority and Pakistan Environmental Protection Agency

Description: The project seeks to reduce pollution from the brick kiln industry. The project includes the following components a) undertaking environmental impact assessments of brick kilns; b) promoting the use of efficient combustion technologies; and c) demonstrating the benefits of environmentally clean brick kilns through pilot projects.

Project 16: Adaptation in healthcare

Implementing Agencies: Capital Development Authority, Islamabad Capital Territory Administration and Ministry of Health

Description: The project seeks to reduce the incidence of climate-related disease and improve healthcare and treatment, including access to treatment. The proposed project would include a) establishing measures to prevent the breeding and spread of mosquitoes; b) setting up mobile health units to deliver basic treatment services to outlying areas that have poor health coverage; c) partnering with local healthcare NGOs to improve healthcare services; and d) improving laboratory and analytical facilities.

Project 17: Flood Protection

Implementing agencies: Capital Development Authority, Islamabad Capital Territory Administration and Capital Administration Development Division

Description: The project seeks to reduce the impacts of floods especially floods that occur as a result of storms and heavy rain. This proposed project is large and broad in scope, and will consider the following types of activities

- a) improving drainage;
- b) improving bank protection – especially along the Nullah Lai and its tributary streams; and
- c) improving urban planning to prevent proliferation of settlements in flood prone areas.

5.5 Medium- to Long-term Considerations

The following points should be considered for medium- to long-term adaptation:

- Review institutional planning capacity of city authorities to undertake mitigation and adaptation measures in the long-term. For long-term gains the government must review the institutional planning capacity of Capital Development Authority, Islam-

abad Capital Territory Administration and Capital Administration Development Division in undertaking climate-resilient planning and making Islamabad and Islamabad Capital Territory climate-resilient in the long-term.

- Undertake a review of the revised master plan, building by-laws and town planning regulations so that they incorporate climate change concerns and adopt climate-resilient planning processes.
- Freely share climate change data, resources and assessments between agencies for improved response to and management of climate change. The Global

Change Impact Studies Centre, Space and Upper Atmosphere Research Commission, and the Pakistan Meteorological Department all have excellent knowledge resources and analysis capacity and the data and expertise they acquire needs to be shared freely amongst municipal agencies.

- Build capacity of provincial governments in climate change adaptation for improved implementation of the national Climate Change Policy, currently housed within Climate Change Division. The capacity of provincial governments needs to be improved so that they can devise their own climate change policies, strategies and action plans.



Islamabad skyline
Photo © UN-Habitat

UN-Habitat's Cities and Climate Change Initiative promotes enhanced climate change mitigation and adaptation in developing country cities. This document is an initial output of the Cities and Climate Change Initiative activities in Islamabad, Pakistan. This abridged report is based on the report titled: "Climate Change Vulnerability Assessment of Islamabad".

Starting with a brief background of the city, this report addresses Islamabad's climate change situation from a comprehensive vulnerability perspective that focuses on exposure to climate change hazards, socio-economic sensitivities and the adaptive capacities of the city and its stakeholders. Based on this analysis the report identifies vulnerable people, places and sectors and provides preliminary climate change adaptation options.

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United Nations Human Settlements Programme

P.O. Box 30030, Nairobi 00100, Kenya

E-mail: infohabitat@unhabitat.org

www.unhabitat.org