

**Opportunities for Climate Change Adaptation in
Developing Countries - A Case of
Local Governments in Pakistan**

By

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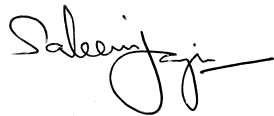
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DECLARATION

The work of this thesis has not been submitted previously for a degree or diploma at any university or institution. Except where explicit reference is made in the text of the thesis, this thesis contains no material published elsewhere or extracted in whole or in part from a thesis by which I have qualified for or been awarded another degree. No other person's work has been relied upon or used without due acknowledgment in the main text and bibliography of the thesis. However, most of the material and results from this thesis have already been appeared in the refereed conference and journal publications during my Ph.D. study period.



Signed: -----

(Saleem Janjua)

August 2011

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ABSTRACT

In developing countries, climate change poses a serious challenge to social, environmental and economic development. Adaptation to climate change is relevant and crucial to developing countries because their economies are often dependent on climate-sensitive natural resources, and because they are less able to tackle the impacts of climate change themselves than richer nations (Adger et al., 2003; Handmer, 2003; and Kates, 2000). Further, climate variability and the extreme events that are driven by a more variable climate (floods, droughts and storms) constitute one of the greatest global concerns related to climate change, and have many implications at the local level. For instance, climate change affects local governments (urban, rural and coastal) by changing the conditions that must be faced by various types of infrastructure including: built systems (roads, bridges, water and sewage, networks); natural systems (watersheds, forests); and human systems (health, education, human welfare).

Throughout the world, the barriers and opportunities to climate change adaptation at the local government level are not well understood and documented. These barriers can be a result of societal and organisational behaviour, financial, economic and regulatory disincentives and/or inadequate information and awareness. These barriers can also be perpetuated by a lack of expertise in climate change issues at the local government level. The author is of the view that climate change adaptation at the local government level produces positive externalities (including opportunities such as reduction of local pollution and economic improvement). This positive impact leads to a fundamental and intriguing question: *If climate change adaptation is desirable by all the actors involved, then why is it not more widely pursued by the local governments of Pakistan?* With this background, the overall goal of this research is to explore opportunities for

climate change adaptation at the local government level in Pakistan and to develop a strategy for building local government capacity to adapt to climate change impacts.

This thesis is one of the first attempts in the context of urban Pakistani local governments that starts with a comprehensive inventory of what is going on in the field of climate change adaptation and what sort of existing information is available in Pakistan. Further, it provides an analysis of what the major sources of resistance to climate change adaptation are, and what strategies could be used in urban Pakistani local governments to lower resistance to taking action on climate change adaptation.

In particular, this thesis reflects on the applicability of the learning organisation paradigm to the climate change adaptation agenda, by providing a theoretical underpinning to the organisational learning and learning organisation concepts. Subsequently, it applies a learning perspective to the climate change adaptation debate in the context of urban Pakistani local governments. Further, from a critical analysis of conceptual evidence, this thesis identifies a framing of six key characteristics for climate change adaptation learning and action often attributed to a learning organisation (described in this thesis as “change model for climate adaptation”). The characteristics or elements of the change model presented are categorised as:

- *Leadership for adaptation;*
- *Vision for adaptation;*
- *Organisational culture for adaptation;*
- *Good governance for adaptation;*
- *Innovation and creativity for adaptation; and*
- *Resources for adaptation*

Moreover, the thesis uses an actor-based approach to examine the key conceptual ideas noted above in the urban Pakistani local government context. It further assesses the broader applicability of the proposed change model for climate adaptation to local governments (around the globe) where climate change adaptation had been already planned, and to gain insight into the range of adaptation frameworks (strategies, plans) for designing a local level adaptation strategy in the context of urban Pakistani local governments. Finally, this thesis designs a Pakistan-specific strategy for building capacity to adapt to climate change impacts at the urban local government level in Pakistan. It discusses the proposed strategy itself by suggesting various initial practical actions for urban Pakistani local governments to take that would help assist in the implementation of relevant capacity-building.

The author believes that this thesis could prove to be a practical and functional tool for recognising, executing, and appraising the climate change adaptation requirements (on a methodical basis) of any urban Pakistani local governments, and to helping and providing assistance for dealing with the climate-related risks. Further, the results of this thesis could also be adapted for use by the local governments in other Asian developing countries. Lastly, the results presented in this thesis are helpful in enabling universities, research organisations, and international donor agencies to better understand the impacts of climate change in Asian developing countries by providing them with a pragmatic and functional strategy to work together for the better implementation of climate change adaptation actions at the local levels.

CHAPTER 1 - INTRODUCTION

1.1 Orientation to the Chapter

This Chapter positions the research within the context of the climate change issue, which poses a serious challenge to the social, environmental and economic development of developing countries such as Pakistan. It discusses the importance of climate change adaptation, and examines the concept of local governance at the local institutional level for climate change adaptation actions in Pakistan. In this context, adaptation consists of the actions that people take in response to, or in anticipation of, projected or actual changes in climate, to reduce impacts or take advantage of the opportunities posed by climate change (Mertz et al., 2009; Huq et al., 2003; IPCC, 2001; Pielke Jr., 1998). Within this realm, the Chapter provides an overview of the statement of the problem. After this, there is a brief discussion about the justification of the research topic itself, including the overall research goal, objectives, and research questions. This is then followed by a discussion of scope and limitations of the research, including an overview of the entire thesis and research design (Stage-I, II and III). After this, a brief discussion about the motivations and ethical considerations is presented. Finally, a list of publications resulting from this research is given in the last section.

1.2 Context/Background to the Research

1.2.1 What is Climate Change?

The scientific findings that the earth is warming are no longer controversial. The Intergovernmental Panel on Climate Change (IPCC) in its initial documents of the Fourth Assessment Report (2007, p. 10) clearly says that “most of the observed increase in globally averaged temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations”. The IPCC report (2007, p. 12) also states that “for

the next two decades a warming of about 0.2°C per decade is projected..... even if the concentrations of all greenhouse gases and aerosols had been kept constant at year 2000 levels, a further warming of about 0.1°C per decade would be expected”.

The atmosphere is a delicate balance of gases that maintain our climate. Stewart and Jonathan (2003) argue that the build-up of greenhouse gases (GHGs) in the atmosphere from anthropogenic sources have many potentially serious consequences. Katz (1999) believes that carbon dioxide (CO₂), methane (CH₄), water vapour (H₂O) and other greenhouse gases [nitrous oxides (NO_x), tropospheric ozone (O₃), hydrofluorocarbons (HFCs), chlorofluorocarbons (CFCs), and sulphur hexafluoride (SF₆)] are necessary to maintain our climatic conditions, but human growth, technology and transportation dependence, energy consumption, waste generation, and other anthropogenic actions have begun to disrupt this balance. Similar to a greenhouse, CO₂ and other GHGs let sunshine (visible light) through the atmosphere, but prevent some of the heat (infrared radiation) reflected or radiated by the earth from escape. When these gases build up, the balance between solar input and heat output is upset, and the result is having global warming (an increase in the average temperature of the earth), which leads to climate change.

1.2.2 Climate Change Response Strategies

Climate change is an issue that is being addressed at every level of government and society along two primary tracks: mitigation and adaptation. According to the IPCC report (2001, p. 881), “mitigation of climate change refers to activities which reduce the greenhouse gases (GHGs) that result in global warming while adaptation refers to adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts”.

The field of climate change adaptation is, however, new and there is yet no accepted consensus of the term. Several definitions of adaptation are found in the climate change literature (Smit and Wandel, 2006; Fussel and Klein, 2003; Burton, 2000; Feenstra et al., 1998; Pielke Jr., 1998; Scheraga and Grambsch, 1998; Downing et al., 1997; Rennie and Singh, 1996; Smit, 1993; and Stakhiv, 1993). Almost all these academics/researchers are of the view that adaptation consists of the actions that people take in response to, or in anticipation of, projected or actual changes in climate, to reduce adverse impacts or take advantage of the opportunities posed by climate change (IPCC, 2001). These studies also consider that adaptation refers to adjustments in individual, group, and institutional behaviours in order to reduce society's vulnerabilities to climate, and thus reduce its impacts (Pielke Jr., 1998). IPCC (2001) and Munasinghe and Swart (2005) consider that adaptation to climate change can be reactive (undertaken in response to impacts of current climate variability or climate change) or anticipatory (implemented before impacts are observed). Ways can vary from activities by individuals or communities to policies related to planning and infrastructure development.

The review of literature (Fussel, 2007; Schipper, 2006; Ringius et al., 2002; Muller, 2001; Helm and Simonis, 2001; Arler, 2001; Azar, 2000; and Rose et al., 1998) indicates that attention is still largely focused on issues of mitigation. However, these studies also indicate that 'mitigation' and 'adaptation' are two alternative but important and complementary policy responses to climate change (Fussel, 2007; Schipper, 2006; Ringius et al., 2002; Muller, 2001; Helm and Simonis, 2001; Arler, 2001; Azar, 2000; and Rose et al., 1998). The principal difference between the two response strategies is that mitigation attempts to prevent the climate change problem from occurring in the first place, while adaptation aims to cope with the problems of climate impacts which have not or are not going to be prevented either before, during or after they occur (South

South North, 2009). Therefore, mitigation tries to reduce the source of the problem of climate change and hence the impact, while adaptation tries to reduce the consequences of those impacts.

1.2.3 Why Adaptation to Climate Change is Important?

The United Nations Framework Convention on Climate Change (enforced on 21 March 1994) addresses adaptation in its article 2, 4.1 (b), 4.1 (e), 4.1 (f) and 4.4 with the overall aim that all parties should take necessary measures to facilitate adequate adaptation to climate change (UNFCCC, 2007a). The Intergovernmental Panel on Climate Change (2007) states that even with reductions in greenhouse gas emission, some climate change is regarded as ‘unavoidable’. So while emissions reduction or mitigation is still of great importance for limiting the amount of climate change, Smit and Wandel (2006) consider that the society must also be prepared to adapt to the inevitable consequences of climate change. There is growing consensus amongst the climate change experts that mitigation is not going to halt the recent development in change in the global average temperatures. Therefore, adaptation should also be recognized as an important policy option which complements the mitigation efforts. It is the reason that a high priority is being given to ‘adaptation’ now a day by different research institutions and international agencies all over the world (AdaptNet, 2010; VCCCAR, 2010; NCCARF, 2010; ALM, 2010; Climate Change Adaptation Programme-RMIT University, 2010; IISD, 2010; Asian Cities Climate Change Resilience Network, 2010; AusAID, 2010; ADB, 2010; Pew Centre on Global Climate Change, 2010; and Asia-Pacific Network on Climate Change, 2010).

Stern (2006) estimates the cost of future climate change related damage, without adaptation, at between 5 and 20 per cent of global gross product, depending on the assumptions relating to the size of the temperature increase and the range of impacts that are included. However, Schipper (2006) says that a little attention has been paid to the possible trade-offs between both types of

options. The Intergovernmental Panel on Climate Change (2007, p. 17) says that “a wide array of adaptation options is available, but more extensive adaptation than is currently occurring is required to reduce vulnerability to future climate change”. The report says that “there are barriers, limits and costs, but these are not fully understood” (IPCC, 2007; p. 17).

1.2.4 Adaptation in Developing Countries and Southeast Asia

In developing countries, climate change poses a serious challenge to social, environmental and economic development. The review of literature (Adger et al., 2003; Handmer, 2003; and Kates, 2000) indicates that adaptation to climate change is more relevant and crucial to the developing countries because their economies are more dependent on climate-sensitive natural resources, and because they are less able to tackle the impacts of climate change. Yamin et al. (2005) are of the view that the people who will be exposed to the worst of the impacts are the ones least able to cope with the associated risks. Populations in developing countries generally develop a number of coping mechanisms (e.g. diversification of crops, changing sources of income, migration and social networks of support) in order to live with climatic variations and uncertainty. Roy et al. (2006) consider that these adjustments or adaptations mostly take place in an informal way as people in developing countries have a very little access to formal support through public sector. Further, the rapid changes in the climate (e.g. extreme events) present an additional challenge to develop adaptation mechanisms in developing countries. The people in developing countries are, therefore, considered among the most vulnerable to the impacts of climate change. Reducing vulnerability to climate change in recent years has become an imperative issue and is at the forefront of any sustainable development policy agenda. Therefore, it is important to find out ways and means by which communities in developing countries may be enabled to adapt to climate change.

South Asia, which includes the Indian sub continent (India, Pakistan, Bangladesh and Nepal) as well as Sri Lanka, Maldives and Bhutan, is especially at risk related to the climate change impacts. Mirza and Muhammad (2005, p. 5) summarise past technical studies in this area by saying; “there has been a general rising trend in surface temperature in the order of $0.5^{\circ}\text{C}\pm 0.1^{\circ}\text{C}$ over the entire South Asia region during the past century”. Roy et al. (2006) consider that this region is particularly vulnerable to the predicted climate change impacts because of its population load, low adaptive capacity, several unique and valuable ecosystems (coral reef, large deltaic region with rich biodiversity) and vast low altitude agricultural activities. The past decade has produced a vast literature on study of climate variability, and impacts in this region. However, Roy et al. (2006) are of the view that most of the studies available on this topic are for India and Bangladesh. Only a small number of climate change studies have covered Pakistan, as well as other South Asian countries.

1.2.5 Climate Change Impacts in Pakistan

Roy et al. (2006) estimate that the Pakistan has experienced both cooling of -0.4°C to -2.6°C and warming of 0.1°C to 4.0°C during the past century. CICERO (2000) [included in the IPCC reports] has estimated that a 0.9°C increase in temperature will occur by 2020, doubling to 1.8°C by 2050 for Pakistan. The recurrences of extreme weather events in the recent past manifested by drought (2006, 2008 and 2009) and excessive floods (2007, 2009 and 2010) in Pakistan have raised the concern of dealing with the climate change issue on an urgent basis. Murtaza and Iqbal (2005, p. 48) consider that, “in Pakistan, there are direct sectoral impacts due to the climate change on urban infrastructure, water resources, agricultural production, forestry, land use changes, coastal zones and biodiversity loss”.

As a consequence, and expanded by the vulnerability of Pakistan to climate change (see below), Pakistan provides a useful focus for the exploration of climate change adaptation strategies for the developing countries.

1.3 Statement of the Problem

1.3.1 Vulnerability to Climate Change in Pakistan

Pakistan, like many other developing countries, is a society in transition from agriculture to an industrial economy (Murtaza and Iqbal, 2005). This transition involves high population growth, rapid urbanization, infrastructure degradation, soil erosion, water and air pollution, and many other factors. Shah and Rafique (2005) are of the view that Pakistan's key resources, its economy and society, are at risk; that such socio-economic pressures and imbalances establish vulnerability to climate change. In Pakistan, climate change together with other socio-stresses (e.g., population growth, urban expansion, terrorism, economic growth, globalization) is having substantial "impacts on its major sectors including; water, agriculture, forests, industry, fisheries, biodiversity, community health, business, tourism, transport and public services" (Murtaza and Iqbal, 2005; p. 49). Hence, adaptation to climate change is vital. The coping capacity of most of the population in Pakistan is limited due to the low per capita income, lack of access to social capital, and administratively and politically disconnected functions related to climate change response at the federal, provincial and local government levels. Vulnerability of population from climatic hazards in Pakistan can be reduced through adaptive governance, primarily at the local government level, which may include climate-focused development, mainstreaming adaptation in development planning, institutional and political reforms and cooperation.

Rudestan and Newton (1992, p. 47) consider that “a suitable way to devise research is to work out-what bothers you”. In Pakistan, the level of work and studies undertaken on climate change, up till now, has largely been in the area of mitigation, including:

(i) *Greenhouse Gas Inventory (2007)*

(ii) *National Environmental Action Plan (2007)*

(iii) *Climate Impact Assessment Studies for Key Sectors conducted by Pakistan National Communication (2003)*

(iv) *National Conservation Strategy (1992)*

No effort has been made to carry out research or studies regarding ‘climate change adaptation’ to cope with this issue.

1.3.2 Local Level Responsibility for Climate Change in Pakistan

Pakistan introduced a decentralization plan called as the ‘Devolution of Power’ in January 2000, which was implemented after a series of local government elections in August 2001 (Pakistan MOE, 2007). The Government of Pakistan brought these reforms through introducing a new Local Government Ordinance-2001 and abolition of executive magistracy through amendments in relevant laws (NRB-Pakistan, 2007). In addition to devolving administrative and expenditure responsibilities to local governments the decentralization also involved, to differing degrees, changes in the administrative level of decision making, the accountability of the decision making authorities (political and bureaucratic) and the nature and amount of fiscal resources available

(NRB-Pakistan, 2007). After devolution in 2001, local governments in Pakistan were formed at three levels:

- (i) *District;*
- (ii) *Tehsil; and*
- (iii) *Union.*

Each level comprised of its Nazim and Naib Nazim, its elected body (District, Tehsil & Union Councils), and its administrative structures (District, Tehsil/Town Municipal and Union Administration). The following table shows the number of local governments in Pakistan in 2007.

Provinces	Districts	City Districts	Total	Tehsils	City Towns	Total
Punjab	31	5	36	116	6	122
Sindh	15	1	16	86	18	104
Baluchistan	21	1	22	71	2	73
NWFP	23	1	24	34	4	38
Total	90	8	98	307	30	337

Table 1.1: Local Governments at ‘District Level’ in Pakistan

Note: This research looks at all the 98 local governments at district level, which are responsible for local governments at tehsil level.

Although the local governments in Pakistan did exist in periods prior to the devolution in 2001, they did not have any significant role as those local governments (especially in rural areas) were practically inactive (NRB-Pakistan, 2007). Most of the state functions were carried out at the

provincial levels. Now, after devolution, as stated by the Pakistan MOE (2007), the vast majority of public services (including environmental protection and climate change) that were previously under the provincial administration have been transferred to the local governments, substantially increasing their scope and responsibilities.

1.3.3 Climate Change Adaptation at the Local Level

Climate variability and the extreme events (causing floods, droughts and storms) are one of the greatest global concerns. These global concerns have many implications at the local level. As the climate changes, “it is anticipated that even small shifts in climate will have potentially large ramifications for existing infrastructure” (Auld and McIver, 2005; p. 26). Hence, climate change will affect Pakistani local governments (urban, rural and coastal) as well by changing conditions faced by various types of infrastructure including: built systems (roads, bridges, water and sewage, networks); natural systems (watersheds, forests); and human systems (health, education, human welfare). The local governments in Pakistan need systems (built, natural, human) that can withstand future climate change impacts. In the present conditions, every local government in Pakistan has administrative, financial and decision-making authority (NRB-Pakistan, 2007). But simultaneously each one of it is also facing challenge of climate change as it affects the local government services, assets and infrastructure.

Climate change adaptation at the local government level will require close consultation between government, business, planners, scientists and local communities, as adaptation involves taking action to minimize the negative impacts of climate change and taking advantage of new opportunities that may arise. Rosenfeld et al. (2004) consider that the types of adaptation measures adopted should depend on the impact of climate change on the region and on individual economic sectors. The author believes that by increasing the capacity to adapt at the local

government level in Pakistan will definitely reduce vulnerability to the effects of climate change at provincial and national level. As no work has been done on climate change adaptation in Pakistan so far, this indicates that there are some barriers as well as opportunities. Therefore, it requires a great understanding of what the barriers to change are and what strategies, policies or tools could be used (opportunities) to deal with those barriers.

1.4 Justification of the Topic

Pakistan has agreed (date of signature: 13 June 1992; date of ratification: 1 June 1994) to adopt national programmes for mitigation and adaptation under the United Nations Framework Convention on Climate Change that was enforced on 21 March 1994 (UNFCCC, 2007b). However, as said by Murtaza and Iqbal (2005, p. 45), firstly, “the resources and capacity at the local government level in Pakistan to deal with the implementation and operational issues regarding climate change adaptation are not always considered”. Secondly, in Pakistan like many other developing countries the climate change agenda focuses only on mitigation of greenhouse gas emissions (see Chapter 1.2.1). In the context of Pakistani local governments, no publically available research work regarding climate change adaptation has been carried out up till now.

Hence, it is necessary to develop a Pakistan specific strategy for adaptation to climate change at the local government level in order to prioritize the most urgent local climate change adaptation activities and identify the required local, human and financial resources. Moreover, it is necessary to understand how climate impacts locally on the different sectors and their resultant vulnerabilities in Pakistan. This will focus attention on where priority intervention might reduce the impacts of climate change, and help local governments of Pakistan to adapt (soft solution) rather than react (hard solution) when the damage has already been done. While developing a long-term climate change adaptation strategy in Pakistani local government context, the first

component is ‘identification of barriers to climate change adaptation at the local government level in Pakistan’, and then by using that information to determine what sorts of methods, policies or tools could most effectively lower those barriers. The outcomes of the research are based on a realistic appraisal of Pakistani local governments’ strengths and weaknesses while keeping in mind their social, economic and environmental needs.

1.5 Goal, Objectives, and Research Questions of the Thesis

Throughout the world, the barriers and opportunities to climate change adaptation at the local government level are not well understood and documented. Such barriers could be a result of the societal and organisational behaviour, financial, economic and regulatory disincentives as well as inadequate information and awareness. These barriers could also be perpetuated by a lack of expertise at this level. The author is of the view that climate change adaptation at the local government level produces positive externalities (opportunities). This leads to a fundamental and intriguing issue:

If climate change adaptation is desirable by all the actors involved, then why is it not more widely pursued by the local governments of Pakistan?

Having taken a good inventory of what is going on the field and what sort of information is available, the author feels that the element missing is the analysis of what the major sources of resistance to climate change adaptation are and what strategies, policies or tools (opportunities) could be used to lower those resistances.

1.5.1 Goal

The overall goal of this research is to explore opportunities for climate change adaptation at the local government level in Pakistan and to develop a strategy for building capacity to adapt to climate change impacts.

1.5.2 Objectives

For achieving the overall goal of the research, the following objectives were formulated:

- 1. To review the climate variability and its impacts for Pakistan*
- 2. To identify the key predicted impacts of climate change and any anticipated vulnerability to these particular impacts for Pakistani local governments*
- 3. To examine the theoretical background of adaptation to climate change by reviewing the scholarly interpretations of adaptation meanings and types*
- 4. To identify the potential climate change adaptation actions (strategies) specifically for Pakistani local governments through literature review, and place them under the different themes*
- 5. To identify barriers and challenges to climate change adaptation at the local government level in Pakistan through primary data collection (Stage-I; this initial exercise will bring refinement in this research, and would help guiding the detailed direction of the research)*
- 6. To begin another extensive review of the literature (on the basis of the results of Stage-I of this research) to establish the theoretical basis for Stage-II of the research, and to formulate research issues for further examination*

7. *To collect and analyse data in Stage-II of the research*
8. *To understand how local areas (local governments, municipalities, cities) around the globe are approaching climate change adaptation planning, and how they could present climate change adaptation options (lessons) for local governments in Pakistan (Stage-III)*
9. *To design a strategy for building capacity to adapt to climate change impacts at the local government level in Pakistan*
10. *To discuss the climate change strategy itself by proposing some initial practical actions for Pakistani local governments to help assess the practicality for implementing such a strategy*

1.5.3 Research Questions

This research focuses on finding the answers to the following two fundamental questions;

- (a) *What are the barriers and challenges to climate change adaptation at the local government level in Pakistan? And*
- (b) *What type of climate change adaptation strategy would be the most effective in lowering those barriers as an overall opportunity to build capacity to adapt to climate change impacts at the local government level in Pakistan?*

1.6 Research Scope and Limitations

Pakistan is considered one of the world's most complex geopolitical areas - one struggling with terrorism, poverty, weak governance, corruption and many other related global issues (Wadhams et al., 2008). Pakistan's several domestic problems extend beyond its borders and have a widespread impact on regional and global security as well (Atlantic Council of the United States, 2009). Against this milieu, the increasing scientific evidence backing up the speed and scope of climate change looks, at most, a less important issue in Pakistan. However, climate change - by altering the water availability, food security, disease occurrences, land use and coastal boundaries - may have severe implications for country's overall security and stability. Related to the various other challenges faced by Pakistan, the author considers that actions on climate change will, of course, only ever be one challenge among many. However, there is much that Pakistani governments (federal, provincial, and/or local) can do along with various stakeholders to adapt to the impacts of climate change. With this in mind, this thesis explored opportunities (learning dimension) for climate change adaptation at the local government level in Pakistan, and developed a strategy for building capacity to adapt to the climate change impacts. This study attempted to bridge the gap between the theoretical and practical aspects of organizational change for climate change adaptation which could enable climate adaptation learning and action in any urban Pakistani local governments.

It is worth mentioning that this thesis did not attempt to answer every possible question on 'adaptation to climate change in Pakistan'. However, the author believes that the outcomes and discussions during Stage-I, II and III of this research answer, with enough clarity and profundity, the initial research questions and objective outlined earlier in this Chapter. While reviewing this thesis, the readers should bear the following points in mind:

- (a) *The research started with encompassing all (urban and rural) local governments in Pakistan (Stage-I). However, the timelines did not allow the author to analyse the rural local governments in later parts (Stage-II and III) of this research.*

- (b) *The scope of the study and timelines did not allow the author to look at the context under which the local governments have existed in Pakistan. Neither has it analyzed the process of devolution in 2001 by looking at its political, administrative, fiscal, and/or developmental components;*

- (c) *The scope of the study and timelines did not allow the author to explore issues arising from the complexity posed by climate change for adaptation at various scales in Pakistan, including inter-linkage with other global problems mentioned in the above paragraphs.*

While Pakistan's security and economic conditions in future are still uncertain given terrorism, poverty, weak governance, corruption and other issues, what is clear is that Pakistani local governments would continue delivering services to their people under all such prevailing conditions. Simultaneously, changes in climate would continue affecting the Pakistani local governments (urban, rural and coastal) by changing their conditions of built systems (roads, bridges, water/sewage networks), natural systems (watersheds, forests), and human systems (health, education, human welfare). Therefore, identifying and implementing climate change adaptation strategies at the local government level will produce positive externalities (opportunities) for Pakistan.

1.7 Structure of the Thesis

The thesis comprises of nine Chapters. In Chapters 2, 3 & 4 (Stage-I), the author critically examines the concept of local governance at the local institutional level for climate change adaptation actions. Through a combination of data generation tools (documents identification; face to face semi-structured interviews with Pakistani professionals, and administering a questionnaire to all the 98 Pakistani local governments), he identifies barriers to climate change adaptation at the local government level in Pakistan.

In Chapters 5 & 6 (Stage-II), the author presents a broad picture of change for climate change adaptation learning and action within Pakistani local governments. This process begins with an extensive review of the literature regarding ‘organisational change for climate change adaptation learning’ that establishes the theoretical basis for Stage-II of this research. Similar to Stage-I, Stage-II also employs a combination of data collection approaches; predominantly interview methodologies (exploratory and explanatory stages). Specifically, a total of 21 Pakistani professionals, working in a variety of roles for local government, are subject to the interview process in Stage-II. A thematic analysis of the data identifies six discrete characteristics (stating it as a change model for climate adaptation) that could be used to frame the context of climate change adaptation learning and action in the urban Pakistani local government context.

Chapter-7 (Stage-III) assesses the broader applicability of the proposed change model for climate adaptation to local governments where climate change adaptation had been already planned, and gains insight into the range of climate change adaptation frameworks (strategies, plans) around the globe for designing a local level climate change adaptation strategy in the context of urban Pakistani local governments. The first part of Stage-III (Chapter-7) examines those local

governments (cities, local areas) that are located in Asia and Africa (relatively close to the Pakistani context) to find out any transferable lessons to support the structure or process for adaptation planning in urban Pakistani local governments, including: Albay; Cape Town; and Durban. And the second part of Stage-III (Chapter-7) explores some more lessons to support the ‘content’ for climate change adaptation planning in urban Pakistani local governments by identifying and evaluating the adaptation actions of ten different local governments (cities, local areas) around the globe, including: Vancouver; Cape Town; London; Washington; Durban; New York; Halifax; Boston; Albay; and Chicago.

Based on the framework developed in Stage-II (Chapters 5 & 6), as well as lessons learnt from Stage-III (Chapter 7), Chapter 8 portrays and discusses an integrated local level strategy for tackling the climate change impacts in urban Pakistani context, besides taking into account the concept of ‘climate adaptation as a learning process’. Chapter 9 (last Chapter) presents a brief overview of the overall findings, from Stage-I, Stage-II and Stage-III of this research, and corresponding to the research objectives and questions outlined in Chapter 1. It throws light on the major contributions made by this piece of research. This Chapter also draws a range of recommendations, as overall opportunities, for future research work on the topic.

1.8 Research Methodology (Stage-I, II & III)

Tashakkori and Teddlie (2003, p. 11) define multi-method approach as “research in which more than one method is used”. The fundamental strategy of this approach is to attack a research problem with an arsenal of methods that have non-overlapping weaknesses in addition to their complementary strengths (Greene, 2007; Brewer and Hunter, 2006). Given the lack of empirical research in climate change adaptation area especially in the developing countries like Pakistan, the author considered a multi-method methodology being the most suitable approach for this

research (the detailed description and justification of methodology in each Stage are given in Chapters 4, 6 and 7). In order to achieve the overall objectives, Pakistan, a developing country was the focus of this study.

Specifically, the research was conducted in three Stages; Stage-I, Stage-II, and Stage-III.

1.8.1 What is Stage-I?

Stage-I of this research focused on finding the answers to one of the fundamental research questions mentioned above:

To identify barriers and challenges to climate change adaptation at the local government level in Pakistan

Stage-I could be considered as a ‘preliminary pilot study’, which was designed to identify not only the key barriers that could inhibit the climate change adaptation actions at the local government level in Pakistan. But, this Stage also helped to guide the detailed direction of the research that was conducted in Stage-II.

Specifically, the data generation tools that were used during Stage-I of the methodology included:

- (i) *Document analysis;*
- (ii) *Face to face semi-structured interviews; and*
- (iii) *Questionnaire survey*

(The detailed description and justification about the choice of the research paradigm and methodology developed in Stage-I are given in Chapter-4).

1.8.2 What is Stage-II?

Stage-I of this research was completed in early 2008. Stage-I indicated that the ‘lack of information, education, or training’ (learning dimension of climate change adaptation) was the key barrier to climate change adaptation at the local government level in Pakistan. In the start of Stage-II, the author examined what sort of actions could make it easier to lower the key barrier. Therefore, the author started exploring some theoretical base for further research. After discussions with both supervisors, he decided to explore the literature to the extent that could enable him to identify the characteristics of the urban Pakistani local government’s capacity to change for learning in the context of climate change adaptation. After a literature review for Stage-II, the primary research question that emerged was:

How to bring about change in the context of climate adaptation learning and action in urban Pakistani local governments?

Specifically, the data generation tools that were used during Stage-II of the methodology included:

- (i) *Initial scoping interviews (to explore the issues); and*
- (ii) *In-depth, semi-structured interviews (to explain the issues)*

(The detailed description and justification about the choice of the research paradigm and methodology developed in Stage-II are given in Chapter-6)

1.8.3 What is Stage-III?

In Stage-III of the research, the author went beyond the analysis of a single experience (focusing on Pakistan) to depict the assortment of adaptation efforts that local areas (local governments, municipalities, cities) have initiated around the globe, and test those key elements that were identified earlier in Stage-II of the research. Stage-III helped understand how local areas (local governments, municipalities, cities) were approaching climate change adaptation planning and how they could present adaptation options (lessons) for urban local governments in Pakistan. The transferable lessons were considered as the building blocks for a local level climate change adaptation strategy in the urban Pakistani local context.

In the first part of Stage-III, the author examined (through primary data) those local areas that were located in Asia and Africa (Albay, Cape Town, and Durban) to find any transferable lessons. The lessons from the know-how or practice of these various local areas were considered to support the structure or process for climate change adaptation planning in urban Pakistani local governments. However, the author also considered that the nature and type of ‘content’ would also be the cornerstone for any effective climate change adaptation planning and implementation action in urban Pakistani local governments. Therefore, in the second part of Stage-III, he also made an attempt to provide more lessons (through secondary data) on the basis of publicly available local climate change adaptation strategies (frameworks, plans) from the ten identified local areas (local governments, municipalities, cities), including: Chicago (USA); London (UK); Washington (USA); New York (USA); Boston (USA); Halifax (UK); and Vancouver (Canada). The lessons obtained from this exercise supported the ‘content’ for climate change adaptation planning in urban Pakistani local governments *(The detailed description and justification about*

the choice of the research paradigm and methodology developed in Stage-III are given in Chapter-6)

Finally, the thesis portrayed and discussed an integrated local level adaptation strategy for tackling climate change impacts in urban Pakistani context, besides taking into account the concept of ‘climate adaptation as a learning process’.

1.9 Motivations and Ethical Considerations

According to Marshall and Rossman (1999, p. 25), “initial curiosities for research often come from the real-world observations”. This summarises the author’s motivation as he has almost 13 years of working experience in Pakistan, many South Asian countries, and Australia in the fields of climate change, environmental policy and management (worked as district officer environment in Rawalpindi local government; assistant director in Pakistan Environmental Protection Agency - Pak EPA; expert in United Nations Industrial Development Organization - UNIDO; and editor of AdaptNet). He considers that his PhD research is in accordance with his personal and professional passion, and is also in line with what Marshall and Rossman (1999, p. 25) think “researchers may also reflect on the intersection of their personal, professional, and political interests to ascertain what particular topics or issues capture their imaginations”.

There were some ethical issues involved as well during this research, which required planning and preparation on the author’s behalf. Interviewing different Pakistani, Asian, and African stakeholders about the local government policies and actions addressed sensitive topic that brought up some issues of the inadequacy of the local governments’ polices and systems in those areas. However, the author understood that the research at RMIT (involving human participants) must be conducted in an ethical manner, and must be approved by a Portfolio Human Research Ethics

Sub-Committee or the RMIT Human Research Ethics Committee (HREC). Therefore, he acted in accordance with the University rules and obtained an Ethics Approval before starting the practical work in all three Stages of this research. Moreover, the author was also generally aware of the behaviour of Pakistani and Asian public servants, politicians, and academics.

The author believes that his motivation for conducting this research and having expertise in the field prepared him to be a ‘responsible’ and ‘engaged’ researcher and not simply a researcher, who Slim et al. (1995) describe as a person “who is involved in research that is merely a voyeuristic pursuit, or just an exercise in knowledge extraction”. The author is a true example of what Chambers (1997) values in research that is local people who have knowledge and skills which can play an important role in their own development. However, as Marshall and Rossman (1999) warn, the greatest challenge for the author during this research was to develop the logical connections between the PhD topic, overall goal (objectives), and the design and methodology.

1.10 Publications

The publications arising from this thesis are listed below:

1.10.1 Refereed Journal Papers

1. Janjua, S. (2009), “Climate change impacts: adaptation challenges for Pakistan”, *International Journal of Climate Change: Impacts and Responses*, vol. 1, no. 4, pp. 1-15 (Chapter 2 and part of Chapter 3)
2. Janjua, S. (2009), “Climate change adaptation at the local government level: The case of Pakistan”, *International Journal of Environmental, Cultural, Economic and Social Sustainability*, vol. 5, no. 3, pp. 61-71 (part of Chapter 4)

3. Janjua, S. (2010), “Designing a local climate adaptation strategy in urban Pakistani context”, *Journal of Science, Technology and Development*, vol 27, no. 1, pp. 7-12 (part of Chapter 8)
4. Janjua, S., Thomas, I., McEvoy, D. (2010), “Framing climate change adaptation learning and action”, *International Journal of Climate Change Strategies and Management*, vol. 2, no. 3, pp. 281-296 (Chapter 5 and part of Chapter 6)
5. Janjua, S., Thomas, I. (2010), “Learning from Experience: Deriving Lessons from the Local Level Climate Adaptation Actions in Three Urban Areas of Asia & Africa”, *Climate and Development*, In-press (part of Chapter 7)

1.10.2 Conference Papers and Posters

6. Smith, JM., Janjua, S., “AdaptNet: RMIT-Nautilus climate change adaptation network”, poster presented, *The Gathering Storm: Will Asia Pacific Cities Adapt to Climate Change?* Nautilus Institute and the Global Cities Institute 2007 Global Scenarios Workshop, Ho Chi Minh City, Viet Nam, 6-7 November 2007.
7. Janjua, S. “Climate change impacts: How ready is Pakistan?” accepted for oral presentation, *2008 All Our Futures Conference - Education for sustainable futures*, University of Plymouth, UK, 8-11 September 2008.
8. Janjua, S. “Climate change concerns in Pakistan”, accepted for oral presentation, Track 9, *14th Annual International Sustainable Development Research Conference (AISDR)*, India Habitat Centre, New Delhi, India, 21-23 September 2008.

9. Janjua, S. “Barriers to climate change adaptation at the local government level”, accepted for oral presentation, *ESF-FMSH-ES (European Science Foundation) Conference on New Methodologies and Interdisciplinary Approaches in Global Change Research*, Porquerolles, France, 05-10 November 2008.
10. Janjua, S. “Climate change adaptation at the local government level”, accepted for oral presentation, Paper ID: S09P0372, *5th International Conference on Environmental, Cultural, Economic and Social Sustainability*, Mauritius, 05-07 January 2009.
11. Janjua, S. “Climate change and adaptation challenges”, accepted for oral presentation, Paper ID: C09P0060, *International Conference on Climate Change: Impacts and Responses*, Pune, India, 09-11 January 2009.
12. Janjua, S., “AdaptNet: RMIT-Nautilus climate change adaptation network”, poster presented, *Interconnections of Global Problems in East Asia: Climate Change Adaptation and its Complexity in Perspective of Civil Society Initiative*, Nautilus Institute 2009 Seoul Workshop, Jijihyang Conference Center, Paju, South Korea, 16-19 March 2009.
13. Janjua, S. “Climate change adaptation at the urban local government level”, accepted for publication, *Climate Change: Global Risks, Challenges and Decisions*, *IOP Conf. Series: Earth and Environmental Science*, vol. 6, session 58, 582015, doi:10.1088/1755-1307/6/8/582015, November 2009
14. Janjua, S., “Learning from experience: deriving lessons from the local level adaptation activities in Albay, Cape Town and Durban”, accepted for oral presentation, *Ist World*

Congress on Cities and Adaptation to Climate Change (ICLEI Resilient Cities 2010 Congress), Bonn, Germany, 28-30 May 2010.

15. Janjua, S., McEvoy, D., “Local level climate adaptation actions in three urban areas of Asia and Africa”, accepted for poster presentation, Paper ID: 180, *Australian NCCARF 2010 International Climate Change Adaptation Conference*, Gold Coast Convention and Exhibition Centre, Australia, 29 June – 1st July 2010.

16. Janjua, S., Thomas, I., “Opportunities for climate adaptation learning and action at the urban local level: The case of Pakistan”, accepted for poster presentation, Paper ID: 181, *Australian NCCARF 2010 International Climate Change Adaptation Conference*, Gold Coast Convention and Exhibition Centre, Australia, 29 June – 1st July 2010.

1.11 Summary

The Chapter is an introduction to this thesis. It started with the background to the research, including two policy responses to climate change – mitigation and adaptation. It further discussed the importance of climate adaptation in developing countries, including Southeast Asia and Pakistan. The problem statement, justification of the research topic, overview of the entire thesis, and research design (Stage-I, II and III) have followed the discussion. Next came the research scope and limitations set by the author. Finally, the motivations and ethical considerations, as well as a list of publications resulting from this research are presented in the last part of this Chapter.

CHAPTER 2: CLIMATE CHANGE IMPACTS - MAJOR CONCERNS IN PAKISTAN

2.1 Orientation to the Chapter

The overall purpose of this Chapter is to review the climate variability in Pakistan, and to identify some of the major concerns due to the changing climate in Pakistan. Section one of the Chapter presents the country profile in terms of physical, socio-economic and climate conditions, which provides the context for examining the impacts of climate change in Pakistan. Section two presents a summary of the key predicted impacts of climate change and any anticipated vulnerability to these particular impacts for Pakistan.

2.2 Physical and Socio-economic Conditions of Pakistan

Pakistan, one of the promising Asian developing economies, is situated between latitudes 24°N and 37°N and longitudes 61°E and 76°E (Sultana et al., 2009; Khan, 1993). According to Ahmed (1993) and Framji et al. (1981), Pakistan stretches on an area of 98 million hectares, including varied topography, ranging from perpetually snow capped peaks of Himalayan Range like the Karakoram, K-2 elevation 28,265 ft. (8,615 m) to lush green canal irrigated plains and the hot dry deserts of Sindh and Baluchistan where summer temperatures can exceed 50C. The river Indus and its various streams slice up Pakistan, offering one of the world's largest irrigation systems (Leichenko and Wescoat, 1992; PARC, 1982). In accordance with the PCO (2010) and PAP (2002), Pakistan's population was estimated at 132 million in 1998 census. This population is disproportionately spread amongst four Pakistani provinces: Punjab, Sindh, North West Frontier Province-NWFP (name changed as 'Khyber Phukhtoon Khaw' on 20 April 2010), and Baluchistan. The data collected by PCO (2010) indicates that over half of the entire population

resides in the prosperous province of Punjab, while the largest Pakistani province - Baluchistan - has the lowest population. Sultana et al. (2009) mention that Pakistan is separated into five geomorphic areas (based on terrain texture, rock type, and geologic features and history), each with a number of subdivisions, including:

1) Hindukush and the Western Mountains

2) Himalayas

3) Pothwar Plateau and the Salt Range

4) Indus Plain, and

5) Baluchistan Plateau

Besides, the coastal region can also be regarded as one of the geomorphic areas. Ashiq et al. (2010) and Rafiq (1998) argue that interrelations amid various geomorphic features - water resources, anthropogenic actions, climate change - have caused the establishment of many discrete ecological areas in Pakistan. Such ecological areas encompass the mountains in north, the rainfall-dependent lands, the irrigation-dependent lands, the dry mountains, the hill torrents, the deserts, and coastal areas (Rafiq, 1998). Only around one-fourth of Pakistan's total area (~20 million hectares) has the potential for agricultural activities (USAID, 2009). Irrigated agriculture in Pakistan is carried out approximately on 16 million hectares of land, whereas the outstanding 4 million hectares of land is devoted to rainfall-dependent agriculture (USAID, 2009). Khan (2008) considers that Pakistani water resource sector is the backbone of progress and growth in Pakistan. Nonetheless, he argues that the per person surface water availability in Pakistan is continuously

shrinking due to the ever increasing population rate and changing climate conditions. Consequently, many research studies (Condon et al., 2009; Erenstein, 2009; Khalila et al., 1994) indicate that Pakistan is gradually moving on a path of water scarcity (one amongst various other sectors). This condition demands for identifying and implementing various climate and non-climate adaptation actions related to water sector, both at national and local levels. This could comprise the building of more dams on the river Indus, with the adoption of various water saving actions.

As stated by Bhatti (1997), almost 14% area of Pakistan consists of deserts, comprising: Cholistan; Thal; Thar; Kharan; and Chagei. He further adds that the rainfall is the key source of water in these regions. Also, many research studies (Shahid, 2000; Ayaz, 1999; Ahmed, 1993) indicate that human activities in these regions are mainly reliant on the accessibility of rainfall water. The author considers that high temperature situations (more than 50 C) in the large parts of Pakistani deserts are terrible. Per se, a little rise in temperature is unlikely to have any apparent consequence on present situations. Though, any variation in precipitation will definitely have many considerable effects on such Pakistani regions and, in turn, will increase their vulnerability. Nevertheless, as stated by Bhatti (1997), it is vital to differentiate the impacts caused by socio-economic actions from those attributed solely to climate change. Particularly, this necessitates developing an understanding of the relative significance of climatic and non-climatic elements simultaneously. This is particularly critical as well when contemplating various adaptation actions. It can be assumed that such vulnerability will determine the blueprint of adaptive actions, and that climate change will either strengthen or weaken the intensity of such adaptation actions.

Khan (1993) indicates that dwindling human resource development in Pakistan is also worsening vulnerability to climate change impacts. In addition, the author considers that unbridled growth in

population, for instance, is also applying extra stress on Pakistani physical infrastructure and the environment in general. Minimal literacy in Pakistan is also attached to high level of fertility and a disregard of basic health and food availability at the local level (PMRC, 2009). As stated by HDC (2007), the lack of basic health services and education amplifies the vulnerability of South Asian population (including Pakistan) to climate-related changes with respect to: water-associated diseases; respiratory-related ill health; and heat-related morbidity and mortality. A Pakistan-related country study carried out by a consortium composed by DRN, ADE, Baastel, ECO, and NCG (2004) argues that the socio-economic conditions on their own in Pakistan put the country into a vulnerable situation. In addition, climate change is also likely to have some bearing on, and aggravates the condition. For instance, a rise in temperature could increase the number of mortality incidents and, in turn, morbidity in Pakistan. PMRC (2009) finds that deaths associated with heat strokes in Pakistan are also mainly related to increase in extreme temperatures. Almost each year in Pakistan, newspapers have a wide coverage of death incidents from heat stroke (HDC, 2007). The author considers that heat stroke deaths are perhaps underreported for rural areas of Pakistan. Moreover, amplified precipitation in Pakistani areas could also cause added stagnant pools, and give rise to various water-related diseases, unless coping strategies are developed and implemented properly. One of the fact-sheets of WWF-Pakistan (2010) indicates that presently in Pakistan, the spread of water-related diseases causes approximately 40% of all deaths. The usual water-related diseases in Pakistan comprise: gastroenteritis; dysentery; cholera; infectious hepatitis; and typhoid. Finally, Pakistan EPA (2010) also indicates that the managed disposal of municipal wastes in Pakistan is very limited to areas of a very small number of big cities and industrial areas.

Overall, the review indicates that many socio-economic conditions in Pakistan put the country into a vulnerable situation. In addition, climate change has also some bearing on, and aggravates the overall condition of country.

2.3 Climate of Pakistan

Pakistan has been classified into eight climatic zones (see Fig. 2.1), which coincide with the Köppen Geiger classification (zones generally defined on the basis of monthly temperature and precipitation data) of zones. Pakistan MOE (2003) indicates that these zones range from mild, moist winters and hot, dry summers in the north to semi-arid and arid zones in the west and parts of the south.

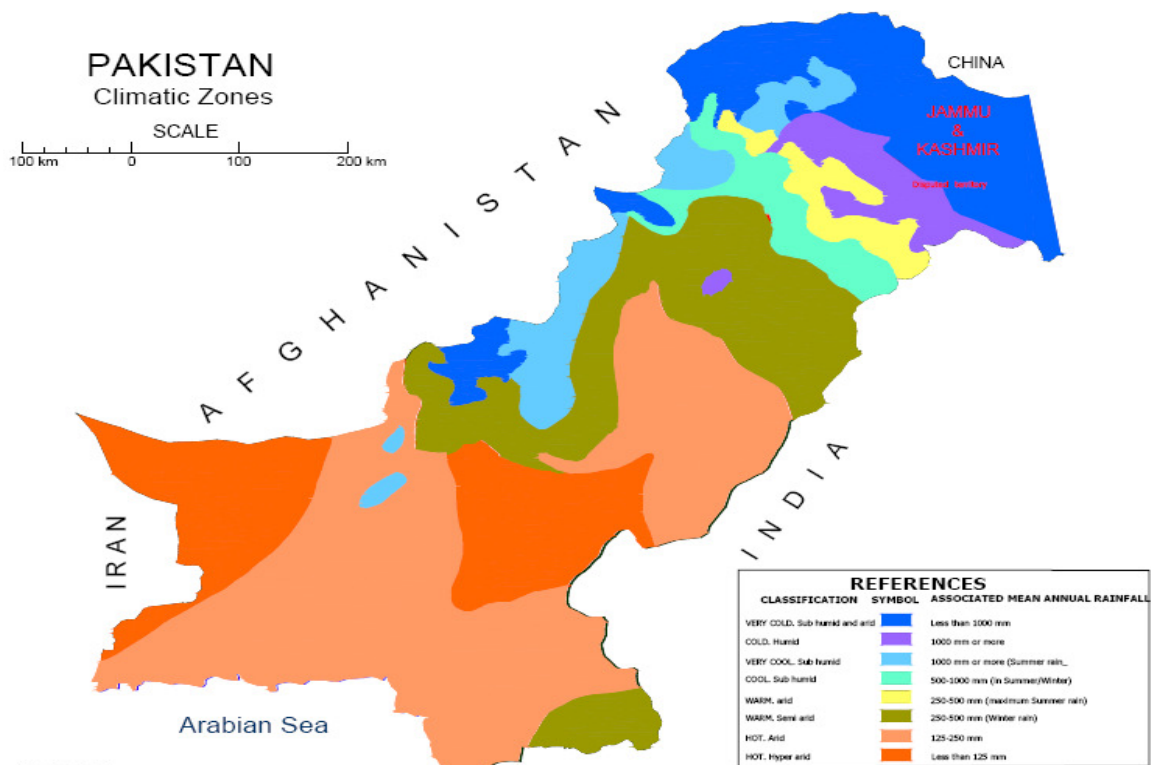


Figure 2.1: Climatic Zones of Pakistan

According to Islam et al. (2009, p. 36), Pakistan is a 'region having several climatic aspects'. McSweeney et al. (2007, p. 2) argue that 'Pakistan's geography is very diverse and this contributes to the diversity in climatic conditions in different regions of the country'. The far north of Pakistan reaches into the Himalayas, whilst the southern and western, and coastal regions are lowland plains of the River Indus. Average temperatures are strongly dependent on this topography, with coolest annual temperatures below zero in the far North (the Himalayan region), and higher average temperatures in the lower-lying south-east (McSweeney et al., 2007).

Pakistan has four seasons (Blood, 1994):

- (i) A cool, dry winter from December through February
- (ii) A hot, dry spring from March through May
- (iii) The summer rainy season, or southwest monsoon period, from June through September, and
- (iv) The retreating monsoon period of October and November

The commencement and extent of these seasons fluctuate somewhat according to area or location. UNDP (2007, p. 3) notes that 'in the warmest months average temperatures in the North of Pakistan do not exceed 15°C, whilst in the South they can reach up to 35°C. In the coolest months are well below zero in the highest altitudes, and 20-25°C in the low-lying south. Most of the country receives very little rainfall throughout the year (20-30mm per month), but the Northern regions, on the southern side of the Himalayan mountains, receive rainfall of up to 200 mm per month as a result of with the summer monsoon through July to September'.

2.3.1 Climate Trends

McSweeney et al. (2007) have outlined the recent climate trends and GCM (general circulation models) projections for future climate of Pakistan, which are briefly presented below;

2.3.1.1 Current Trends: Temperature

(a) Mean annual temperature in Pakistan has increased by 0.35°C since 1960, an average rate of 0.08°C per decade.

(b) The frequency of hot days and hot nights has increased significantly, annually, since 1960.

- *The average number of 'hot' days per year in Pakistan has increased by 20 (an additional 5.5% of days) between 1960 and 2003. The rate of increase is seen most strongly in SON (September-October-November) when the average number of hot SON days has increased by 2.4 days per month (an additional 7.6% of SON days) over this period.*
- *The average number of 'hot' nights per year increased by 23 (an additional 6.4% of nights) between 1960 and 2003. The rate of increase is seen most strongly in MAM (March-April-May) when the average number of hot MAM nights has increased by 2.3 nights per month (an additional 7.6% of MAM nights) over this period.*

(c) The frequency of cold days and nights, annually, has decreased significantly since 1960.

- *The average number of 'cold' days per year has decreased by 9.7 (2.7% of days) between 1960 and 2003.*

- *The average number of ‘cold’ nights per year has decreased by 13 (3.6% of days). This rate of decrease is most rapid in DJF (December-January-February) when the average number of cold DJF nights has decreased by 2.1 nights per month (6.9% of DJF nights) over this period.*

2.3.1.2 Current Trends: Precipitation

- (a) Mean annual rainfall over Pakistan has not changed with any discernible trend since 1960.
- (b) There is no consistent trend in the extremes indices for observed daily rainfall.

2.3.1.3 Future Projections: Temperature

- (a) Under the GCM, the mean annual temperature in Pakistan is projected to increase by 1.4 to 3.7°C by the 2060s, and 1.9 to 6.0°C by the 2090s. The range of projections by the 2090s under any one emissions scenario is 1.5-2°C.
- (b) The projected rate of warming is most rapid in the most northern regions of Pakistan.
 - *All projections indicate substantial increases in the frequency of days and nights that are considered ‘hot’ in current climate.*
 - *Annually, projections indicate that ‘hot’ days will occur on 16-25% of days by the 2060s, and 18-38% of days by the 2090s. Days considered ‘hot’ by current climate standards for their season are projected to increase most rapidly in JAS (July-August-September), occurring on 27-74% of days of the season by the 2090s.*

- *Nights that are considered ‘hot’ for the annual climate of 1970-1999 are projected to occur on 18-30% of nights by the 2060s and 20-42% of nights by the 2090s. Nights that are considered hot for each season by 1970-99 standards are projected to increase most rapidly in JAS (July-August-September), occurring on 32-81% of nights in every season by the 2090s.*
 - *Projected increases in hot days and nights in JAS (July-August-September) are more rapid in the southern, coastal regions of the country than the north.*
- (a) All projections indicate decreases in the frequency of days and nights that are considered ‘cold’ in current climate, and in much of the country, do not occur at all by the 2090s.

2.3.1.4 Future Projections: Precipitation

- (a) Projections of mean annual rainfall averaged over Pakistan, from different models in the ensemble, project a wide range of both positive and negative changes in precipitation. Projected changes range from -9 to +20 mm per month (-20 to +41%) by the 2090s, with ensemble means close to zero.
- (b) Whilst the range of projections across the model ensemble is large, the model ensembles tend to project decreases in rainfall in JFM (January-February-March) and AMJ (April-May-June), and increases in JAS (July-August-September).
- (c) Whilst there is very little agreement between models as to changes in mean rainfall amount, there is greater consistency for the rainfall extremes.
- *The proportion of total rainfall that falls in heavy events shows mixed positive and negative changes in projections from different models. These changes do,*

however, tend towards increases over the annual average and particularly in JAS (July-August-September).

- *Maximum 1-and 5-day rainfalls also tend to increase in projections (particularly in JAS), although some models do project decreases. Changes range from -3 to +24 mm in 1-day maxima, and -8 to +36mm in 5-day maxima.*

IPCC (2007) states that the complex topography in Southeast Asia (including Pakistan) means that local variations in response to global warming, particularly precipitation, are likely to be large and many areas may vary from the regional trend. IPCC (2007) acknowledges that the lack of consistency between scientific models contributes to uncertainty in estimates of future climatic changes in this region. However, the scientific projections (IPCC, 2007; McSweeney et al., 2007) do indicate that Pakistan will experience rapid changes in climate, and would remain sternly impacted by the inevitable effects of climate change. Therefore, Pakistan should have a strong commitment in protecting itself from the wide-ranging adverse impacts of climate change.

2.4 Issues for Adapting to Changing Climate in Urban Pakistan

2.4.1 Expected Changes

The review of literature finds that, so far, only two comprehensive studies about climate change impacts, vulnerability and adaptation assessment for Pakistan have been carried out. First, CICERO (2000) report titled ‘Developing Strategies for Climate Change: The UNEP Country Studies on Climate Change Impacts and Adaptations Assessment’ summarises four country studies (including Pakistan) that were undertaken. On the basis of climate and socio-economic scenarios, Pakistan’s study identifies potential impacts of climate change on different sectors. It also suggests some adaptation measures that it deems necessary to adopt at the national level in Pakistan. The second noteworthy study is ‘Pakistan’s Initial National Communication on Climate

Change' (Pakistan MOE, 2003), which the Pakistan government has submitted to the United Nations Framework Convention on Climate Change (UNFCCC). Adopting the same climate and socio-economic scenario-based approach, this report also assesses the impacts of climate change on different Pakistani sectors such as; water resources, agriculture, forestry and land use, coastal zones, livestock, biodiversity, ecosystems, health to climate change and sea level rise. Based on these reports as well as keeping in view projections for climate change in Pakistan (described earlier in this chapter), a summary of the key predicted impacts of climate change and any anticipated vulnerability to these particular impacts for Pakistan has been briefly presented below. The summary identifies major concerns for Pakistan due to the changing climate:

- a) *Pakistani cities with the highest population density will be the most vulnerable areas.*
- b) *The Pakistani residential sector will continue to show rising energy intensity trends.*
- c) *The poor in Pakistan will be the most vulnerable due to their low adaptive capacity.*
- d) *The stress on Pakistani water resources will increase due to population growth and urbanisation.*
- e) *Extreme rainfall events that last a whole day, two days, and even three days, will increase.*
- f) *Low-latitude regions of Pakistan will be vulnerable to climate change because of agricultural density and already high temperatures.*
- g) *Crop-based agriculture will be severely constrained in Pakistan.*

h) The monsoon governs the hydrological system of Pakistan. So, monsoon-dependent agriculture could remain the single largest economic activity of Pakistan.

2.4.2 Approaches for Dealing with Adaptation

The above-mentioned both studies related to Pakistan have adopted the IPCC top-down scenario-based approach to provide information for understanding the potential impacts of climate change and the adaptation measures necessary to address them at the country level. These studies depend primarily on ‘climate change’ as well as ‘socio-economic’ scenarios as these are considered main drivers of the impacts, from which adaptation strategies for Pakistan have been devised. There are no doubts that the IPCC scenario-based approach has been widely used in the literature, and has also become gradually more refined with the addition of socio-economic, land use, and formal approach scenarios, improved depiction of uncertainties in climatic projections, and better spatial resolution through statistical or dynamic downscaling (Mahmouda et al., 2009; Dubrovsky et al., 2005; Arnell et al., 2004; Wilby et al., 2000). However, one could argue that the climate change studies (especially for the developing countries) adopting scenario-based approaches are still hardly (if any) able to provide sound information for decision-makers and policy-makers. Due to a number of limitations of the IPCC approach, many adaptation researchers even in the developed countries have changed their attention from ‘scenarios/impacts/adaptation strategies’ (initial version of adaptation research) to adaptation to reduce ‘vulnerability’ and moving towards ‘resilience’ in planning and development context (new version of adaptation research). For these researchers (Moser, 2008; Nelson et al., 2007; Clark and Pulwarty, 2003; Tompkins and Adger, 2003; Burton et al., 2002; Barnett 2001), scenarios and likelihood of changes in climate are less important. Instead, methodologies for vulnerability and risk assessments, adaptive governance/resilience that enhance adaptive capacity (or coping capacity) are more favoured. Such studies consider that despite the substantial indecisiveness over climatic projections and

their impacts, we should start adapting to the present day (on the basis of recent changes in climate) as this could be understood a good guide to future climate change. Hence, such bottom-up approaches (vulnerability assessment, risk assessment, resilience) could be very helpful to understand the vulnerability of Pakistan to current climate change and the rationale of adaptation in the local context.

2.5 Summary

By outlining the recent climate trends and GCM future projections, this Chapter has reviewed the climate variability and its impacts for Pakistan. It has found that the lack of consistency between scientific models have contributed to uncertainty in estimates of future climatic changes in Pakistan. However, the scientific projections did indicate that Pakistan will experience rapid changes in climate, and would remain sternly impacted by the inevitable effects of climate change. So far, only two comprehensive studies about climate change impacts, vulnerability and adaptation assessment for Pakistan have been carried out. The Chapter reviewed these studies and found that both of them have adopted the IPCC top-down scenario-based approach to provide information for understanding the potential impacts of climate change and the adaptation measures necessary to address them at the country level. The author argues that the climate change studies (especially for developing countries) adopting scenario-based approaches are still hardly (if any) able to provide sound information for decision-makers and policy-makers. Due to a number of limitations of the IPCC top-down approach, this Chapter suggests crafting a set of plans and incentives at the local level with participation and inputs from local actors themselves (bottom-up approach) for successful integration of climate change adaptation into the local-level planning and development processes of Pakistan.

CHAPTER 3: OPTIONS FOR ADAPTATION RESPONSES BY PAKISTANI LOCAL GOVERNMENTS

3.1 Orientation to the Chapter

Building on the outline of Pakistani physical, socio-economic and climate conditions in Chapter 2, this Chapter reviews the literature and identifies some of the possible climate change adaptation actions (strategies) for Pakistani local governments that could generate benefits regardless of what level of climate change takes place in Pakistan. Specifically, this Chapter examines (section one) the theoretical background of adaptation to climate change by bringing to light scholarly interpretations of different adaptation meanings and types. Section two identifies some of the potential climate change adaptation actions (strategies) generally and relating them to Pakistani local governments, and places them under different themes. The literature review finally attempts to explore some of the barriers and challenges to climate change adaptation at the local government level in Pakistan.

3.2 Adaptation in Theory

The IPCC considers that ‘current knowledge of adaptation and adaptive capacity is insufficient for reliable prediction of adaptations, and for rigorous evaluation of planned adaptation options, measures, and policies of governments’ (Dovers and Hezri, 2010, p. 217). Such opinion has supported (as well as encouraged) the scholarly study of climate change adaptation into a new area that has appeared to involve climatologists, scientists, social science, environment and planning experts, and numerous civil society organisations (Biermann and Pattberg, 2008). Consequently, a large amount of conceptual work is being carried out to characterise climate change adaptation, with stakeholders ranging from scientists to the various community groups

(Mimura, 2010; Moser, 2008; Nelson et al., 2007; IUCN, SEI and IISD, 2003; Clark and Pulwarty, 2003; Tompkins and Adger, 2003; Burton et al., 2002; McGuigan et al., 2002; Smith, 2002; Barnett, 2001; Smit, et al., 2000). Nevertheless, adaptation is not a new notion, and can be found historically in natural and ecological science, specifically in biological science (Stringer et al., 2009). Further details are given below.

3.2.1 What is 'Adaptation'?

The common definition of 'adapt' is 'to make suitable to or fit for a specific use or situation' (Online Dictionary, 2010). With reference to climate change, adaptation generally stands for initiating actions to change to a new scenario of climate conditions, either dissimilar to those previously present, or altered elements of existing conditions. This broader definition informs that such actions could be either 'intentional' or 'unintentional' - it can be implemented based on some planning works, or it can happen without any planning works to put into practice. While numerous research studies have identified diverse adaptation types and portrayed many notions and ideas as foundation for analysing various forms of adaptation, the majority in this regard still spotlights on 'planned adaptation' both for developed and developing world (Richardson et al., 2009; Huq et al., 2003; Klein, 2003; Smit and Skinner, 2002; Pittock and Jones, 2000; Fankhauser, et al., 1999).

Füssel and Klein (2002, p. 53) define adaptation as 'all changes in a system, compared to a reference case that reduces the adverse effects of climate change'. Downing et al. (1997, p. 19) even present a simpler concept of adaptation and pick out the idea of 'downstream coping' while suggesting the definition of adaptation to climate change. These two definitions could include numerous potential actions, thus requiring a further hunt for a more exclusive definition for adaptation. The IPCC defines adaptation as 'adjustment in ecological, social, or economic

systems in response to actual or expected climatic stimuli and their effects or impacts' (Mertz et al., 2009, p. 746). This definition importantly accentuates not only alterations in 'social' and 'economic' systems, but in 'ecological' systems as well. The definition also provides a reference to the importance of both 'intentional' and 'unintentional' adaptation, as mentioned above. Essentially, the IPCC definition also incorporates both 'climate change' and 'climate variability'.

Similarly, another definition of adaptation indicates that adaptation 'means any adjustment, whether passive, reactive or anticipatory, that is proposed as a means for ameliorating the anticipated adverse consequences associated with climate change' (Stakhiv, 1993, in Schoon, 2005). This definition encompasses various forms of adaptation, and brings to light that adaptation is an act being carried out to enhance a specific condition. Yet taking a broader perspective is the definition that 'adaptation to climate is the process through which people reduce the adverse effects of climate on their health and well-being and take advantage of the opportunities that their climatic environment provides' (Richardson et al., 2009; Burton, 1992). In this case, climate change adaptation is regarded as a process by which to accommodate new situations caused by diverse transformations.

Adaptation is also defined as an institutional process, where it 'refers to adjustments in individual, group and institutional behaviour in order to reduce society's vulnerabilities to climate' (Huq et al., 2003; Pielke Jr., 1998). Burton (1994) considers that adaptation eventually refers to all those reactions to climate change that may be utilised to lessen vulnerability. This description of adaptation accentuates 'vulnerability', and fundamentally utilises adaptation as an element to reducing vulnerability. Another definition finds that adaptation 'involves adjustments to enhance the viability of social and economic activities and to reduce their vulnerability to climate, including its current variability and extreme events as well as longer term climate

change' (Smit et al., 2000, p. 227). This explanation also refers to decreasing vulnerability, and finds that adaptation should not only take place to deal with climate change alone, but climate variability and extreme events as well to which adaptation should take place. This is supported by a definition that also incorporates variability, and notes that 'adaptive actions are those responses taken to enhance resilience of vulnerable systems, thereby reducing damages to human and natural systems from climate change and variability' (Tompkins and Adger, 2005; Scheraga and Grambsch, 1998). This description encompasses the notion of 'resilience' as an ecological perception. Rennie and Singh (1996, p. 18) are of the view that adaptation comprises 'ways in which local individuals, households and communities have changed their mix of productive activities, and modified their community rules and institutions in response to vulnerabilities, in order to meet their livelihood needs'.

Overall, there are numerous definitions of climate change adaptation with importance given to varied notions, including:

- *Vulnerability*
- *Resilience*
- *Extreme events, and*
- *Climate variability*

While several researchers point to the definition suggested by the IPCC, it is apparent that various definitions are available in literature and in practice as well.

The IPCC considers that adaptation is both the 'process of adapting' and the 'condition of being adapted' (Sluys, 2009; Wheaton and Maciver, 1999). This twofold application of adaptation may also be a bequest of initial concepts in the climate change scholars, where climate adaptation was

regarded as the ‘subsequent’ action, and mitigation was regarded as the ‘preceding’ action. Primarily, due to this reason, many disaster management approaches were designed in initial adaptation literature, wherein the influence of many physical and socio-economic conditions, susceptibility and adaptive capacity on the impacts of climate change was not well thought-out and studied (also mentioned briefly in Chapter 2). Fankhauser (1998) considers that modifications in forestry and agriculture management practices, early warning information systems, and creation of migration pathways could also be considered components of adaptation. Smit et al. (2000) argue that adaptation could also be considered with reference to businesses who require to adapt to variations in physical and socio-economic conditions attached to climate change; for instance as a consequence of mitigation actions. In the early 1990s, adaptation was also thought of as comparable to ‘restoration’ or ‘insurance’ (Fankhauser, 1998).

The above all indicates that what adaptation encompasses and involves mostly remains ‘unpack’ for scholarly discussions yet, and requires researchers to keep on for unpacking its more dimensions. So far, one way that researchers have utilised to differentiate various kinds of adaptations is by grouping them in accordance with their scale. Therefore, these are briefly examined below.

3.2.2 Elements of Adaptation

Several researchers have made efforts to categorise adaptation types. The resulting groupings exhibit how wide the range of actions is that could be regarded as adaptation. This also assists designing various conceptual framings for adaptation, and identifies the features or elements of adaptation as well. Smit et al. (1999, p. 208) consider that the types, by and large, presented in adaptation studies are rooted in different characteristics of adaptation, such as: ‘purposefulness’, ‘timing’, ‘temporal and spatial scope’, ‘effects’, ‘form and performance’. Smit and his

colleagues' research studies perhaps include the most thorough assessment of adaptation categories so far, and are reproduced in the IPCC reports as well. Other researchers have also added their part to unfolding adaptation types, and the following section reviews some of the types identified in the adaptation literature. Fankhauser (1998) is of the view that the dissimilarity between the types may be obvious in climate adaptation literature, but in the real world scenario it may be more complex to characterise them. Such review is, therefore, presented here only by way of highlighting the frames available in the adaptation literature. These types have been presented within the explicit context of climate change, but are also founded on other considerations of responding to global changes in environment.

'Autonomous' and 'planned' adaptation notions are conceivably the most pertinent types in the adaptation theory, as these characterise between the 'do nothing' and 'do something' philosophies (Bosello et al., 2009; Hill, 2008; Toll et al., 2008; Füssel, 2007; Smit, et al., 1999). Autonomous adaptation is carried out exclusive of any deliberate outer force and is therefore advocated in the perspective of 'do nothing'. The dissimilarity is that autonomous adaptation denotes that a system is capable of carrying out various adaptation actions 'itself' with no intrusion of any specific plans or strategies. For instance, a farmer working in some rural area of Pakistan would himself/herself make change in the category of crops grew on the basis of the lessons obtained from the preceding years. He/she would prefer such crops that were largely successful in times of less or heavy rainfalls over those categories of crops that noticeably could not contend with the shortage or excess of water availability. Smit (1993) considers autonomous adaptation as 'no action now'. He also considers autonomous adaptation as 'spontaneous', 'passive', 'natural' or 'automatic' (Smit, et al., 1999, p. 208). By comparison, planned adaptation has been thought as 'purposeful', 'intentional', 'policy', 'active' or 'strategic' (Adger et al., 2005, p. 92; Smit, et al., 1999). Smit (1993) explains 'incidental' (autonomous) adaptation contrary to

‘purposeful’ (planned) adaptation. Tol, et al. (1998), think that autonomous adaptation cannot be assured regardless of available information, know-how and ability, and would also be remained shorter than the needed, if it does take place. However, as stated by Adger et al. (2007), undoubtedly, there is substantial quest in the level to which autonomous adaptation will take place, as it will avert finances for governments (especially in developing country governments that already lack financial resources), and will also establish a foundation alongside the necessity for determining the planned adaptation.

One other significant type is ‘reactive’ and ‘anticipatory’ adaptation (Toll et al., 2008; Huq et al., 2003; Smit et al., 1999; Fankhauser et al., 1999; Smith 1997). With reference to ‘reactive’ and ‘anticipatory’ adaptation, Fankhauser et al. (1999) bring to light their dissimilarities, as these two types ascertain when adaptation actions should be carried out. Reactive adaptation is conducted with reference to experiential impacts, and can also be considered as ‘responsive’ adaptation (Bosello et al., 2009, p. 14). On the contrary, anticipatory adaptation means carrying out actions prior to impacts are experienced (Huq et al., 2003). Anticipatory adaptation can also be considered as ‘proactive’ adaptation (Bosello et al., 2009, p. 14). Adger et al., (2003) also differentiates between ‘public’ and ‘private’ adaptations, where public mostly relates to planned adaptation, and private goes with autonomous adaptation. Private adaptation would generally be carried out in one’s own benefits (Smit and Pilifosova, 2001). For instance, buying a fan by any Pakistani during hot summer would be a reactive-private adaptation action, whereas establishing some heat-related warning systems in Pakistan would be an anticipatory-public adaptation action. However, Smith (1997) considers that indecision or vagueness of impacts can cause one of the key obstructions to anticipatory adaptation, especially in the actions being carried out by the developing country governments, where there may be a high level of finances required in executing anticipatory adaptation actions than in developed country governments. Moreover, Toll

et al. (2008) and Klein (2003) consider that anticipatory adaptation is not definite to avert impacts from taking place. At this point, the author considers that the dissimilarities between these two categories of adaptation are not completely understandable in adaptation theory, as a number of adaptation actions that are carried out will most likely be rooted in the know-how of present climate inconsistency, and would involve a risk of anticipated extreme changes in climate as well, and therefore be considered both reactive and anticipatory.

So far, this Chapter has presented various categories and types of adaptation to climate change. Particularly, it described adaptation, and scrutinised some of its fundamental areas that have impacted the meaning and application of adaptation in the climate change debate. Keeping in mind these various meanings and understandings of climate adaptation, some possible (and appropriate) adaptation responses have now been discussed and suggested below for Pakistan (second objective of this Chapter). These will help identify a number of Pakistan specific potential climate change adaptation actions as well.

3.3 Scale of Climate Adaptation for Pakistan

The current global change literature, both for developed and developing countries, indicates that fear of climatic changes and related extreme weather events are some of the utmost universal apprehensions, and these universal apprehensions have many implications for the local levels (Janjua, 2009; Agrawal, 2008; Roberts, 2008; Smith et al., 2006; Allen, 2006; Naess et al., 2005). Auld and McIver (2005, p. 26) states that ‘as the climate changes, it is anticipated that even small shifts in climate will have potentially large ramifications for existing infrastructure’ of any area. So, as said by Janjua (2009, p. 63), ‘the changes in climate will also have effects on Pakistani local governments (urban, rural and coastal) by changing settings of diverse types of infrastructure including: construct system (streets, roads, flyovers, drinking water and sewage

lines etc.), natural system (trees, water bodies, atmosphere etc.) and living system (education, health, human wellbeing etc.)'. The adaptation literature, mentioned earlier in this Chapter, also indicates that local governments, especially in developing countries, are vital for devising, as well as implementing, various climate change adaptation actions due to the following two reasons:

- a) *Climatic impacts are more apparent at local levels. Changes in climate, by and large, are considered as an increase in global temperature causing variation in local climate patterns; experiencing warmer days, more severe storms, decrease in rainfall, or changes in the commencement and time-span of growing seasons. In developing countries, these climate changes quickly affect local living manners, economic activities, health conditions etc. Hence, global climatic changes are turned into local-level phenomena in response to local topography and other social, environmental and economic aspects; and*
- b) *Adaptive capacity and vulnerability are understood clearly at the local level because both are context-specific. Adaptive capacity and vulnerability are the consequence of many complex local level interactions between different socio-environmental aspects and factors such as earning levels, infrastructure conditions, settlement patterns, ecosystem, human health, gender, political structure, and individual and organisational behaviours. These complex factors, separately or collectively, transform the local systems in which individuals are able to lessen exposure to, deal with, and/or pull through the negative effects of climate change or, instead, take benefit of the opportunities produced by climate change.*

Chapters 1 and 2 indicate that climate change, together with other socio-stresses (e.g., population growth, urban expansion, economic growth), in Pakistan is having substantial impact on its major sectors including; water, agriculture, forests, industry, transport and public services. Hence,

adaptation to climate change is vital. Coping capacity of most of the population in Pakistan is limited due to the low per capita income, lack of access to social capital and administrative and political disconnected functionalities at federal, provincial and local government levels (Murtaza and Iqbal, 2005). Chapter 1 also makes the case that the vulnerability of population from climatic hazards in Pakistan can be reduced through adaptive governance, primarily at the local government level in Pakistan.

In the current adaptation studies, there are a number of different approaches (for instance; vulnerability assessment, risk assessment/management, adaptive governance, resilience) available at 'national level' to provide guidance on conducting assessments of climate change impacts or adaptation responses (Moser, 2008; Nelson et al., 2007; Clark and Pulwarty, 2003; Tompkins and Adger, 2003; Burton et al., 2002; Barnett, 2001). However, local government/city level adaptation research, especially in developing countries, is also in full swing, but is currently in its preliminary phase and in many instances has not stirred further than just assessing the potential local impacts or risks (Prasad et al., 2009; Tanner et al., 2009; Revi, 2008; Roberts, 2008; Kovatrs and Akhtar, 2008; Blanco, 2007; Mukheibir and Ziervogel, 2006). Such studies indicate that, at local government/city level, a risk assessment or management approach to address the potential consequences of climate change is mostly advocated as a means of evaluating decision alternatives in the context of various uncertainties. Further, these studies acknowledge that to find out the best possible adaptation response, a methodical assessment of the risks facing a particular area due to climate change is needed to support users in the: listing of risks related to climate change impacts; prioritising the risks involving more consideration; and establishing the processes to make sure that prioritised risks are administered properly. Such studies advocating risk assessment/management approach for local governments/cities (Prasad et al., 2009; Tanner et

al., 2009; Revi, 2008; Roberts, 2008; Kovatrs and Akhtar, 2008; Blanco, 2007; Mukheibir and Ziervogel, 2006) mostly set down the following generic steps in the adaptation process:

- a) *Finding risks - by identifying how climate change will have impacts on different sectors/areas;*
- b) *Analysing Risks - by identifying current/available management options, the possibility of different risks, and the level of ensuing risks for different climate change impacts;*
- c) *Evaluating Risks - by grading risks against severity, and finding out those that necessitate further analysis; and*
- d) *Treating Risks - by identifying and picking-up the pertinent risk management and/or adaptation options.*

The experience of different Asian cities where the author worked, as well as one of the author's earlier papers on the topic (Janjua, 2009) suggests the need for inclusion of two more steps in the above-mentioned adaptation process for making it feasible in Pakistani conditions:

- *Setting-up the enabling conditions; and*
- *Conducting climate change vulnerability assessment*

Therefore, the adaptation process currently being designed or developed in different studies (mentioned above) could be modified to take into account the needs of Pakistani local governments, which could be:

- (a) *Setting-up the enabling conditions (by identifying ways and means for delivering adaptation information, and engaging stakeholders for successful adaptation)*

- (b) Assessing the vulnerability (by conducting climate sensitivity analysis and evaluating the adaptive capacity to find out how vulnerable Pakistani people are to climate change)*
- (c) Finding risks*
- (d) Analysing risks*
- (e) Evaluating risks; and*
- (f) Treating risks*

The above-mentioned steps do not propose a simple linear sequence from enabling conditions to adaptation options or actions, because the literature suggests that adaptation does not essentially go along a lock-point process. Therefore, the forward-looking Pakistani local government practitioners or managers could add in adaptation options into the planning and implementation cycle of their projects without working on many of the stages recommended above.

3.4 Adaptation Actions for Pakistani Local Governments

As explained above, the development and implementation of adaptation actions or strategies for local governments, especially in the developing parts of the world, are at a very early stage. However, a few lessons could be still extracted from such preliminary studies focusing on many developing countries (Prasad et al., 2009; Tanner et al., 2009; Revi, 2008; Roberts, 2008; Kovatrs and Akhtar, 2008; Blanco, 2007; Mukheibir and Ziervogel, 2006). The lessons recommend that there are number of techniques by which adaptation actions for Pakistani local governments could be described, such as:

- a) Incorporating adaptation goals into the basic and primary policies that organise local governments themselves – in the type of local governments plans, principles, standard operating procedures-SOPs, and other related office documents;*

- b) Preparing comprehensive adaptation plans (like environmental plans prepared by Pakistani local governments); or*
- c) Integrating climate adaptation into the plans and procedures of different offices working at the Pakistani local government level.*

Keeping in mind the current increasing scope and responsibilities of Pakistani local governments (discussed in Chapter 1), as well as review of the literature in Chapters 2 and 3, some of the climate change adaptation actions specifically for the Pakistani local governments have been identified and placed them under different themes (given below). Pakistani local governments can start taking action on them, which could generate benefits and, above all, provide net economic, social and environmental benefits regardless of what level of climate change takes place at that level in Pakistan.

3.4.1 Core Adaptation Challenges

Establish the enabling conditions for adaptation / setting-up the institutional mechanisms for taking the adaptation process forward in Pakistani local governments; awareness raising; and engaging stakeholders.

3.4.2 Adaptation Actions – Policy Level

Conduct vulnerability and risk assessments at the Pakistani local governments' level for finding out the key areas of vulnerability and risks and to fix priorities.

Include potential climate change adaptation actions/options into the strategic Pakistani local level planning.

3.4.3 Adaptation Actions – New Infrastructure

Implement and promote climate resilient building designs (where appropriate) that incorporate local cooling and heating needs e.g. addition of natural ventilation cooling, considering the building orientation and low energy use.

Approve/promote such building designs that allow considerations of future climatic impacts and could incorporate future adaptation.

3.4.4 Adaptation Actions – Existing Infrastructure

Observe changes (if any) to the condition in structures, so that any adjustments and/or retrofitting take place on time and prior to disaster.

Propose substitute choices for the existing buildings and infrastructure related to the Pakistani public services, so that these may remain connected and functional in case of severe climatic disruptions / storm event etc.

Design retrofitting to a higher standard (where practical and feasible) than the minimum set

Gradually, include strict design standards into the Pakistani local public works and asset management.

3.4.5 Adaptation Actions – Community Health / Recreation

Determine the risks (at broad level) of climate change impacts to the local community to help prioritise potential adaptation actions.

Plan carefully local development related activities in areas of high risk.

3.4.6 Adaptation Actions – Natural System

Determine the risks (at broad level), such as flood liability, storm surge, security of water supply, species extinction.

Minimise other external pressures e.g. air, water, and solid waste pollution on Pakistani local areas.

3.5 Barriers and Challenges to Adaptation in Pakistani Local Governments

The literature review (Chapters 1, 2 and 3) suggests that, so far, no work has been done on climate adaptation in Pakistani local governments. Therefore, one of the most critical challenges in the development of adaptation processes in Pakistani local governments would be to establish some institutional mechanisms for taking the adaptation process forward. Although, on the basis of the literature review alone, it is quite early to determine which institutional mechanisms would probably suit best for Pakistani local governments. However, the knowledge and information to date suggests a call for an ongoing process to bring about some innovation within the Pakistani local governments, so that different stakeholders related to Pakistani local governments (internal or external) could consider initiating some relevant adaptation actions or strategies. Though, it would entail hard work, primarily, from committed, devoted and dedicated local political and public-service members.

There is a substantial body of literature available on barriers to achieving effective adaptation, but most of it is based on the work carried out for developed countries (Adger et al., 2009; Tompkins et al., 2009; Håkon Inderberg and Ove Eikeland, 2009; Swart et al., 2009; Adger et al., 2007; Adger and Vincent, 2005; Dessai and Hulme, 2004; Adger, 2001). However, Huq et al. (2004), Heller and Shukla (2003), Barnett (2001) and Downing et al. (1997) have presented some barriers and challenges that limit the successful adaptation in developing countries. Studies indicate that there are numerous barriers to climate adaptation but not all of them are exclusive to only climate

change, and some of them are innately connected to many other complex decision making procedures (Adger et al., 2009).

Based on the review of literature (Huq et al., 2004; Heller and Shukla, 2003; Barnett, 2001; Downing et al., 1997), seven major reasons have been identified as barriers to climate adaptation (and these provide the basis for investigation in Stage-I of this research). These reasons are:

- (i) *Adaptation requires information, education, and awareness*
- (ii) *Adaptation needs more resources*
- (iii) *Adaptation requires technological expertise*
- (iv) *Adaptation is not attached to any regulatory requirements*
- (v) *Adaptation is inconvenient*
- (vi) *Adaptation benefits will be gained by others not our organisation, and*
- (vii) *Adaptation is the wastage of money*

For the purpose of this research, these seven reasons have been classified into the following five categories for their analysis, through primary data collection, in the next part of this research:

- a) *Informational Barriers (adaptation requires information, education, awareness)*
- b) *Financial Barriers (adaptation needs more resources)*
- c) *Technological Barriers (adaptation requires technological expertise)*
- d) *Regulatory Barriers (adaptation is not attached to any regulatory requirements)*

e) Attitudinal Barriers (adaptation is inconvenient; adaptation benefits will be gained by others not our organisation; adaptation is the wastage of money)

As mentioned in the start of this Chapter, the section below now discusses some of the potential challenges to adaptation in Pakistani local governments.

Stakeholders' engagement (on continuing basis) for successful adaptation could be one of the key challenges in Pakistani local governments. However, the role of stakeholders, their level of engagement and participation will vary, depending upon the type and extent of climatic impacts on a specific Pakistani local government. However, key stakeholders for adaptation at Pakistani local government level could include:

- *District Officers (Environment)*
- *Executive District Officers (Municipal Services)*
- *Executive District Officers (Works and Services)*
- *Executive District Officers (Health)*
- *District Officers (Transport)*
- *District Officers (Solid Waste)*
- *District Officers (Planning)*
- *District Officers (Civil Defence)*
- *District Officers (Fire Fighting)*
- *District Officers (Forests), and*

- *WAPDA, WASA, and others.*

For initiating adaptation processes in Pakistani local governments, it would also be a challenge that the local decision-makers and the stakeholders (who influence the local decision-makers) are made aware of the significance of climate impacts and available adaptation options, so that they realise that various realistic options are available and could be implemented to reduce vulnerability of their areas. Which Pakistani local decision-makers/practitioners require being aware of climate impacts, and should be considering adaptation strategies? – This could also be one of the key challenges. Adaptation is required in various sectors working under a Pakistani local government. Hence, the preferences will differ to a larger extent on specific local risks or vulnerabilities. In urban Pakistani local governments where the heat waves will be a foremost issue under the climate change (widespread tree-plantation can be made to offset the effect of urban heat island), key decision-makers or practitioners could include the concerned elected local government representative of such areas (Union Council Nazims), District Officers (Environment), Executive District Officers (Health), WAPDA, District Officers (Civil Defence), District Officers (Fire Fighting), District Officers (Forests), District Officers (Planning), and Executive District Officers (Works and Services), and others. Similarly, where shortage of water is expected to happen, key decision-makers or practitioners could include representatives of local level union councils, Public Health Engineering Department, WASA, major water consumers in private and public sectors, District Officers (Environment), and others. Where flooding from storm-water is expected, key decision-makers or practitioners could include the concerned elected local government representatives of that area (Union Council Nazims), District Officers

(Planning), District Officers (Solid Waste), District Officers (Environment), District Officers (Transport), and others.

For implementing successful adaptation in Pakistani local governments, as in any another developing-country area, the presence of some effective 'leadership' could also be one of the key challenges. Enhanced awareness of decision-makers and other practitioners in Pakistani local governments could arise as a consequence of various autonomous factors consisting of problems such as water shortages, or extreme events (such as storms), or urban heat waves in relation to climate change. However, making careful efforts to enlighten stakeholders and the general public about adaptation is also an essential component of any adaptation plan or strategy. Therefore, adaptation awareness efforts in Pakistani local governments could include:

- Developing adaptation fact sheets
- Preparing short, multi-coloured publications/success stories that sum up important adaptation outcomes of different other Southeast Asian developing countries for the general public and decision-makers
- Delivering presentations to a wide-range of local level audiences
- Organising stakeholder and staff-level local adaptation workshops; and
- Preparing animated sea level rise, presenting how sea-water might cause floods in low-lying Pakistani local regions.

It is pertinent to note that awareness by itself will not adequate to motivate action on adaptation in Pakistani local governments. Different 'organisational change' or other methodologies

(discussed in the next Chapters) could also be predominantly helpful as ways of implementing successful climate change adaptation in Pakistan local governments.

3.6 Summary

On the basis of the review of literature, this Chapter has identified some of the possible climate change adaptation actions (strategies) for Pakistani local governments that could generate benefits regardless of what level of climate change takes place in Pakistan. In section one the author has examined the theoretical background of adaptation to climate change by uncovering scholarly interpretations of different adaptation definitions and types. Whereas, in section two, he identified some of the possible climate change adaptation actions (strategies) specifically for Pakistani local governments, and placed them under different themes. The last part of the Chapter explored some of the barriers and challenges to climate change adaptation in Pakistan local governments.

CHAPTER 4: STAGE - I METHODOLOGICAL APPROACH & DATA ANALYSIS

4.1 Orientation to the Chapter

This Chapter explains the design for Stage-I of the research. Specifically, it outlines the methodology and research tools that the author used to generate data during his first visit to Pakistan from December 2007 to February 2008. Further, it presents and analyses the data generated from Stage-I of the research.

4.2 Stage - I Methodological Approach

4.2.1 What is the Stage-I?

Stage-I of this research focuses on finding the answers to one of the fundamental research questions mentioned in Chapter 1: 'To identify barriers to climate change adaptation at the local government level in Pakistan'. Stage-I could be considered as a 'preliminary pilot study', which was designed to identify not only the key barriers that could inhibit the climate change adaptation actions at the local government level in Pakistan. But, this Stage also helped guiding the detailed direction of the research that was conducted in Stage-II of this research.

During Stage-I of the research, the author visited Pakistan during December 2007 to February-2008. The overall purpose for this visit was to:

- (a) Collect the most up-to-date information / books / reports about climate change and impacts for Pakistan*

- (b) Find out if there is any literature available in Pakistan on the concept of climate change adaptation and barriers specifically for communities at the local government level*
- (c) Discuss (preliminary) with the interested parties regarding challenges and barriers to climate change adaptation at the local government level in Pakistan*
- (d) Distribute/collect questionnaires in all the 98 local governments to gather initial primary data for identifying barriers to climate change adaptation at the local government level in Pakistan*
- (e) Identify interested parties (which may participate in the focus group later on) with the help of local climate change experts, academics, NGOs and local government functionaries*

4.3 Stage-I: Identification of the Data Generation Tools

The following section explains the research tools that the author used to generate data during Stage-I of the research. For this, a broad set of literature was reviewed to select the best possible data collection approaches for this initial Stage of the research that are appropriate within a case study design for this whole study that the author proposed in Chapter 1. Creswell (2002) and Tuckman (1999) identified three broad groups or categories of data collection approaches: interviews, documents and direct observations. Yin (2003) identified six categories of sources of evidence: documentation, archival records, interviews, direct observations, participant observation, and physical artifacts. Gray (2009) and Denscombe (1998) identified four categories of data collection approaches:

- Questionnaires;
- Interviews;
- Observation; and

- Documents.

The data collection approaches that the author used in Stage-I of this research are based on (at the broader level) the categories outlined by Gray (2009) and Denscombe (1998).

Specifically, the data generation tools that were used during Stage-I of the methodology included:

- Document analysis;
- Face to face semi-structured interviews; and
- Questionnaire survey

Apart from these, the author also decided to keep a ‘field visit-I diary’ where he recorded all relevant information related to the study. The ‘field visit-I diary’ helped the author to record his own observations on issues pertaining to this research study.

4.3.1 Document Analysis

The author considered the arguments put forward by Terre-Blanche and Durrheim (1999) that an interpretive analysis sometimes make use of documentary sources such as letters, newspapers articles, official documents and books. As a researcher who was interested in identifying barriers to climate change adaptation at the local government level in Pakistan, the author used ‘document identification’ (one of the data generation tools) as an initial way of opening a path of inquiry. Patton (2001, p. 302) observes that “documents prove valuable, not only because of what can be learned directly from them, but also as stimulus for a path of inquiry”. He further notes that documents could help with: describing the social environment; capturing historical perspectives; and commenting on what does not happen. So, in start, the author wanted to capture if there was any historical perspective of climate change adaptation at any government levels (federal,

provincial or local) in Pakistan, so that he may conduct research on ‘what has not been done previously in Pakistan on this topic’. However, he was also aware of Patton’s (2001) warning that it would be difficult to get access to some important documents, understand how and why the documents were produced, and determine the accuracy of documents. The author’s choice of reviewing the documents was supported by the research of Patton (2001, p. 10), who observes that “researchers are uniquely positioned to study those texts by analysing the practical social contexts of everyday life within which they are constructed and used”.

4.3.2 Face-to-Face Semi-structured Interviews

A ‘face to face semi-structured’ approach was planned for all the interviews that were conducted during Stage-I of this research. Keeping in views of thoughts of York (1998), this approach was planned because it allows some scope for both the interviewer and the interviewees to broaden the discussions and explore relevant areas that might have provided increased understanding of the situation. Overall, the purpose for conducting ‘face to face semi structured interviews’ during this initial stage of the research methodology was to find insights about;

- (a) What are opportunities due to climate change in the context of Pakistani local governments?*
- (b) What are barriers to climate change adaptation at the local government level in Pakistan?*
- (c) How new information gained through this research could feed back into the next stage (Stage-II) of this research?*

According to Cohen et al. (2000), a semi-structured interview is inter-subjective that allows participants, both interviewers and interviewees, to discuss their interpretations of the world in

which they live. Cohen et al. (2000) argue that interviews allow a researcher to investigate and prompt things that one can not observe and that through interviews one can probe an interviewee's thoughts, values, prejudices, perceptions, views, feelings and perspectives. This benefited a lot during Stage-I of the research, as most of the respondents opened up during the interviews. Gay and Airasian (2000) regard an interview as a purposeful interaction, usually between two people, focused on one person trying to get information from the other person. Gay and Airasian (2000) further add that interviews permit the researcher to obtain important data that can not be obtained from observation only. It is in this context that the author intended to get information as to how the climate change experts in Pakistan consider prospects for climate change adaptation at the local government level in Pakistan. Further more, he was interested to explore and probe participants' responses to gather in-depth information about their experiences and feelings in relation to the major sources of resistances (barriers) to climate change adaptation at the local government level in Pakistan. Gay and Airasian (2000) further argue that an interview is a joint construction of meaning between the researcher and the participant, not just construction of the participant. It is in this context that the author intended to generate a set of actions (strategy, policy) to lower climate change adaptation resistances at the local government level in Pakistan that the interviewees suggested in a broader way.

In order to get information about opportunities due to climate change, and barriers to climate change adaptation at the local government level in Pakistan, an interview-schedule was developed. Moreover, two primary questions for the interviews were also developed, which are as under:

- (a) *What do you consider as 'opportunities' due to climate change at the local government level in Pakistan?*

(b) What do you consider as 'barriers' to climate change adaptation at the local government level in Pakistan?

4.3.3 Questionnaire Survey

A questionnaire was designed for administering to the Pakistani local government elected as well as public sector members. The purpose of the questionnaire was to collect data in the following three main areas to determine:

- a) Current levels of understanding and awareness of professionals (elected as well as public sector members) working in Pakistani local governments about climate change impacts*
- b) Identification and prioritisation of the current climate change actions, potential threats and opportunities for Pakistani local governments*
- c) Identification of barriers to climate change adaptation at the local government level in Pakistan. Moreover, based on the outcomes of Stage-I, making decisions about the detailed direction of the research to be conducted in stage-II*

The scope and length of the questionnaire were kept to a minimum during Stage-I of methodology. After designing the questionnaire in RMIT University, Melbourne along with the both research supervisors, the questionnaire was also discussed with two Pakistani academics for their review and comments. Slight modifications were made to the questionnaire based on the feedback received from these two Pakistani academics. The details about the interviewees who took part in Stage-I of the research have been given in Appendix A. Further, the questionnaire used during this Stage of the research is also shown in Appendix B.

The questionnaire was divided into four sections, including: general background information (section I); current levels of understanding and awareness about climate change impacts (section

II); current climate change actions (adaptation and mitigation) being implemented in Pakistani local governments (section-III); and barriers to climate change adaptation at the local government level in Pakistan (section IV). The respondents were asked to choose one option (in some questions more than one options) from several choices provided that applied to them. In order to allow individual opinions, an additional category of “others” or blank spaces were also provided in the questionnaire.

4.4 Stage-I: Data Analysis of Tools Used

4.4.1 Document Analysis

The author visited the following organisations and institutes working in Rawalpindi and Islamabad, Pakistan for collecting the most up-to-date information, books or reports about climate change and its impacts for Pakistan. In particular, he was interested in finding that if there was any literature available in Pakistan on the concept of climate change adaptation, barriers, or opportunities, specifically for the communities dealing by the Pakistani local governments.

(a) Ministry of Environment, Govt. of Pakistan, Islamabad

(b) Pakistan Meteorological Department, Islamabad

(c) Global Change Impact Studies Centre, Islamabad

(d) Sustainable Development Policy Institute, Islamabad

(e) UNDP-Global Environment Facility (GEF), Islamabad

(f) National University of Science and Technology (NUST), Rawalpindi

(g) District Nazim Office, City District Government, Rawalpindi

The availability of documents (other than the following) related to the climate change adaptation in the above-mentioned organisations or institutes was extremely limited as no document management or archival practices seemed to exist for working documents of this nature. The author observed that the documents were, however, available about ‘climate change’ ‘impacts’ and ‘mitigation’, but almost nothing was available on previous activities, proposals, submissions or internal correspondence in relation to ‘climate change adaptation at the local government level in Pakistan’. After spending a significant time in the above-mentioned organisations or institutes, the following information or literature was found;

- (a) *Global Change Perspective in Pakistan: Challenges, Impacts, Opportunities & Prospects, Proceedings of National Workshop, April 28-30, 2005, Islamabad, Pakistan*
- (b) *Science and Culture, Water Resources in South Asia: An Assessment of Climate Change-associated Vulnerabilities and Coping Mechanisms - Special Issue, Vol. 71, No. 7-8, July-August, 2005*
- (c) *Capacity Building Workshop on Global Change Research, Proceedings of Workshop, June 08-10, 2004, Islamabad, Pakistan*
- (d) *Climate and Water Resources in South Asia: Vulnerability and Adaptation, Amir Muhammed, M. Monirul Qader Mirza and Bonnie A. Stewart (eds.)*
- (e) *Developing Strategies for Climate Change: The UNEP Country Studies on Climate Change Impacts and Adaptations Assessment, CICERO & UNEP, 2000*
- (f) *Pakistan’s Initial National Communication on Climate Change, MOE-Ministry of Environment, 2003*

The author reviewed the above mentioned documents, as well as read through some of the unpublished reports to assess the extent to which these documents address the climate change adaptation at the local government level in Pakistan. The assessment indicated that the level of work and studies undertaken in Pakistan on climate change, up till now, has largely been in the area of mitigation, such as: Pakistan MOE (1992); Pakistan MOE (2006); and Pakistan MOE (2007). Some very limited literature was also available on climate change adaptation, but was mostly at the national level (CICERO, 2000; Pakistan MOE, 2003). No effort has been made, particularly for the Pakistani local governments to carry out 'climate change adaptation' research to cope with this issue in Pakistan.

4.4.2 Face-to-Face Semi-structured Interviews

The face to face semi-structured interviews were conducted at the offices of the interviewees in Rawalpindi and Islamabad during December-2007 to February-2008. The interview process provided a critical insight of the Pakistani local governments in relation to exploring the climate change adaptation barriers and opportunities. Interviewees were cooperative during their interviews. The author arranged interview sessions with the following 09 Pakistani experts and professionals directly involved with the environmental management in different strategic settings. The names of the interviewees have been mentioned in Appendix A:

(a) Two Local Climate Change Experts (A and B)

(b) Two Academics (C and D)

(c) Two Elected Local Government Functionaries (E and F)

(d) Three Public Local Government Functionaries (G, H and I)

As is the requirement of the RMIT University, ethical considerations were taken into account and respondents were informed in detail as to the purpose and intention of the interviews and the research.

Interviews were used as a data collection methodology to gain an overall knowledge and understanding of the barriers to climate change adaptation at the local government level in Pakistan, which focused directly on the questions developed for Stage-I of the methodology. The semi-structured interview technique, that the author used, not only maintained the strength of the structured interviews where all respondents were asked the same questions, but this technique also enabled some of the advantages of the unstructured interviews where issues could be explored further.

As mentioned earlier, two primary questions were asked during the interviews:

(a) What do you consider as 'opportunities' due to climate change at the local government level in Pakistan?

(b) What do you consider as 'barriers' to climate change adaptation at the local government level in Pakistan?

The sequence of the above-mentioned both questions in the interview schedule was not always maintained. Where, in a free flowing response, the interviewee introduced a topic that would have been covered in a later question, the interviewee was generally allowed to continue this response. In this manner, the unstructured interview approach allowed the respondents to introduce related matters as part of their response. These matters were usually followed up at that time, rather than cutting the respondents short by indicating that a later question would cover that

matter. The author also observed, similar to what Brown (1997) felt, that the use of a semi-structured approach also established good rapport with each respondent, who had some control over the development of the interview. Before each interview session, permission was also sought to audiotape (record) the interview. The purpose was to minimise any inaccuracies which might have occurred with the use of field notes and therefore to improve the reliability of the data (Perakyla, 1997). However, the interviewees did not agree to audiotape (record) the interview due to their official work responsibilities and other work-related constraints. One of the interviewees suggested the author to make field notes, as ‘recording’ interviews is generally considered a ‘knowledge-test’ in Pakistani society. Therefore, the author took brief field notes at each interview and recorded them in his ‘field visit-I diary’ for analysis.

Regarding the question of ‘opportunities’ due to climate change at the local government level in Pakistan, academic “C” suggested that first of all the author should ‘categorise’ various threats and opportunities in order to prioritise future work in this area. Local climate change expert “A” was of the view that opportunities can be identified under ‘two domains’ i.e. ‘environment domain’ and ‘community domain’. However, academic ‘C’ and ‘D’ as well as local climate change expert ‘B’ thought that ‘opportunities’ might be categorised in ‘two domains’ related to the local governments (urban local government domain, and rural local government domain) to identify issues. Academic ‘C’ suggested that the author should also find out major ‘climate drivers’ and factors influencing ‘capacity to adapt’ against various issues. Local climate expert ‘B’ and academic ‘D’ were of the view that after finding out ‘issues’, the author should also find out ‘priority cross-sectoral issues’ as well, either through a questionnaire or literature review. They further suggested that after finding out ‘priority cross-sectoral issues’, the author may, then, identify ‘opportunities’ that are relevant to the priority cross-sectoral issues. When the author asked the same question to the elected local government functionaries ‘E’, ‘F’ and public local

government functionaries 'G', 'H' and 'I', they did not go into as much detail as given by the academics and local climate experts. However, they thought that the following 'opportunities' may arise at the local government level due to the changing climate in Pakistan.

- (a) Improved monitoring of ecosystems and processes in different local areas of Pakistan*
- (b) More efficient, comfortable and storm resistant house designs in urban local areas of Pakistan*
- (c) Water efficiency and implementation in Pakistan local areas*
- (d) Emergence of new local markets for water saving devices*
- (e) Improved community understanding and awareness about various local issues*
- (f) Re-design of housing areas that fall under the jurisdiction of Pakistani local governments*
- (g) Enhanced land use planning and controls in local areas*
- (h) More investments in alternative water supply options*
- (i) Local community's willingness towards 'grey' water recycling*
- (j) Better training of local govt. functionaries, especially environment offices staff*
- (k) Improved storm-water design at the local level*
- (l) Improved long term monitoring of waterways*
- (m) Improved community understanding of sustainability through information, education and demonstration programs*
- (n) Strengthen local Pakistani communities*
- (o) Improved Pakistani local governments strategic planning risk management*

Academic ‘C’ suggested that the author that he should also look at the possibilities to enhance ‘adaptive capacity’ of Pakistani local governments in relation to climate change adaptation. Academic ‘C’ further expressed that he was of the view that “adaptive capacity reflects the ability to develop or generate adaptations to climate change as well as the capacity of a system or community to apply them”. Building on this view the author discussed with some of the academics and local climate experts about ‘what actually determines adaptive capacity? Some of the insights from the discussions on this allied topic are outlined below;

- (I) *Education/Training: almost all experts were of the view that ‘education/training’ at the local government level in Pakistan is likely to improve awareness of climate change issues, as well as improve the capacity of individuals to gather and process information about climate change and to develop various suitable adaptive responses*
- (II) *Wealth: some experts (‘B’ and ‘C’) were of the view that wealthy local governments in Pakistan would be better able to generate and apply technological, management or financial adaptations to climate change (or extremes) than poor ones*
- (III) *Technology: expert ‘A’ was of the view that technological, management and financial innovations may extend adaptive capacity at the local government level in Pakistan. He further thought that this may be particularly important where only incrementally change in a system is required to avoid harm from climate change*
- (IV) *Institutions and governance structures: almost all experts were of the view that the efficient Pakistani local governments may be important determinants of adaptive capacity. Corruption, duplication of bureaucracies, poor decision-making processes, lack of coordinated planning, ineffective management arrangements may all impair the capacity of Pakistani local governments to adapt to climate change*

(V) *Social capital: public local government functionary 'G' said that a need for the existence of some efficient informal institutions / non-government organisations (NGOs) at the local level in Pakistan can also be important determinants of adaptive capacity. Such institutions help build community interactions and could also help improve awareness of climate change issues and facilitate the development and communication of adaptive responses at the local government level in Pakistan*

The academic interviewees ('C' and 'D') also indicated that there is a need for establishing an institution or institutions in Pakistan to play a 'leadership role' in driving local response to climate change impacts and adaptation. They further added that Pakistani local governments, in particular, could have the potential to provide that leadership and coordination role. However, they also considered the provincial and federal governments are also crucial in terms of providing additional funding and information. Perceptions about the lack of leadership or initiative from the federal government level were also expressed by some interviewees from local government elected members. They referred to this as an issue in relation to enabling or driving change for climate change adaptation at the local government level, when there appeared to be a very little climate change adaptation policy or program frameworks at the provincial or federal levels in Pakistan.

Many of the interviewees (5 out of 9), including local climate experts 'A', 'B', academics 'C', 'D', and local government professional 'H', felt that the 'lack of awareness' of climate change adaptation within the Pakistani local government professionals is one of the major barriers to climate change adaptation. However, some interviewees ('F' and 'I') expressed that the 'lack of resources' is amongst the most frequently reasons for difficulties in adaptation to climate change

at the local government level in Pakistan. The interviewees categorised the following as ‘barriers’ to climate change adaptation at the local government level in Pakistan:

- (a) Lack of awareness/training/expertise*
- (b) Low level of education and respect for environment*
- (c) Lack of resources/funds and logistics to carry out climate change adaptation programs*
- (d) Lack of commitment*
- (e) Political interference and bureaucracy*
- (f) Inadequate co-ordination amongst local government institutions throughout the Pakistan*
- (g) Illegal operations and corruption*
- (h) Protection of financial interest*
- (i) Language barriers*
- (j) Inadequate legal framework to ensure climate change adaptation enforcement*

After conducting the interviews during field visit in Stage-I of the research, the author observed that the Pakistani public local government professionals interviewed in the environment and agricultural sectors described some levels of awareness about ‘climate change’ and ‘climate change adaptation’. However, most interviewees (especially elected local government representatives) said that whilst their level of awareness within their areas of direct concern was high, their general understanding of implications of climate change could be improved. The author felt a strong desire amongst interviewees (local government elected members and professionals) for improved information, awareness, education, training about ‘climate change

impacts’ and ‘climate change adaptation’ actions. However, the general view of interviewees was that this information needs to be:

- (a) Area specific - e.g. how impacts in one local area of Pakistan differ from other parts of Pakistan? Or how might responses in one local area of Pakistan differ from others?*
- (b) Targeted and focused - on particular sectors, industries, groups, and others*
- (c) Relevant - should provide practical understanding of the impacts of climate and what adaptation measures can be taken to address them*
- (d) Reliable - where there is uncertainty for example, the level of uncertainty needs to be made clear*

4.4.3 Questionnaire Survey

During the month of December-2007, the questionnaires were also disseminated in all the 98 local governments of Pakistan by using a combination of personal and postal means. A covering letter explaining the purpose of the study, assuring anonymity of respondents and their organisations, and providing instructions on ‘how’ and ‘who’ should complete the questionnaires was also attached with all questionnaires. Postage-paid, self-addressed return envelopes were sent to all of the respondents. Questionnaires were disseminated with the help of the Ministry of Environment, Government of Pakistan - Islamabad. The representatives from various Pakistani local governments completed the questionnaire, and returned either to the provincial Environmental Protection Agencies/Ministry of Environment, Government of Pakistan (and then passed onto the author) or directly to the author through reply paid post.

As no names were included on the responses, only a general follow up could now take place within the Pakistani local governments on author’s behalf to gain any additional information.

While this was not a totally satisfactory process that the author adopted during Stage-I of methodology, it was, however, the only way to gain information (at a broader level) about the barriers to climate change adaptation at the local government level in Pakistan, so that the received information can be used to make decision about the detailed direction of the research that will be conducted in Stage-II of this research. In total, 98 questionnaires were distributed, but only 60 responses (or 61%) were received. However, as the responses were not meant to be a representative sample, but were part of a process to collect information and to verify the interview data collected in Stage-I, these returns provided sufficient responses for that purpose. The data from the questionnaire were used to support and verify the interview responses as a form of triangulation (Stake, 2000; Yin, 2003).

Section I of the questionnaire was related to the background information (sampling size and professional affiliation) of the respondents. The collected responses in this section indicate that respondents are mostly from three Pakistani provinces out of four; Punjab (89% of the total local governments in Punjab), Sindh (76% of the total local governments in Sindh) and N.W.F.P (67% of the total local governments in N.W.F.P). However, the author could not get any response from Baluchistan province. The actual number of respondents in each province has been shown in Appendix C. Making up 60% of the total respondents; civil servants were the most represented group of Pakistani local government professionals targeted for this study. Also, 24 respondents were local government elected members (representing 40% of the total respondent pool) that put them on second number in the survey. The actual number of respondents from both circles of professionals has been shown in Appendix D.

The analysis of the responses received for Section I of the questionnaire indicates that the data of only Punjab, Sindh and N.W.F.P. has been incorporated in the Stage-I of this research. However,

Baluchistan province could not be represented due to the lack of time to encourage more responses. Pakistani local government civil servants were the most represented group in this research.

The purpose for Section II of the questionnaire was to assess the current levels of understanding and awareness of Pakistani local government professionals in relation to climate change impacts. Part (a) and part (b) of the collected responses in this section indicate that most of the respondents (58% and 43% respectively) were aware of the changes in temperature and rainfall patterns due to the climate change in Pakistan by considering that their areas were becoming warmer and drier with the passage of time. However, (15% and 12%) of the respondents indicated that they 'do not know' if there was any change in the temperature and rainfall patterns in their areas respectively. Regarding the question of 'climatic changes due to the human activities', most respondents (70%) said that they think human activities mostly contribute to the climatic changes. Further, most respondents (83%) were of the view that they were "not at all" or "slightly" informed about the impacts climate change could have in their areas. Only 04 respondents (07%) had some know-how about things to do with climate change through their work place/professional activities. The rest had a variety of experiences in relation to the climate change information via; education, newspapers, radio, TV, magazines, and/or internet.

The collected responses for Section II (understanding and awareness) indicate that Pakistani local government professionals know that human activities are changing the climate of their areas. However, their own level of understanding and awareness about dealing with various climate change impacts was very low. The actual number of responses received for Section II has been shown in Appendix E.

Section-III of the questionnaire was to find out the current climate change actions being carried out by the Pakistani local governments, as well as to identify potential threats and opportunities for Pakistani local governments. Part (a) of the collected responses in this section indicates that most of the respondents (81%) considered that their local governments were “very concerned” or “concerned” about the impacts of climate change in “agriculture sector”. However, 73%, 63% and 32% respondents also considered as “safe drinking water”, “health” and “forestry” areas that their local governments were “very concerned” or “concerned” respectively. Some respondents also considered “biodiversity” – an area where their local governments were “not at all concerned” to deal with it in relation to climate change impacts.

The purpose for parts (b) and (c) of section-III of the questionnaire was to assess the current level of implementation status of climate change adaptation and mitigation strategies in Pakistani local governments. 73% of the respondents said that they were not sure whether their local governments were currently involved with climate change adaptation actions or not. However, 5% respondents claimed that their local governments were taking some actions in relation to climate change adaptation. But, they did not provide any further details in order to strengthen their statement. Similarly, 23% of the respondents were not sure whether their local governments were currently involved with climate change mitigation actions or not.

The analysis of the responses received for Section III of the questionnaire indicates that most of the local governments in Pakistan are not taking any actions in relation to climate change adaptation. This indicates that Pakistani local governments do have a number of potential threats (if local governments continue carrying on the same current practices) and opportunities (if local governments now start taking actions in relation to climate change adaptation). The actual number of responses received for Section III has been shown in Appendix F.

The analysis of the data gathered during Section IV of the questionnaire survey was performed to identify “barriers” to climate change adaptation at the local government level in Pakistan. For this, the author set the following criterion for ranking the barriers:

- (a) Major Barriers: Any barriers with more than 80% responses as “strongly agree” or “slightly disagree” will be considered as the major barriers*
- (b) Minor Barriers: Any barriers with 60% to 80% responses as “strongly agree” or “slightly disagree” will be considered as the minor barriers*
- (c) Questionable Barriers: Any barriers with greater than 80% responses as “strongly disagree” or “disagree” will be considered as the questionable barriers*
- (d) Key Barrier: The barrier amongst the major barriers with the highest percentage of responses as “strongly agree” will be considered as the key barrier to climate change adaptation at the local government level in Pakistan*

In this section (section IV) of the questionnaire, seven different reasons were listed that had formulated through literature review (Chapter-3) and discussions with both primary and secondary supervisors and Pakistani local climate change professionals. Some of the seven factors (listed in Table 4.1) are clearly similar and almost all are probably related. While six of the seven were considered by the majority of respondents to be the barriers to the climate change adaptation at the local government level in Pakistan, the respondents indicated that some of these factors were more important than others. The actual number of responses received for section IV has been shown in Appendix G.

The questionnaire responses of the seven barriers to the climate change adaptation at the local government level in Pakistan have been ranked against the criteria, outlined above, and are shown in Table 4.1;

Barrier	% strongly agree	% slightly disagree	% disagree	% strongly disagree	Major barrier	Minor barrier	Questionable barrier	Key barrier
Needs more information about adaptation (lack of information/training)	80%	13%	50%	02%	✓	✗	✗	✓
Costs more money (lack of resources)	67%	20%	08%	05%	✓	✗	✗	✗
No regulatory requirements	63%	18%	12%	07%	✓	✗	✗	✗
Involves technological expertise	58%	17%	13%	12%	✗	✓	✗	✗
It may be inconvenient	50%	20%	23%	07%	✗	✓	✗	✗
Benefits will be gained by others not our organization	32%	33%	05%	30%	✗	✓	✗	✗
It is wastage of money	05%	08%	33%	53%	✗	✗	✓	✗

Table 4.1: Stage-I Data Analysis-Ranking of the Barriers

4.4.3.1 Major Barriers

According to the questionnaire respondents, the top three “major barriers” were:

- (a) *The lack of information, education and/or training*

(b) The lack of sufficient resources

(c) The lack of legal framework for adaptation

The respondents indicated that these three factors were particularly significant. Further, all the respondents agreed that these three were barriers, and the majority considered them to be the major barriers.

- Lack of Information, education and/or training about climate change adaptation: This was cited as the most significant barrier to the climate change adaptation at the local government level in Pakistan. 93% (56 out of 60) respondents said that it was a major barrier. One respondent (Pakistani local government elected member) commented that the local governments in Pakistan are not yet aware of the concept of climate change adaptation strategies and, therefore, do not think about it. Another respondent (Pakistani local government civil servant) was of the view that climate change adaptation is some thing new, about which they have very little or no idea. However, a large percentage of respondents, regarding this barrier (lack of information, education and/or training about climate change adaptation), indicated that there is a need to raise the level of awareness and knowledge regarding climate change adaptation strategies in Pakistan.

Based on experience working in Pakistani local governments, it appears there are possibly several reasons for this “information barrier” (or learning dimension in the adaptation context) being evident for Pakistani local governments. Specifically such types of local organisations in Pakistan are unable to comprehend the specific levels of details that may be required to implement adaptation. In the author’s views, information regarding climate

change adaptation strategies has not been readily available to date in Pakistani local governments. There are no independent associations dedicated to providing technical assistance and adaptation information to Pakistani local government professionals. No formal centres exist which could serve as a clearing house of information and as a counselling centre for the promotion of climate change adaptation at the local government level in the country.

- Lack of Sufficient Resources for Implementing Adaptation: The respondents felt that the lack of sufficient resources for implementing adaptation strategies in various Pakistani local government functions is also a barrier. Precisely, 87% of the respondents configured this as a major barrier. The author also considers that financial resources in a developing country local government, such as Pakistan, may be a major hurdle to the initiation of climate change adaptation projects at the local government level. According to the author's observation, everything in a small organisation like Pakistani local governments is related to money and so statements like "don't forget we have the limited money" are often encountered. Possibly the organisations are not interested in investing any money on adaptation or are not willing to take risks.
- No Regulatory Framework for Adaptation and Implementation Procedures: A majority of the respondents (81%) also felt that no regulatory framework and implementation procedure from the government was the major barrier to widespread climate change adaptation at the local government level in Pakistan. Most respondents agreed that, in Pakistan, lack of political commitment and weak governance especially at the local government level is apparent, to a greater or lesser degree, regarding the environmental protection issues. From experience as an environmental officer in local government the author's observations are that environmental considerations (climate change is one of its components) are not effectively

integrated into the country's economic growth and poverty reduction plans. This means that, in general, environmental programmes do not speak adequately to the agendas of many of the powerful networks of the country. Therefore, it is understandable that the support for environmental issues especially at the local government level in Pakistan has remained weak amongst the elite who constitute these networks and the people they lead and influence. The environment offices established at the local government level in Pakistan (engaged in environmental protection of their respective jurisdiction) suffer from staff shortages and competence issues, and lack of a consistent linkage with other departments working at the local government level. This really makes a challenge to implement climate adaptation actions at the local government level in Pakistan.

The author considers that the lack of interest from Pakistani local government professionals (either elected or civil servants) is also a barrier to widespread climate change adaptation at the local government level in Pakistan. As the simple saying goes “we have always done it this way, so why should we change now?” This attitude, especially amongst the various Pakistani elected local government members, as well as local government civil servants, is a major barrier to implementing adaptation. These people believe that what they have been doing for so many years cannot be wrong. The author is of the view that implementing adaptation actions to climate change in Pakistani local governments would require a paradigm shift from reactive to proactive thinking, which some Pakistani local government professionals might not be accustomed to. In the author's personal experience, many Pakistani public organisations wait for some one else to take the risk first and if it is a success story, then only they think doing some thing. Usually no one wants to be the first one for the fear that they may be unsuccessful and in turn loose their reputation or professional career.

4.4.3.2 Questionable Barriers

One of the seven factors was considered to be “not a barrier” by more than 80% of the respondents. Therefore, it seems questionable whether this factor could be considered a real or significant barrier. This barrier was: “climate change adaptation is a waste of money”

“Climate change adaptation is a waste of money” was considered to be “not a barrier” by the majority (52 out of 60 or 86%) of the respondents. However, only (8 out of 60 or 13%) felt that it was also a major barrier.

Though, respondents were given the opportunity to list any “other” barriers that think were not included in the list of seven, there responses all related in one way or another to those listed.

4.4.3.3 Key Barrier

According to the ranking of barriers against the criteria (discussed above), “lack of information, education and/or training about climate change adaptation” was considered as the key barrier to climate change adaptation at the local government level in Pakistan.

Finally, the author considers that the options for climate change adaptation at the local government level in Pakistan are wide-ranging. Climate adaptation need not be limited to reactive technological and infrastructure measures only, but can also include proactive measures such as learning for adaptation, engagement of Pakistani local government professionals, and their capacity building in relation to climate change adaptation.

Stage-I of this research clearly indicates that the lack of information, education and/or training (leaning dimension) is the key barrier to climate change adaptation at the local government level in Pakistan. Now, in Stage-II of this research (Chapters 5 & 6), it is required to review the

literature once again about what sort of actions could make it easier to implement climate adaptation in Pakistani local governments in the future, or how ‘learning for adaptation’ dimension could better help to lower the key barrier in the Pakistani context.

4.5 Reliability and Validity of Data Collected in Stage-I

According to Silverman (2000), the reliability and validity of the data collected through interviews, document analysis and questionnaire survey are often criticised, based on how the researcher categorises the data and the consistency with which the researcher assigns the data to the categories. Similarly, “criticism is raised about the potential problems which can arise from the use of powerful anecdotal material without sound attempts to analyse how representative the data is and also to analyse less clear or contradictory data” (Silverman, 2000, p. 2). During Stage-I of this research, the collection of data through questionnaire survey enabled some verification of the interview statements in relation to what Pakistani local government professionals considered as key barriers to climate change adaptation at the local government level in Pakistan. Similarly, the collection of data by both interview and by questionnaire survey enabled some verification of each type of response in this Stage of the research. The collection of data through the document analysis also enabled some limited verification of the interview statements. The multiple approach during Stage-I of the research provided diverse data, which allowed some confirmation and verification of the findings. Therefore, the approach and techniques adopted in Stage-I of the research have provided the capacity for findings to be reliable and qualified.

4.6 Some Final Comments for Stage-I of the Research

In Pakistan, the capability and resources at the local government level to plan and implement climate change adaptation programmes are not evident. Specifically in Pakistan, the climate change programmes mostly focus on mitigation of greenhouse gas emissions. So far, no

exclusive research work regarding climate change adaptation has been identified during this initial Stage of the research. Therefore, it is important to plan and develop a long-term action programme for climate change adaptation at the local government level in the Pakistani context. In this way the most pressing local climate adaptation needs could be categorised after identification of the available and required local resources (human and financial). Moreover, it is vital to be aware of how climatic changes have had local impacts on various sectors and their consequential vulnerabilities in Pakistan. This will spotlight attention on where priority actions might lessen the climate change impacts, and facilitate local governments of Pakistan to adapt rather than react when the damage has already been done.

This Chapter looked at (at broader level) what barriers to climate change adaptation are imperative to the local governments in Pakistan. The Chapter found that the lack of information, education and/or training (learning dimension) as the key barrier to climate change adaptation at the local government level in Pakistan. This recognises the need to understand climate change adaptation as an iterative learning process in Pakistani context in the next Stages (Stage-II and III) of the research. While developing a long-term action programme, the first component was identification of barriers to climate change adaptation at the local government level in Pakistan, and then by using that information a further research (Stage-II) could determine what sorts of methods, and/or policies could most effectively lower those barriers.

4.7 Summary

This Chapter has outlined the methodology and research tools used to generate data for Stage-I of the research. Three data generation tools were used in Stage-I of the research: document analysis; face to face semi-structured interviews; and a questionnaire survey. Further, the data generated from the face to face semi-structured interviews and the questionnaire survey were presented and

discussed systematically in this Chapter. Stage-I (desktop research and field visit-I) provided a direction, at a broader level, to examine climate change adaptation as an iterative learning process (in Pakistani context) in the next Stage of the research. Moreover, this initial exercise brought some refinement in this research as well, and helped guiding the detailed direction of the research that was conducted in Stage-II.

CHAPTER 5- THEORETICAL BASIS FOR FRAMING CLIMATE ADAPTATION LEARNING & ACTION IN PAKISTANI CONTEXT

5.1 Orientation to the Chapter

On the basis of the results of Stage-I of this research (which identified the learning dimension of climate adaptation as the key barrier to effective adaptation planning and implementation in Pakistan), the author now intends to explore the literature to the extent that could enable him to identify the characteristics of Pakistani local governments' capacity to change for learning in the context of climate change adaptation. Therefore, in this Chapter (part-1 of Stage-II) a framing of key characteristics have been identified and critically examined that could bring about change for climate change adaptation learning and action in urban Pakistani local governments. This process begins with an extensive review of the literature that establishes the theoretical basis for part-1 of Stage-II of the research. The review assists in the construction of a theoretical basis that guides the formulation of five various research issues for further examination in part-2 of Stage-II.

5.2 Learning Organisation Paradigm and Climate Adaptation

Adaptation to climate change is increasingly becoming a management priority for government and private sector organisations across the globe, partly driven by a rationale that successful adaptation will reduce the consequences of climatic impacts that are unavoidable (Doria et al., 2009; Adger et al., 2005). As noted by Ayers and Huq (2008) as well as Oxfam (2007), organisational change which enables climate change adaptation learning is considered crucial to a process of improving climate resilience in the developing world. However, grasping such an opportunity is a major challenge, particularly in the urban public sector in developing countries such as Pakistan.

Senge et al. (1999, p. 5) set out some general aspirations that drive organisational change: “they are trying to respond quickly to external changes and think more imaginatively about the future...they want better relationships, with less game-playing and more trust and openness...they want to unleash employees natural talents and enthusiasm....they hope to move genuinely closer to their customers....through all of this they are striving to shape their destiny, and thereby achieve long-term success”. Despite the presence of these aspirations, a large number of change initiatives (both in developed and developing countries) have had limited success due to a variety of institutional barriers (Stanleigh, 2008; Ndou, 2004; Polidano, 2001; Hamel, 2000; Senge et al., 1999; Handy, 1989). Although these barriers differ according to local context, two general themes can be distilled from such studies. Firstly, there is often a failure to create enabling conditions that actively support and encourage change through organisational learning, and secondly a failure to implement an effectual change process. Under such a scenario, the applicability of a ‘learning organisation’ concept appears to be the most appropriate in any change process.

Limerick et al. (2000) claim that an environment that supports change for learning is grounded in an organisational vision that represents a future desirable state for the organisation and that has the capacity to energise employee communication, participation and commitment. Further, much has been written, for instance, Schein (1992) and Limerick et al. (2000) about the important role leaders have in formulating a vision for the organisational learning that is realistic, credible, attractive and consistent with the core values of the organisation. Not only is it the responsibility of leaders to formulate such a vision, it is also crucial that they stick with it if they wish to gain the commitment of their employees to change the process.

The quintessence of the learning organisation paradigm is seemingly straightforward, and rotates around developing a positive tendency to learn, adapt and change. In the developed-world context (Sette, 2008; Elkjaer, 2004; Nutley and Davies, 2001; Senge et al., 1999; Dodgson, 1993) there have been a large number of studies that have either made efforts to explore the dynamics of learning organisations or else the extent to which organisations could develop an internal environment that promotes and encourages learning for different purposes. However, such studies are much more limited for developing countries, including Pakistan (Alam, 2009; Bhatnagar and Sharma, 2005; Kharbanda, 2002). This could be due to the increasing number of definitions and characterisations of learning organisations and the importance given by different researchers to different features of the learning organisation.

Responding to this knowledge gap, the following parts of the Chapter reflect on the application of the learning organisation paradigm to the climate change adaptation agenda in the context of urban Pakistani local government. From the review of academic literature, the Chapter initially provides a theoretical underpinning to the organisational learning paradigm, as well as highlighting some of the key characteristics often attributed to a learning organisation. These conceptual characteristics are then critically examined to consider how such an approach may help to encourage change for climate change adaptation activity in Pakistani urban local governments.

5.3 Learning as a Change Catalyst in Organisations

As stated by Levitt and March (1988), it is important to develop a comprehension of how public sector organisations learn from their own experience, how they learn from other organisations, and how they develop their own internal understanding and framework for action. Initially, one of the fundamental questions could be: who learns and what.....the public sector organisations or

the individuals....or both? Another fundamental question is how learning takes place i.e. how do public sectors organisations learn? Individuals learn and afterwards change their attitudes and possibly their perceptions of nearby settings. However, learning also has a number of implications at a collective level, which could change the overall behaviour of groups or public sector organisations. This reveals that developing a better understanding of how public sector organisations actually learn is vital for any change initiative.

Nevis et al. (1995, p. 2) define organisational learning as the “capacity” or the “processes within an organisation” that actually allow it to increase the effectiveness of its working. Also, as Lopez et al. (2005, p. 228) indicate, organisational learning is a “dynamic and adaptive process that engages the creation, acquisition and integration of knowledge”. Beeby and Booth (2000), Pahor et al. (2008), Argyris and Schön (1996), and Senge (1990) are of the view that organisations learn by the efforts of individuals attached to those organisations, particularly in relation to communications and interactions with internal and external groupings. Kim (1993) considers that almost all organisations learn whether they knowingly choose to or not. Hence, what is critical to bring change within an organisation is not only the learning rate, learning material, and individuals who learn, but also how learning is captured, transferred and converted internally into actions.

Keeping in mind the significance of learning from an organisation’s point of view, two important questions appear:

(a) How does learning by individuals take place within the organisations?

(b) How is individual learning captured and shared within the organisations?

5.3.1 Individuals Learning within the Organisations

An individual's role is vital in the creation of knowledge. Their involvement is acknowledged by the often quoted saying: 'our organisation's most valuable resource is our people'. This recognition of the importance of the individuals within an organisation has been given new credibility through what has become known as the 'knowledge based view of the firm or organisation' (Foss, 1996; Grant, 1996; Nonaka, 1991). While Collins (2001, p. 41) agrees with this general proposition, he warns that it is crucial "to have the right people on the bus and in the right seats and the wrong people off the bus if the organisation has to succeed".

Learning is in fact a knowledge-gaining process through which individuals build the capacity to act. This involves both operational (how to do) and conceptual (why we do) learning. Robinson et al. (1997) argue that both operational and conceptual learning are based on the interpretation of feedback from prior action. Different models of individual learning have been demonstrated in literature (Combs, 2008; Pietersen, 2002; Kim, 1993; Kolb, 1984) such as: Deming cycle, Kolb's learning cycle, and strategic learning process. Pietersen (2002) finds that Kolb's learning cycle is analogous to that of the Deming cycle of 'plan, do, check, act', and the strategic learning process of 'learn, focus, align, execute'. According to the Kolb cycle, learning is stirred when individuals examine an unintentional effect or outcome resulting from their routine actions or conduct. At this point, the author is not going to make an in-depth analysis of different models as this is beyond the scope of this research. However, he is interested in looking at, 'what are the implications for management of a local government organisation that arise out of this overview of how an individual learns?'

Schein (2002) discusses why few learning organisations exist worldwide. He considers that reluctance to learning is due to the learning anxiety: anxiety that links to the desire of learning new but at the same time scared of not being able to achieve it. Responding to the learning anxiety is survival anxiety; anxiety that links to the requirement of survival. Schein (2002) concludes that an individual learns only when survival anxiety goes beyond the learning anxiety. Senge et al. (1999) consider that anxiety in relation to a 'change' can be revolutionised by creating a climate of frankness, admiration, gratitude, provision of counselling and support, and building-up what Handy (1989, p. 55) explains as "a negative capability - an attitude of mind which learners need to cultivate to help them to write off their mistakes as experience". Moreover, Schein (1992) is of the view that learning entails the liberty of trial and novelty within an employee's area of responsibility, so organisations that do not provide a culture of encouraging and rewarding their actions are non-productive.

5.3.2 Shared Learning within the Organisations

Individuals are anticipated to perform their duties as per the standard operating procedures (SOPs) and behavioural norms (for promoting organisational synchronisation and strength) when they enter an organisation. These SOPs and behavioural norms are based on shared mental models and knowledge/skills of past and present employees of the organisation, and as said by Kim (1993) and Schein (1992) correspond to its organisational memory and culture. Appelbaum and Reichart (1997) argue that the learning-ability of an organisation and thereby changing its SOPs and behavioural norms depends on its learning-orientation (its principles and practices that establish where learning takes place and what is learnt) and its enabling conditions (the structures and processes that influence how intricate or easy it is for combined and/or mutual learning to occur). They consider that individual's devotion to the organisation and readiness to work in partnership is influenced by the extent of alignment between the individual's mental models and

the shared mental models of the organisation. This requirement for alignment is what Collins (2001, p. 41) also considered; “getting the right people on the bus and in the right seats and the wrong people off the bus”.

Senge (1990) is of the view that true organisational learning depends on the team-learning and the existence of a shared vision. Senge (1990) further says that the combined efforts of a well-organised group (within one organisation) tap the ability or endowment of the individuals, develop operational reliance and promote learning within other groups in the organisation. He stresses establishing a shared vision that promotes devotion to the organisation and produces the enthusiasm, power and concentration, which are vital for learning and innovation to take place.

5.3.3 Learning and Innovation in Government Organisations

In the academic literature, policy learning (ideas) is also considered to be an important element for bringing change and innovation in government organisations (Szarka, 2006; Braun and Benninghoff, 2003; Benz, 2002; Braun and Busch, 1999; Sabatier, 1993; Fischer and Forester, 1993; Bennett and Howlett, 1992). Policy, in general, is considered to be a series of proposed actions taken up by a government. As stated by Bennett and Howlett (1992), policy learning relates to a pre-arranged, planned and cognisant change in thoughts regarding a particular policy topic. Similarly, change and innovation are considered to be a shift in actions, which is mostly due to a ‘change in thought’. However, it is important to take into account that change and innovation are both directly and indirectly connected to ‘learning’ and ‘knowledge’. The scale and method of change and innovation is further influenced by the form of the knowledge implicated in the change initiative, and the type and nature of the organisation. Sabatier (1993) is of the view that policy learning is a type of shared learning, as policy is formulated and implemented simultaneously by a number of different organisations. In general, a key feature of

policy learning is that it engages intra-organisational as well as inter-organisational learning to bring about change. However, this also creates some intricacy in relation to who learns ‘what’ and ‘why’, as this involves both individual and collective thinking. Sabatier (1993) also considers policy learning as a long-term change of thoughts or behavioural intentions that are related to the achievement of a specific belief system, arguing that this is similar to the typical learning-based view (organisational learning) as it considers a long-term change of thoughts (within an organisation) with simultaneously changes in frames, values and meanings to make it a learning-organisation in a specific context.

5.3.4 Organisational Learning and Learning Organisation

Different authors use terms ‘organisational learning’ and ‘learning organisation’ frequently in their research, which raises some confusion in their appropriate use. The review of literature (Lee and Roth, 2007; Moilanen, 2005; Watkins and Marsick, 2003; Easterby-Smith and Araujo, 1999; Argyris and Schon, 1996; Marsick and Watkins, 1994) clarifies these terms. Such studies indicate that ‘organisational learning’ is a ‘process’ that leads to the ‘product’ of a ‘learning organisation’. Dodgson (1993) considers that organisational learning takes place naturally; however, some struggle or effort is required to create a learning organisation. Tsang (1997) is of the view that organisational learning is a series of actions, while the learning organisation is a specific form of organisation. In addition to this, Easterby-Smith (1997) believes that the literature about organisational learning materialised through research, whereas the literature about learning organisation came out, primarily, through practice or routine.

The term organisational learning is still not very well explained although it became famous in 1990 by Peter Senge. Currently, the fundamentals that constitute a learning organisation are also indistinct and this, as said by Zairi (1999), affects recognition of the means by which individual

learning gets applied or transferred. Different definitions for organisational learning exist in the current literature (Lee and Roth, 2007; Moilanen, 2005; Sankar, 2003; Loermans, 2002; Daft and Marcic, 1998; Coopey, 1995; Campbell and Cairns, 1994; Garvin, 1993; Pedler et al., 1991; Senge, 1990). However, definitions that focus on converting organisational vision into action through learning are rare. Senge (1990, p. 3) defines learning organisation “where people continually expand their capacity to create results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together”. Pedler et al. (1991, p. 1) consider an organisation as a learning organisation when it “facilitates the learning of all its members and continuously transforms itself”. Garvin (1993, p. 80) defines learning organisation having ability for “creating, acquiring and transferring knowledge, and at modifying its behaviour to reflect new knowledge and insights”.

Once we know, ‘how learning takes place by individuals within the organisations’; and ‘how individual learning is captured and shared within the organisations’; an important question arises, ‘how a public sector organisation could bring about change through learning’. The literature reviewed does not give a straight forward answer to this question, although it highlights a number of similarities in the steps involved. Some research studies (Lee and Roth, 2007; Elkjaer, 2004; Appelbaum and Gallagher, 2000; Hodgkinson, 2000; Easterby-Smith and Araujo, 1999; Argyris, 1999; DiBella, 1995; Garvin, 1994; Senge, 1994; Kim, 1993; Senge, 1990) have made efforts to establish different orientations for learning within organisations. Garvin (1994) considers that the first step towards organisational learning is when individuals within the organisation are exposed to new thoughts and increase their knowledge. Elkjaer (2004), Appelbaum and Gallagher (2000), and Senge (1994) are of the view that creating learning within organisations, in fact, begins with the individual learning. Hodgkinson (2000) thinks that there is an unspecified link between the

individual learning, the application of the learning and the organisational learning. However, Senge (1990) found that this was not necessarily so, although the assumption of Hodgkinson (2000) looks understandable being that an organisation is comprised of individuals, then if individuals learn the organisation learns as well. Kim (1993, p. 1) is of the view that “transfer of learning is also a crucial issue” as such transfer is the heart of learning within organisations, and could bring about change.

5.4 Linking Organisational Learning Paradigm to Climate Adaptation

Learning for climate change adaptation is a new, but an important and challenging, research area. McEvoy et al. (2008) stress the need for making space for adaptation learning in decision-making domains. Indeed, the authors consider the concept of ‘climate change adaptation as a learning process’ a vital component of an adaptation framework for action at the local level (*ibid*). Other literature (Pelling et al., 2008; Fazey et al., 2007; Adger et al., 2005; Easterling et al., 2004; McCarthy et al., 2001; Eriksen, 2000) suggests that one of the key aims of adaptation is to build ‘adaptive capacity’, commonly defined as the ‘ability of a system to adjust to climate change, including climate variability and extremes, to moderate potential dangers, to take advantage of opportunities, or to cope with the consequences’. Easterling et al. (2004) noted that adaptive capacity reflects how well an organisation is capable of adjusting to dynamic climatic changes. Fazey et al. (2007) are of the view that developing the ability to learn flexibly in a variety of ways, contexts, and circumstances, is an important element of developing adaptive capacity. They argue that the widespread implementation of modern social science related approaches could make a substantial contribution to building and maintaining adaptive capacity in the context of climate change. Eriksen (2000) claimed that a crucial part of building adaptive capacity is to develop a suitable policy to facilitate the learning for local people’s innate, dynamic and integrated adaptation approaches. Change in policy for climate change adaptation alone is not

enough - enabling conditions (including learning) for the functioning of a wide-ranging portfolio of policies is also necessary.

Lovell et al. (2002) suggest that without change in organisations (with learning as a part of that change), adaptation efforts will remain unproductive. As a result the current top-down (scenario-based, technical) and bottom-up (vulnerability reduction, moving towards resilience, and social and organisational) approaches will remain disconnected, and organisations will therefore continue to function with large, outdated and ineffective structures. In one of its reports, ICSU (2005) places considerable importance on considering soft organisational aspects such as: learning, culture, history and psychology. Folke et al. (2002) stress the development of adaptive, flexible and learning institutions in responding to the non-linear dynamics of natural and human systems for environmental action. In the context of learning to adapt, the quality of local government operation will be critical. Huq et al. (2007, p. 6) consider that in well-governed cities “good provision for storm and surface drainage can easily be built into the urban fabric, along with complementary measures to protect flooding”. Also, they consider that “in poorly governed cities this does not happen, and it is common for buildings and infrastructure to be constructed that actually disrupt drainage channels”. This example highlights the pivotal role that the local public sector plays in implementing actual adaptation measures, whilst needing to avoid instances of mal-adaptation. However, little of the current literature has attempted to identify the factors relevant to better adaptation performance at the urban local level, and the role that learning has in its facilitation.

In order to understand how an organisation could bring about change through learning, DiBella (1995) highlights three common perspectives of learning through which change within organisations can be attained:

- *A normative perspective that observes learning as taking place only under specific settings i.e. learning within organisations is captured by focusing on characteristics (for example, leadership, vision, culture, governance, creativity) that make sure that learning is deliberately tailored*
- *A developmental perspective which considers learning within organisations as emergent and growing over time, and*
- *A capability perspective that observes different learning approaches as legitimate and does not specify characteristics*

DiBella (1995) considers learning as rooted in the customs, traditions and structure of the organisation. The review of contemporary literature about learning indicates that there are some similarities as well as differences in relation to the question ‘how to bring about change through aspirations of organisational learning’? However, a large number of studies (Berg and Chyung, 2008; Fazey et al., 2007; Sheaff and Pilgrim, 2007; Lovell et al., 2002; Vassalou, 2001; Pedler et al., 1991; DiBella, 1995) focus on the characteristics model of learning for organisations (characteristics such as; leadership, vision, culture, governance, creativity) through which change within organisations could be attained.

There are no noteworthy studies available for Pakistani context that address the notion of learning in Pakistani organisations. Studies in the region are also very limited but are starting to materialise in some countries like India (Bhatnagar and Sharma, 2005; Kharbanda, 2002), and Thailand (Hallinger and Kantamara, 2000). Different threads of research from these neighbouring Asian countries also point to common themes in discussions of learning and learning organisations, primarily revolving around the similar characteristics discussed above. In

attempting to identify and examine characteristics that could promote adaptation learning and action on the part of Pakistani urban local government, it is appropriate to consider some of the characteristics (aspirations) that have emerged from the ‘organisational learning’ literature (Berg and Chyung, 2008; Fazey et al., 2007; Sheaff and Pilgrim, 2007; Lovell et al., 2002; Vassalou, 2001; Pedler et al., 1991; DiBella, 1995).

Hence, guidance for work in Pakistan is best found by drawing on the themes from the analysis of literature related to organisational learning in general, mentioned in previous paragraphs. Hence, five different framing characteristics have been identified that would be of potential relevance to bring about change for climate change adaptation learning and action in urban Pakistani local government. These are categorised as:

- (a) Leadership for adaptation*
- (b) Vision for adaptation*
- (c) Organisational culture for adaptation*
- (d) Good governance for adaptation*
- (e) Innovation and creativity for adaptation*

5.4.1 Leadership for Adaptation

Academic literature (Bartol et al., 2002; Bass and Avilio, 1992; Kirkpatrick and Locke, 1991) indicates that the ‘leadership’ is the process by which one person influences another person, or persons, sufficiently enough that they comply with the expectations of the first person in carrying out some activity or task, that is deemed to be important to an organisation. While there are many debates as to the merits of the various styles of leadership, there is increasing consensus that leadership will be a critical issue for organisations, both in developed and developing countries,

in the Information Age of the 21st century (Uhl-Bien, 2007; Hames, 1994; Senge, 1990; Toffler 1990).

The presence of effective leadership for climate change adaptation is very important in any developing-country local governments. In contrast to reducing emissions of the greenhouse gases (a policy that generates benefits which are substantially external), adaptation generates benefits that are largely internal. This means that those local governments (working in some developing country) that take action to adapt will capture for themselves most of the benefits of their actions, creating a strong incentive to adapt. This explains why a wide range of actions planned and implemented to manage and reduce climate risks are being observed throughout the developed world.

The literature related to climate change adaptation at the local levels, both for developed and developing countries (Binder, 2009; Parzen, 2009; Carmin et al., 2009; Sippel and Jenssen, 2009; Carter, 2008; Wuebbles et al., 2008; Roberts, 2008; Lasco et al., 2008; CIFOR, 2008; Rode, 2007), indicates that the local governments (or cities) that were able to have received a strong, regular and consistent support from their local political leaderships and/or local public servants, the climate change adaptation actions were moving ahead in those areas. The better implementation of climate change adaptation actions in such local areas were primarily dependent on the deliberate presence of effective leadership that empowered stakeholders and enabled them to learn, develop, and implement various climate change adaptation programmes, so that they could move their adaptation agendas forward. The literature (Carmin et al., 2009; Sippel and Jenssen (2009); Roberts, 2008; Lasco et al., 2008) also indicates that the local leaderships in Durban (South Africa), Cape Town (South Africa) and Albay (Philippines) made many interventions and created conditions that better enabled the stakeholders to surmount the

obstacles and take many climate change adaptation actions to help themselves in those local areas. The importance of an effective leadership for climate change adaptation is demonstrated in Table 5.1. Enabling the process of climate change adaptation was the most important adaptation that these local leaders made. The literature (Carmin et al., 2009; Sippel and Jenssen (2009); Roberts, 2008; Lasco et al., 2008) indicates that the local leadership in these areas:

- (a) Facilitated assessment of current climate trends and future projections for their area of jurisdiction*
- (b) Facilitated assessment of climate vulnerability of their area of jurisdiction*
- (c) Facilitated identifying hotspots where adaptation activities were needed*
- (d) Facilitated developing adaptation options using new and existing consultative tools*
- (e) Facilitated developing, implementing, monitoring, reviewing, and modifying their city adaptation programmes*
- (f) Facilitated community involvement (involved persons at risk - the intended beneficiaries)*

While facilitating the above-mentioned actions, the leaders associated with these activities in Durban, Cape Town, and Albay also engaged stakeholders in order to identify vulnerable sectors and existing and potential climate change adaptation initiatives. This engagement process was necessary to bring local politicians and decision makers on board and to give them insight into the projected impacts and potential adaptation actions. Local leaders in these areas also facilitated assessment of the ‘adaptive capacity’ (potential or ability of a system to adapt to the impacts of climate change). From the experience of the author, in Pakistani local government context, there are currently no methodologies for assessing the above mentioned actions, as well as the adaptive

capacity of different sectors, but this is a gap that could be addressed through effective leadership for climate change adaptation.

The importance of an effective leadership for climate change adaptation is demonstrated in Table 5.1;

<i>Illustration of the role of Leadership</i>	<i>Source</i>
Executive Ron Sims showed leadership and helped initiated adaptation actions in King County, Washington	Binder (2009)
London’s Mayor Ken Livingstone was enthusiastic about climate change (adaptation and mitigation) issue and worked about it in London	Carter (2008); Rode (2007)
A firm back-up and constant encouragement from Chicago’s Mayor Richard Daley and two public officials named Sadhu Johnston and Suzanne Malec-McKenna from the Department of Environment (DOE) assisted adaptation action (administratively and financially) in Chicago	Parzen (2009); Wuebbles et al. (2008)
The leadership of Debra Roberts was instrumental for adaptation actions in Durban Municipality	Carmin et al. (2009); Sippel and Jenssen (2009); Roberts (2008)

<p>At the initiative of the Governor, Albay demonstrated a strong leadership to address climate change in their local area</p>	<p>Lasco et al. (2008); CIFOR (2008)</p>
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Table 5.1: Effective Leadership for Adaptation

In short, for climate change adaptation learning and action, there seems to be the recognition that an effective and appropriate leadership style is required for the future needs of local governments. Hence, a research statement and related question of high importance to adaptation leadership at the local government level in Pakistan are:

Research statement 1: “To bring about change in the context of climate adaptation, Pakistani local governments need an appropriate and effective leadership style, one that empowers stakeholders and enable them to learn, develop and implement different climate adaptation actions”

Research issue 1: ‘How would you define the leadership style manifested in your local government in relation to climate adaptation learning and implementation?’

These are the first of the propositions (statements) and questions that will be used in part-2 of Stage-II (next Chapter) to research the question of: “what could bring about change in urban Pakistani local governments in the context of climate change adaptation learning and action’. Nonetheless, this was only the first of the propositions and issues, while the next that considered was the need for a vision for climate change adaptation.

5.4.2 Vision for Adaptation

According to the literature (Jankowicz, 2000; Gately, 1999; Senge et al., 1999, Amburgey and Rao, 1996), the purpose of the organisational vision is to give a direction to the actions of those who are required to carry out the organisations day-to-day activities. Therefore, Fairbrother (1999), Christy (1998), and Ortmann (1997) argue that the organisation's vision should be a reflection of the purpose(s) of the organisation and the specific role it wishes to play in the society in which it operates. Dunphy et al. (2003) and Callus (1999) are of the view that if the organisational vision does not match the actions of those who carry it out, the vision soon becomes meaningless and provides little direction.

Many studies (Bhatnagar and Sharma, 2005; Kharbanda, 2002; Hallinger and Kantamara, 2000) indicate that there has been an implicit assumption in most of the developing-country organisations that only those at senior levels of the governments need to implement the vision, as those at more junior levels are mere functionaries whose jobs are to 'do', rather than to 'think'. Therefore, many employees working in those organisations are even not aware of what the big picture is, nor of their role within that bigger picture because they have no ownership of the vision adopted at the higher levels. Thus, as stated by Hamel (1999), Maani and Benton (1999), Goldrick (1997), and Barker (1993) if the purpose of the organisational vision is to give direction and guidance in a specific context (such as climate change adaptation learning and action) then it stands to reason that those who are expected to act upon the vision also need to have some input into its development. Furthermore, the organisational vision needs to be in harmony with the role that the organisations play in society (Bathgate 1999; Eastman 1999). To this end, Gettler (2003) and Senge (1990) argue that the organisational vision has to be a collective one - a vision that is not only collectively acted upon but also collectively defined. Otherwise how could all the

individuals within an organisation, who had to act upon it, carry out their individual and collective acts and ensure that the vision was achieved? This notion of a collectively defined vision (in any context) seems to have been consistently over-looked in many local government organisations working in developing countries.

The literature related to climate change adaptation in Albay (Lasco et al., 2008, CIFOR, 2008) indicates that Albay (Philippines) local government embedded its vision for climate change adaptation into its strategic planning and development plans and acts, as a series of principles to guide people's behaviour for climate adaptation learning and action. According to Lasco et al. (2008), the provincial government of Albay believed that climate change was real and that it threatens the existence of its various systems (natural, human, economic). They also thought that the climate change was a major hindrance to the attainment of the United Nations' Millennium Development Goals (MDGs) and the Human Development Index (HDI), making the alleviation of poverty much harder to be achieved. Therefore, with a clear vision of the Governor (which was both commonly held and defined by all staff members), Albay utilised climate change adaptation as one of the political platforms for governance, and demonstrated that it was an investment with huge economic returns. Hence, Albay aligned their climate change adaptation actions with their strategic planning and development plans and acts.

Similarly, as noted by Carmin et al. (2009), Sippel and Jenssen (2009), and Roberts (2008), Durban municipality exhibited a vision by designing its climate adaptation strategy that established a direct linkage of climate change to its various municipal departments, and identified the climate change impacts on various key sectors such as human health, urban infrastructure, water, business, coastal areas and agriculture. In this strategy, Durban integrated climate change

considerations into its numerous planning actions that ultimately helped bring change in the context of climate adaptation. Lim et al. (2005) mentioned four major principles;

- (1) *Adaptation to short-term climate variability and extreme events is included as a basis for reducing vulnerability to longer-term climate change*
- (2) *Adaptation policies and measures are assessed in a developmental context*
- (3) *Adaptation occurs at different levels of society*
- (4) *Both the strategy and the process through which adaptation is implemented are equally important*

The importance of an organisational vision is shown in Table 5.2;

<i>Illustration of the role of Vision</i>	<i>Source</i>
Purpose of the vision is to provide direction for the organisation to match the needs (in any context)	Jankowicz, 2000; Gately (1999); Senge (1999); Amburgey and Rao (1996)
A commonly held vision is required to transform an organization	Gettler (2003); Senge (1990)
Vision for climate adaptation is embedded into the strategic planning and development plans and acts, as a series of principles to guide people's behaviour for climate adaptation learning and action	Lasco et al. (2008); CIFOR (2008)
Integrate climate change considerations into numerous planning actions that	Carmin et al. (2009); Sippel and Jenssen (2009); Roberts (2008)

ultimately help bringing change in the context of climate adaptation.	
Adaptation to short-term climate variability and extreme events is included as a basis for reducing vulnerability to longer-term climate change; Adaptation policies and measures are assessed in a developmental context; Adaptation occurs at different levels of society; Both the strategy and the process through which adaptation is implemented are equally important	Lim et al. (2005)

Table 5.2: Importance of an Organisational Vision for Adaptation

Thus, from the literature review, the second proposition and issue were developed. These second proposition and issue are as follows:

Research statement 2: “To bring about change in the context of climate adaptation, Pakistani local governments need a vision that is both commonly held and defined by all staff members”

Research issue 2: “How is your local government’s vision, if formulated, helping it to bring about change in the context of climate adaptation?”

These are the second of the propositions and questions that will be used in part-2 of Stage-II to research the question of: “what could bring about change in urban Pakistani local governments in

the context of climate change adaptation learning and action'. However, this is only the second to be considered and what follows is a discussion of the need for an organisational culture that facilitates climate adaptation as well as reflects the first two propositions and questions.

5.4.3 Organisational Culture for Adaptation

Local governments, as with all other organisations, have a unique organisational culture. It is the culture that influences the way in which people act or are motivated to act, in relation to accomplishing both personal and organisational objectives (Schien, 2002; Robbins et al., 2001; Widdowson, 1996; Denison, 1996; Schien, 1992; Trice and Beyer, 1984). Moreover, there is a strong link amongst the values, available information, and actions of the organisations, and how they develop a particular culture (organisational process) in any particular context (Hamel, 1999; Ogbonna and Harris, 1998; Ramsden, 1998; Burdett 1998; Slaughter 1997). Hoffman and Hegarty (1993) contend that there are various personal values (acts) that each person brings to an organisation, especially those who lead that impact deeply on an organisational culture (organisational process) in that particular context. Finally, as Hetzel and Clarke (1995) have noted, while leaders are catalysts for change it does not automatically mean that any changes will be positive ones that benefit the organisational culture or improve working process, as leaders could also develop what Gartside (1998) calls a corrosive culture. Thus, as noted by Davis (1998) and Davis and Pratt (1997) the impacts of an organisational culture, with its many actions and the milieu of the external environment within which it is being shaped, are often unconsciously ignored. Given that this is the case, it is important to identify, in the context of climate change adaptation, which actions mark out the organisational culture (organisational process) of Pakistani local governments.

The literature (Goldrick, 1997; DiBella, 1995; Hoffman and Hegarty, 1993) indicates that in most of the organisations, the organisational culture (organisational process) prevents them from bringing about change for any context as their organisational routines do not promote, encourage, reward or value learning in most cases. Many researchers (Baird et al., 1999; Goldrick, 1997; DiBella, 1995; Covey, 1994; Hoffman and Hegarty, 1993) argue that developing an appropriate organisational culture - one that promotes, encourages, rewards and values learning (in any context), will first require a paradigm shift of those who 'lead' before that new paradigm can be embedded. Thus, as stated by Covey (1994), the development of an appropriate organisational culture (organisational process) for any particular context (such as, climate change adaptation) in any local organisations will require more than just time, but the implementation of a completely new set of commonly shared actions to ensure that this change can be made, as this set of commonly shared actions needs to support one another, empowering others and to develop innovative actions. The purpose of all this is to encourage a love of learning for that particular context in employees and to develop them into what Collins (1999) calls a 'learning person', which will then enable individual and collective learning to take place more readily (Aram and Noble, 1999; Argyris and Schon, 1996; Anderson et al., 1994).

Climate change adaptation literature related to the Albay situation (Lasco et al., 2008, CIFOR, 2008) indicates that the Albay local government is currently making efforts to set up some novel set of interdisciplinary and multi-sector initiatives to make certain that a cultural change is attained for climate change adaptation learning and action. Lasco et al. (2008) mention that Albay's Government through CIRCA (Centre for Initiatives and Research on Climate Adaptation) employed a holistic climate change adaptation strategy that embraced different organisations in various fields of discipline and interest, such as in the arts and culture, academe, religion, agriculture, and sciences. Lasco et al. (2008) write that Albay is currently making efforts

(through consolidation of various interdisciplinary and multi-sector initiatives) to implement new set of commonly shared actions to ensure that a change is being made in the context of climate change adaptation actions. The actions include: consultation, dialogues, seminars, and wide range of fora from inter-agency to multi-stakeholder communication and information (Lasco et al., 2008).

The importance of an organisational culture (organisational process) for climate change adaptation learning and action is demonstrated by a range of examples such as those in the Table 5.3;

<i>Illustration of the role of Culture</i>	<i>Source</i>
The organisational culture influences the way in which people act or are motivated to act.	Schien (2002); Robbins et al. (2001); Widdowson (1996); Denison (1996); Schien (1992); Trice and Beyer (1984)
The values, available information, and actions of the organisations develop a particular culture (organisational process) for any particular context	Hamel (1999); Ogbonna and Harris (1998); Ramsden (1998); Burdett (1998); Slaughter (1997) Hoffman and Hegarty (1993)
An appropriate organisational culture (organisational process) is one that promotes, encourages, rewards and values learning in any particular context	Baird et al. (1999); Goldrick (1997); DiBella, (1995); Covey (1994); Hoffman and Hegarty (1993)
Albay local government is making efforts to set up some novel set of interdisciplinary and multi-sector	Lasco et al. (2008)

initiatives to make certain that a cultural change is attained for climate adaptation learning and action	
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Table 5.3: Importance of an Organisational Culture for Adaptation

In short, for climate change adaptation there seems to be the recognition that a supportive organisational culture (organisational process) for initiating climate change adaptation learning and action is very important in urban Pakistani local government context. Such culture should not only support but, value and encourage learning for climate change adaptation in urban Pakistani local governments. Hence, a research statement and an issue have been developed in the context of culture for climate change adaptation at the local government level in Pakistan, which are as follows:

Research statement 3: “To bring about change in the context of climate adaptation, Pakistani local governments need an organisational culture that not only supports but, values and encourages learning for climate adaptation.”

Research issue 3: “How is your local government’s organisational culture helping it to bring about change in the context of climate adaptation?”

So, after discussing the first three dimensions of what a Pakistani local government needs to bring about change in the context of climate change adaptation, there are still two other dimensions that should be considered and the next dimension of the model to be examined is the need for good governance for climate change adaptation.

5.4.4 Good Governance for Adaptation

Whereas climate change mitigation is generally approached from the level of global governance moving down to the national level, Adger (2001, p. 924) argues that with adaptation this flow is reversed: “because the impacts are spatially and socially differentiated, climate justice is based on the individual. The actions to adapt to climate change are taken by individuals within their economic and other constraints. Thus the appropriate governance scale is at the local level of the resource user and their management of the climate impacted natural resource or livelihood resource, rather than a global commons”. Thus, because adaptation is largely made up of individual choices at the local level, governance related actions at the local government level are the most appropriate response for adaptation in any urban context.

Devas (2001) argues that the extent to which urban local governments are able to provide low-income groups with necessary environmental infrastructure and services is dependent on two factors: first, on the local government’s capacity to meet their responsibilities - this often depends on local developmental programmes, rules and laws, routines - and secondly on the responsiveness of local governments to the needs of low-income groups. Fernandes (2007) has linked good governance with national level actions to facilitate greater decentralised legal, institutional and financial space for local governments in order for local governments to be effective and more accountable to their citizens. However, as stated by Robinson (2007), the recent research on decentralisation all over the world indicates that such devolution to local authorities is only effective where sufficient time is also given to build local capacity and improve accountability mechanisms. The literature on urban governance and pro-poor development in developing countries (Huq et al., 2007; Satterthwaite, 2007; Satterthwaite, 2001; Devas, 2001) indicates that there are both demand and supply constraints to achieving pro-poor

governance. These can also be applied to governance issues related to climate change adaptation and urban environmental management. Huq et al. (2007) argue that on the supply side, local governments are constrained by a number of factors:

- (a) Local governments' boundaries often do not include areas where the poor reside, thus placing them outside of local governments' jurisdiction*
- (b) Weak managerial and technical capacities at the local government level*
- (c) Lack of financial resources in order to increase service provision and build infrastructure. This is often exacerbated by international donors and development banks that reinforce the power of national governments and pay little attention to governance and needs at the local government level*
- (d) Lack of financial management capabilities and low financial incentives for staff resulting in corruption*
- (e) Conflicts with national or state level governments*

Demand side constraints, as stated by Huq et al. (2007), include:

- (1) The commonly low-frequency nature of high impact events*
- (2) Low levels of awareness about the changing nature of risks (mostly due to climate change)*
- (3) Low levels of empowerment and mobilization by the groups of citizens most adversely impacted by environmental and climate shocks and stresses*

As means of assessing the developing-country local governments' ability and willingness to plan and implement an integrated climate change adaptation programme, Tanner et al. (2009)

proposed a governance-related framework that indicated how characteristics of good governance might support effective climate change adaptation implementation. The framework draws on governance literature, as well as from a study of the attributes of good urban governance in Asia by Mehta (1998). It includes the following categories;

- (a) Devolution and Independence (devolution summarises the ability and capacity of local governments to make decisions and implement across a range of responsibilities and services. These include in particular finance, urban planning, and disaster management; Independence focuses in particular on the relationship with other levels of government and other interest groups, as well as financial independence and managerial capacity of municipal authorities)*
- (b) Answerability and transparency (delivery of climate adaptive development relies on a local government system that maintains a relationship of answerability to its citizens, and is open in terms of financial management, information on the use of funds and adherence to legal and administrative policies)*
- (c) Responsiveness and flexibility (urban climate adaptation relies upon a governance system that can respond rapidly to a range of different scenarios and communicated needs)*
- (d) Participation and inclusion (participation and inclusion refers to the governance arrangements that enhance or preclude the participation of all citizens in decision-making, monitoring and evaluation. This refers in particular to the groups of citizens most vulnerable to prevailing climate shocks and stresses....including those in informal settlements)*

(e) Experience and support (an urban adaptive system will build on existing experience in planning and successful implementation of climate-related risks targeting vulnerable groups)

Also, Hassan et al. (2009) consider that, in the context of climate change adaptation governance, local governments working in the developing countries need to modify some of their aspects including:

(1) Modify local government developmental programmes

(2) Modify local government rules and laws

(3) Modify routines of private organisations and businesses working in local areas

Further, Hassan et al. (2009) argue that by taking up such governance related aspects, local governments in the developing countries could achieve maximum benefit of opportunities for climate change adaptation into their local government operations.

The importance of various governance related aspects for climate change adaptation is demonstrated in Table 5.4;

<i>Illustration of the role of Good Governance</i>	<i>Source</i>
The appropriate governance scale for climate adaptation is at the local level	Adger (2001)
Governance-related framework for climate adaptation may include: devolution and independence; answerability and transparency; responsiveness and flexibility; participation and	Tanner et al. (2009)

inclusion; and experience and support	
Governance-related framework for climate adaptation should include aspects, such as: modifying local government development programmes; modifying local government rules and laws; and modifying routines of private organisations and businesses working in local areas	Hassan et al. (2009)

Table 5.4: Importance of Various Governance Related Aspects for Adaptation

Thus, from the literature review the fifth research statement and issue were developed, which are as follows:

Research statement 5: “To bring about change in the context of climate adaptation, Pakistani local governments need characteristics of good governance that support effective climate adaptation learning and implementation”.

Research issue 5: “Based on the characteristics of good governance (devolution and independence; answerability and transparency; responsiveness and flexibility; participation and inclusion; experience and support) and (modifying local government development programmes; modifying local government rules and laws; and modifying routines of private organisations and businesses working in local areas), how each of these good governance components relates to, and should help, implementing climate adaptation in your local government?”

Now that the fifth dimension of what a Pakistani local government needs to bring about change in the context of climate change adaptation learning and action has been discussed there is still one more dimension to be considered. The next to be considered will be the role of innovation and creativity for climate change adaptation in a local government.

5.4.5 Innovation and Creativity for Adaptation

The need for increased innovation and creativity has become readily apparent with the development of the first computer (Gates, 1998). As the computer was developed from a novelty into a tool that has profoundly affected the world, the possible applications of the computer grew exponentially, but especially in the climate change area. Barker and Camarata (1998) contend, as organisations are dependent on both the innate innovation and creativity of their staff, something that they neither own nor can truly control, many managers feel inordinately uncomfortable. So, Dunn (1998) argues that the most effective way to raise organisational performance, in any specific context, is to increase the overall level of innovation and creativity within the organisation, because the tools to accomplish this only exist in the minds of the workers. Moreover, in their study of Total Quality Management, Anderson et al. (1994) highlighted the need for high levels of motivation and worker commitment. Their argument follows the line that, without this commitment, workers can never maximise their ability to learn and make use of their innate innovation and creativity (Anderson et al 1994). Also, as both Ford (1998), and Giugni and Hill (1998) note that there is the need to not only foster innovation and creativity but also establish the enabling conditions (setting the foundation) whereby employees can reflect on what they are doing and how to do it better is crucial to develop organisational innovation and creativity.

The studies of Dougherty and Hardy (1996), Lawless and Anderson (1996) and Wade (1996) all demonstrate the need to ensure that the innate innovation and creativity of staff is fostered and encouraged by establishing various enabling conditions if organisational performance is to be enhanced and sustained. Moreover, as Drazin and Schoohoven (1996) demonstrate that the organisational structures, policies, procedures and practices, as well as the organisational culture, can all stifle innovation and creativity, something that small organisations such as local governments can hardly afford. Thus, as Lawless and Anderson (1996) contend that increased organisational performance and long-term organisational viability are all increased when the organisations encourage, foster and develop the innate innovation and creativity of staff by establishing enabling conditions, such as: working in partnerships with other organisations; networking and knowledge sharing; connecting stakeholders regularly with each others; and involving various actors in support of their actions. So, as local governments remain one of the key players in the development of new approaches to climate change adaptation then, local governments have a responsibility in developing the innate innovation and creativity of all their employees by establishing various enabling conditions as mentioned above.

Climate change adaptation literature (Weaver et al., 2006; Thomas and Twyman, 2005; Pelling and High, 2005) also considers that innovation and creativity is essential for climate adaptation learning and action. Albay, as mentioned by Lasco et al. (2008), started many innovative programs related to climate change adaptation in their local government, including: creation of CIRCA (Centre for Initiatives and Research on Climate Adaptation); bringing together various local sectors for adaptation actions; and initiating many interdisciplinary and multi-sector initiatives (discussed earlier in this Chapter). The literature about Albay (Lasco et al., 2008, CIFOR, 2008) indicates that the Government of Albay was the first to take this paradigm shift from the usual local operation to climate change adaptation action. Lasco et al. (2008) argue that

not only that the establishment of CIRCA is, in itself, already an innovative venture, CIRCA's strategies are groundbreaking as well. CIFOR (2008) notes that CIRCA's scope of operation, for instance, encompasses almost all sectors of the area - from academic institutions to religious organisations, from scientific communities to cultural and artistic groups, from community and indigenous workers to public intellectuals. Some un-published reports about Albay also indicate that the foremost in its climate change adaptation innovativeness is in the area of education, public information, and creative communication. Through the efforts of CIRCA, climate change adaptation and mitigation measures along with environmental awareness are also now being integrated into the academic curricula of the primary and secondary schools in Albay (Lasco et al., 2008). This innovation is noteworthy as climate change adaptation learning is being integrated to all basic subjects in the elementary and secondary levels for better adaptation action in Albay.

In short, the importance of innovation and creativity for climate change adaptation is demonstrated in Table 5.5;

<i>Illustration of the role of innovation and creativity</i>	<i>Source</i>
All organisations are dependent of the innovation and creativity of its staff. Also, innovation and creativity require high levels of motivation and commitment of staff	Barker (1998); Dunn (1998); Anderson et al. (1994)
For innovation and creativity to flourish it requires establishing various enabling conditions, such as: working in partnerships with other organisations; networking & knowledge sharing; connecting	Ford (1998); Giugni and Hill (1998); Dougherty and Hardy (1996); Lawless and Anderson (1996); Wade (1996)

<p>stakeholders regularly with each others; and involving various actors in support of their actions</p>	
<p>Albay (Philippines) started many innovative programs related to climate adaptation in their local government, including: creation of CIRCA; bringing together various local sectors for adaptation actions; and initiating other interdisciplinary and multi-sector initiatives</p>	<p>Lasco et al. (2008)</p>

Table 5.5: Importance of Innovation and Creativity for Adaptation

Ahmed (2008) finds that due to the continued funding cuts, the load on staff at Pakistani local governments, particularly environment staff, has increased significantly. As stated by Khan (1993), this had created a crisis for the development of innovation and creativity, as there has been a loss of both the time to think and reflect, as one of the precursors to increased innovation and creativity and the loss of organisational slack, in terms of sufficient staff and resources to develop and implement new ideas, practices and processes. Further, as Ahmed (2008) contends, innovation and creativity suffers if resources are too few or not readily available. Hence, providing Pakistani local government professionals with sufficient thinking time could be a key determinant of the level to which innovation and creativity demonstrated in Pakistani local governments for climate change adaptation. Thus, the question is then just how well have Pakistani local governments done in providing, not only environment staff, but also all the other staff, the opportunity, time and resources to develop their innate innovation and creativity to enhance organisational performance in any context. This can be judged through the following sixth research statement and issue that have been emerged through the literature review:

Research statement 5: “To bring about change in the context of climate adaptation, Pakistani local governments need to develop strategies to maximise the use of their staff’s innate innovation and creativity.”

Research issue 5: “How does your local government make the best use of the innate innovation and creativity for climate adaptation of all its staff members?”

5.5 Framing Climate Adaptation Learning & Action in the Context of Urban Pakistani Local Governments

From a critical analysis of conceptual evidence, the author identifies six discrete characteristics (we can call it as the ‘change model for climate adaptation learning’) that could be used to frame the context of climate change adaptation learning and action in the Pakistani urban local government context. To this end, this change model for climate adaptation learning in the context of urban Pakistani local governments is the best seen as a summation and synthesis of the five dimensions. These have been categorised as:

- (1) Leadership for Adaptation*
- (2) Vision for Adaptation*
- (3) Organisational Culture for Adaptation*
- (4) Good Governance for Adaptation*
- (5) Innovation and Creativity for Adaptation*

5.6 Summary

This Chapter (part-1 of Stage-II) identified and critically examined a framing of key characteristics for climate change adaptation learning and action that could bring about change in urban Pakistani local governments. Recognising the need to understand climate change adaptation as an iterative learning process, the literature review (presented in this Chapter) concentrated on organisational and policy learning, with special consideration given to those characteristics most pertinent to the urban governance in the Pakistani context. From a critical analysis of conceptual evidence, the author identified five discrete characteristics that could be used to frame the context of climate change adaptation learning and action in the Pakistani urban local government context. As mentioned above, these characteristics have been categorised as: leadership for adaptation, vision for adaptation, culture for adaptation, good governance for adaptation, innovation and creativity for adaptation, and resources for adaptation.

The next Chapter (part-2 of Stage-II) will examine these five conceptual characteristics with the help of primary data. It will present the details and justification of the chosen research methodology, and will include a discussion and justification of the interviewing process as the most appropriate research paradigm to answer the above mentioned five research issues.

CHAPTER 6: STAGE - II METHODOLOGICAL APPROACH & DATA ANALYSIS

6.1 Orientation to the Chapter

This Chapter explains the design for Stage-II of the research. Specifically, it outlines the methodology and research tools that the author used to generate data during his second visit to Pakistan from November 2008 to February 2009. Further, this Chapter presents and analyses the data generated from Stage-II of the research.

6.2 Stage - II Methodological Approach

6.2.1 Background of Stage-I & Overview of Stage-II (part-1 and part-2)

Stage-I of this research was completed in early 2008. Stage-I indicated that the ‘lack of information, education and/or training’ (learning dimension of climate adaptation) was the key barrier to climate change adaptation at the local government level in Pakistan. In the start of Stage-II (part-1), the author examined what sort of actions could make it easier to lower the key barrier and explored the relevant literature for identifying theoretical base for further research. After discussions with both supervisors, the author decided to explore the literature to the extent that could enable him to identify the characteristics of the urban Pakistani local government’s capacity to change for learning in the context of climate adaptation. So, he reviewed the literature (Chapter-5) regarding ‘organisational change for climate adaptation learning’ under the topics of:

(1) Organisations and climate adaptation learning;

- (2) *Organisational learning and knowledge (individual learning within the organisations, shared learning within the organisations, learning and innovation in government organisations); and*
- (3) *Characteristics that could bring about change in the context of climate adaptation learning in urban Pakistani local governments.*

After the literature review for Stage-2, part-1 (Chapter-5) the primary research question that emerged was:

How to bring about change in the context of climate adaptation learning and action in urban Pakistani local governments?

From the literature review in Stage-II, part-1 (Chapter-5) the author identified five characteristics (called change model for climate adaptation learning) that could bring about change in the context of climate adaptation learning and action in urban Pakistani local governments. These five characteristics were: leadership for adaptation, vision for adaptation, culture for adaptation, good governance for adaptation, and innovation and creativity for adaptation.

With the brief background as mentioned above, the author then developed a plan to travel to Pakistan once again to collect another set of data for Stage-II (part-2) of this research. The overall goal of this visit to Pakistan (November 2008 to February 2009) was to confirm and/or disconfirm the above mentioned five initial characteristics in the Pakistani context. The author considered that in this way he would have examined the research question of “how to bring about change in the context of climate adaptation learning and action in urban Pakistani local governments?”

In the start of Stage-II (part-2), five initial scoping interviews (the exploratory stage) were planned and conducted in Pakistan to confirm and/or disconfirm the above mentioned five characteristics that had been identified by the literature review in Stage-II (part-1). In other words, the purpose of initial scoping interviewing was to establish convergence (either agreement or disagreement), and therefore the sample size was not as important as to ensuring that there was compatibility with the literature (or convergence had been reached). Later in Stage-II (part-2), sixteen in-depth interviews (the explanatory stage) were also carried out. Interviewees were grouped into two cases (case-I and case-II) of eight personnel of one urban-based Pakistani local government (City District Government, Lahore). This process was specifically designed to better understand the characteristics that had been identified by the combination of literature review and initial scoping interviews, and to further examine and substantiate the framing of variables needed to support change within the urban Pakistani local governments in the context of climate change adaptation learning and action.

There were two important rationales why interviews were conducted with a range of different government and non-government actors for this analysis:

- (1) First, to match and cross reference the views those were obtained in the initial scoping interviews (the explanatory stage). This increased the spread of data and hence its validity; and*
- (2) Second, by examining two cases in one urban local level public sector organisation in Pakistan (the explanatory stage) - this further strengthened data validity across each of the individual cases.*

The focus on one urban Pakistani local government was also governed by two practical considerations:

(1) Firstly, these were operational - both in terms of time and gaining access to a reasonable number of interviewees; and

(2) Secondly, the great distances that would have been involved in travelling to other areas of Pakistan.

Thus, both time and distance constraints made it impractical to interview staff members from urban local governments outside the Punjab province in Pakistan.

6.3 Stage-II (part-2): Identification of the Data Generation Tools

Keeping in view of the research problem identified in Stage-2, part-1 (how to bring about change in the context of climate change adaptation learning and action in urban Pakistani local governments?), the author will describe, discuss and then justify the choice of the research paradigm, then similarly review the methodology that he used to conduct the research in Stage-II (part-2).

In literature (Guo and Sheffield, 2008; Guba and Lincoln, 1994; Perry, 1998), research paradigm (explaining the philosophical assumptions in relation to the nature of knowledge and how that knowledge could be measured by a researcher) is extensively discussed as a ‘research vehicle’. Various research paradigms are available in literature (Guo and Sheffield, 2008; Guba and Lincoln, 1994; Perry, 1998). So, initially, the author planned to identify the most appropriate paradigm for this part of research, keeping in view the particular research problem that he had (how Pakistani urban local governments could bring about change within themselves in the context of climate change adaptation learning and action?). The review of literature showed four main research paradigms, including:

(1) Positivism;

(2) *Critical theory;*

(3) *Constructivism; and*

(4) *Realism.*

Guo and Sheffield (2008) and Perry (1998) consider that ‘positivism’ is applied to examine propositions and from this explore the ‘truth’ (single truth only) about the proposition, by applying very planned verification methods such as, laboratory tests and surveys. As the aim of this part of the research is to explore and explain phenomenon (i.e. organisational change in the context of climate change adaptation learning and action) rather than to verify a proposition, it is therefore argued that the positivism paradigm is not best suited for this research.

In respect of ‘critical theory’, as said by Guba and Lincoln (1994, p. 110), the fundamental supposition is that it is a ‘virtual or historical reality’ derived from social contexts. However, as the aim of this part of the research is to explore and explain, ‘how urban Pakistani local governments could bring about change in the context of climate change adaptation learning and action’, rather than exploring some virtual or historical reality, this paradigm is also considered to be inappropriate.

‘Constructivism’ is based on the hypothesis that, there are numerous perspectives of reality and as a consequence there can be no singular truth (Guo and Sheffield, 2008; Guba and Lincoln, 1994; Perry, 1998). Also, Guba and Lincoln (1994) state that the truth is detainable in the shape of numerous, vague mental constructions, socially and experientially based, local and particular in context, and dependent for their structure and content on the individual or groups having the constructions. However, this paradigm is also unsuitable as the aim of this part of the research is

to find ‘how Pakistani urban local governments could bring about change within themselves in the context of climate adaptation learning and action’ and by itself the ‘numerous, vague mental constructions’ of which Guba and Lincoln (1994, p. 111) mention, may not, at present, be there in the brains of the respondents.

Guo and Sheffield (2008) and Guba and Lincoln (1994) find that ‘realism’ can be considered to indicate that the real world cannot be recognised with utter conviction, one that can be methodically and constantly measured, but somewhat it can be recognised only imperfectly and thus, can only be imperfectly measured. In addition, like positivists, realists consider that there is only one ‘reality’, but argue this single reality can be explained and measured by triangulating the variance perceptions that persons keep about it, rather than using a single measure (Denzin, 1978). Thus, the researchers who employ the realism paradigm highlight practices that permit them to find and develop new avenues and know-how about a phenomenon, looking for adding to the body of knowledge (Yin, 1994). Utilising convergent and case study interviews allows the investigator (employing realism paradigm) to collect various standpoints about a single reality, while permitting for significant contextual information to be obtained from knowledgeable persons in an organisational perspective (Guba and Lincoln, 1994). Carson et al. (2000) recommend, while applying realism paradigm, there should be an amalgamation of ‘exploratory’ and ‘explanatory’ stages as necessary components of the research methodology. The realism paradigm presents fairly open and flexible approach/methodology to the researcher, than that of the positivism paradigm. Hence, the review of paradigms reveals that the realism paradigm best meets the requirements of this specific part of the research in analysing the research question of, ‘how Pakistani urban local governments could bring about change within themselves in the context of climate adaptation learning and action?’ Further, the realism paradigm undoubtedly presents a way for using exploratory (initial scoping interviews) and explanatory (case study

interviews) methodology in Stage-II (part-2) of this research. Therefore, the author employed the methodology of initial scoping interviews (to explore the issues) and case study interviews (to explain the issues) in Stage-II (part-2) of the research.

6.3.1 Initial Scoping Interviews

In the first fifteen days (20 Nov 2008 to 05 Dec 2008) of the 2-month visit to Pakistan, the author conducted five different initial scoping interviews (first exercise of Stage II, part-2) as a process of induction (exploratory stage) whereby the each of five themes (five characteristics of the change model for climate adaptation) that emerged during the literature review in Stage-II (part-1) were confirmed by the responses given during this exercise. These interviews were conducted with:

- (1) One academic;*
- (2) One local climate change expert;*
- (3) One person from a NGO; and*
- (4) Two persons from Rawalpindi local government.*

Drawing on previous experience of people engaged in environmental issues, the author selected the above mentioned people on the basis of their expertise and relevance to the aims of the research. Initial five scoping interviews confirmed different key dimensions (characteristics) of what the interviewees considered necessary for urban Pakistani local governments to bring about change in the context of climate change adaptation learning and action. As stated earlier in this Chapter, the main purpose for conducting initial scoping interviewing was to establish convergence (either agreement or disagreement). Therefore, the sample size was not as important as ensuring that convergence has been reached. Prior to conducting the interviews, the author

assumed that five interviews would be sufficient to establish a stable pattern of agreement or disagreement, and it was proved correct later on. The five characteristics that emerged from the literature review in Stage-II (part-1) were the basis for the initial scoping interviewing. As the author was trying to ensure that individuals give him their own understanding of each of the characteristics, therefore he kept the questions mostly open ended. He planned that as themes will converge (new themes may emerge), the analysis and the results stemming out from them would become the basis for the second exercise of Stage-II (part-2) of this research – i.e. the use of a case study interviews. In short, the first exercise of Stage-II (part-2) was planned:

- (a) *To confirm and/or disconfirm the original five characteristics (leadership for adaptation; vision for adaptation; organisational culture for adaptation; good governance for adaptation; and innovation and creativity for adaptation); and*
- (b) *To identify any other themes that did not emerge primarily from the literature review in Stage-II (part-1).*

More precisely, the purpose of the first exercise of Stage-II (part-2) was to get confirmation and / or disconfirmation of the following statements:

- *To bring about change in the context of climate adaptation learning and action, Pakistani urban local governments need an appropriate and effective leadership style, one that empowers stakeholders and enable them to learn, develop and implement different climate change adaptation actions;*
- *To bring about change in the context of climate adaptation learning and action, Pakistani urban local governments need a vision, based on some principles, that is both commonly held and defined by all staff members;*

- *To bring about change in the context of climate adaptation learning and action, Pakistani urban local governments need an organizational culture that not only supports but, values and encourages learning for climate adaptation;*
- *To bring about change in the context of climate adaptation learning and action, Pakistani urban local governments need characteristics of good governance that support effective climate adaptation learning and implementation;*
- *To bring about change in the context of climate adaptation learning, Pakistani urban local governments need to establish ‘enabling conditions’ and then identify local area specific climatic impacts, and develop adaptation strategies to maximise the use of their staff’s innate innovation and creativity; or*
- *Please suggest any other dimension(s).*

6.3.2 Case Study Interviews

In the second exercise of Stage-II (part-2), the author conducted sixteen interviews across one urban local government of Punjab (City District Government, Lahore) to better understand the characteristics that had been confirmed (agreed) by the initial scoping interviews, and to further examine and substantiate the framing of variables needed to support change within the urban Pakistani local governments in the context of climate change adaptation learning and action. This deductive process was necessary to build, refine and then complete the final change model for climate change adaptation learning and action in the urban Pakistani local government context. The different themes that emerged from the first exercise of Stage-II (part-2) were the basis for the case study interviews (second exercise of Stage-II, part-2). These interviews were conducted with:

- (1) *Representatives of City District Government, Lahore (senior management and middle level staff);*
- (2) *Representatives of University of Engineering and Technology (UET), Lahore; and*
- (3) *Representatives of NGOs.*

The details of participants are given in Section 6.3.3.2

The author selected the specific people on the basis of their expertise and relevance to the aims of this part of research. Different themes that emerged from the first exercise of Stage-II (part-2) were kept as the basis for the case study interviewing (second exercise of Stage-II, part-2) with eight respondents from each of the two streams for a total of sixteen respondents, who were grouped into two cases of eight persons within that one urban Pakistani local government (Appendix H).

It should also be noted that there were two reasons why the author investigated a total of only two cases at one urban Pakistani local government.

- (1) *First, he had some constraints, both in terms of time and gaining access to, a number greater than sixteen individual respondents (because of delays in contacting the interviewees and arranging interview times);*
- (2) *Second, the great distances involved in travelling to other local governments to interview staff members elsewhere in Pakistan, as the author was based in Rawalpindi, which was located near Lahore.*

Therefore, the time and distance constraints made it unfeasible for the author to interview staff members from local governments outside the Punjab province. Furthermore, the financial costs

associated with the research, while not prohibitive, were nonetheless real and, due to the limited funds available for PhD research in the School of Global Studies, Social Science, and Planning in RMIT University, the author considered better to conduct the research closer to his home city in Pakistan.

The different themes that had emerged from the literature and were validated in the first exercise of Stage-II (part-2) were the basis for the case study interviews (second exercise of Stage-II, part-2).

The author also designed a ‘case study protocol’ that encompassed the following two elements:

- (1) Firstly, a research issue about each of the different characteristics determined to be relevant to urban Pakistani local governments to bring about change in the context of climate adaptation learning and action was developed; and*
- (2) Secondly, a research statement about each of the characteristics was formulated. The details are below.*

Research issue 1: *How would you define the leadership style manifested in your local government in relation to climate adaptation learning and action?*

Research statement 1: *To bring about change in the context of climate adaptation learning and action, Pakistani urban local governments need an appropriate and effective leadership style, one that empowers stakeholders and enable them to learn, develop and implement different climate change adaptation actions*

Research issue 2: *How is your local government’s vision, if formulated, helping it to bring about change in the context of climate adaptation learning and action?*

Research statement 2: *To bring about change in the context of climate adaptation learning and action, Pakistani urban local governments need a vision, based on some principles, that is both commonly held and defined by all staff members*

Research issue 3: *How is your local government's organisational culture helping it to bring about change in the context of climate adaptation learning and action?*

Research statement 3: *To bring about change in the context of climate adaptation learning and action, Pakistani urban local governments need an organisational culture that not only supports but, values and encourages learning for climate adaptation*

Research issue 4: *Based on the characteristics of good governance (devolution and independence; answerability and transparency; responsiveness and flexibility; participation and inclusion; and experience and support), how each of these good governance components relates to, and should help, implementing climate adaptation learning in your local government?*

Research statement 4: *To bring about change in the context of climate adaptation learning and action, Pakistani urban local governments need characteristics of good governance that support effective climate adaptation learning and action*

Research issue 5: *How does your local government make the best use of the innate innovation and creativity for climate adaptation learning and action of all its staff members?"*

Research statement 5: *To bring about change in the context of climate adaptation learning and action, Pakistani urban local governments need to establish 'enabling conditions' and then identify local area specific climatic impacts, and develop adaptation strategies to maximise the use of their staff's innate innovation and creativity*

6.3.3 Arrangements Made to Support the Research Methods

To ensure that the research methods (discussed above) show respect and beneficence from the perspective of academic research, the author undertook the following necessary steps:

6.3.3.1 Recording of Interviews

The author personally approached each identified organisation and sought permission to use them in his research. He also kept each organisation updated by providing them with the copies of his research methodology (Stage-II, part-2) as it had already been developed at that time. The author also ensured that all participants from these organisations were aware of and understood the purpose of the research that he was conducting, and informed the participants that he was taking notes to record their discussions. Consent to participate in the research was also sought from each organisation. The author recorded information manually, as participants did not give their consent to the digital recording of the discussions. He explained the purpose of the research in the beginning, and let participants know that he was taking notes on the proceedings. The notes did not reflect personal and/or identifying information about participants. With regard to the note taking, the aim of the author was to take notes in a separate note book from Stage-I, and was kept secure as well. He transcribed notes onto his personal laptop immediately after the interviews, and then removed the notes from his laptop as per the requirements of the RMIT ethical committee (Ethical Committee approval letter - Appendix I). Interviewees that were observed remained anonymous as they were assigned codes and no full names appeared in the observations notes. This all ensured respect for the anonymity of all participants and complied with the plan that had been agreed with the RMIT ethic committee for the research.

6.3.3.2 Details of participants

As mentioned earlier, the author conducted semi-structured interviews (informal, unstructured conversations with individuals involved with those organisations) to obtain more detailed

information keeping in mind the overall goal of Stage-II (part-2). He explained participants about the research project and provided them with a plain-English description (Appendix J) and consent form.

The following sixteen adult professionals (experts) were identified for the second exercise of Stage-II (part-2) of this research, i.e. the case study interviews;

- (I) *Local Government Senior/Technical Executives (04 persons);*
- (II) *Local Government General Staff (05 persons);*
- (III) *Federal Government Staff (03 persons);*
- (IV) *Academics (02 persons); and*
- (V) *NGOs (02 persons).*

The participants were recruited from the following institutions:

- (1) *City District Government, Rawalpindi;*
- (2) *City District Government, Lahore;*
- (3) *Pakistan Met Office, Islamabad;*
- (4) *Institute of Environment, NUST University;*
- (5) *Lead Pakistan, Islamabad;*
- (6) *Environment Protection Department, Lahore;*
- (7) *University of Engg and Tech, Lahore; and*
- (8) *IUCN-Pakistan.*

The above mentioned organisations were selected as a result of:

- (1) *The literature review in Stage-II (part-2);*
- (2) *Discussions with both PhD supervisors, and*
- (3) *The author's personal experience of working as Assistant Director and District Officer (Environment) in various Pakistani district governments.*

Regarding each case-study interview, an e-mail comprising a table of each proposition and question was forwarded to each respondents at least a week before the interview, including instructions on how to use the table. The respondents were asked to rate each of the research statements. This rating was recorded manually on the research protocol. Then at the interview, each respondent was asked for his/her answer on each of the research issues. Thus, by using this protocol to rate each proposition, and then to ask each of the questions, the author found that each of the case study interviews presented some consistent data for analysis. From this data, the author then examined and analysed the perceptions of each individuals, allowing for a meaningful set of conclusions to be drawn. This increased validity of the data also enhanced the likelihood that the findings were true.

6.4 Stage-II (part-2): Data Analysis

The five initial scoping interviews confirmed the different key characteristics that had been already considered necessary for the urban Pakistani local governments to promote beneficial change in the context of climate change adaptation learning and action. The academic interviewee suggested including an additional category of 'resources for adaptation', as well as the already identified characteristics, as he considered it a critical component of supporting learning and action in the Pakistani context. One of the interviewees mentioned that 'good governance for

adaptation' should also involve those people who are most at risk, hence flagging a need to improve community engagement processes at the local level. The potential role for private actors was also highlighted at the urban local level in Pakistan, especially as the local governments alone cannot do this task. Interviewees (climate change expert and NGO representative) also suggested including 'resources for adaptation' as a critical factor needed to support adaptation learning and action on the part of urban Pakistani local governments. Another interviewee pointed out that the current level of financial assistance for the adaptation learning and action at the urban local governments in Pakistan is negligible through provincial and federal levels, in comparison to the perceived high level of financial requirements actually needed for adaptation. The academic interviewee said; 'there could be some limitations for mainstreaming climate change adaptation into the current development planning process at the urban local government level in Pakistan due to the uncertainties involved with the climate change impacts, as well as the future socio-economic situation in Pakistan'. One of the interviewee from the District Office Environment, Rawalpindi argued that 'the local decision makers in Pakistan would experience practical difficulties to allocate resources for undertaking initiatives for implementing various climate change adaptation actions, as the allocation of limited resources for different Pakistani local sectors are generally allocated to balancing present day development priorities vis-à-vis managing unknown risks at a far-away future'.

After concluding the round of initial scoping interviews, it was observed that all interviewees confirmed the five initial characteristics identified by the literature review. Their consensual view was that these characteristics, if initiated and implemented properly, could bring about change within the urban Pakistani local governments in the context of climate change adaptation learning and action. However, there was also a strong desire amongst interviewees to include the obviously important characteristic 'resources for adaptation'. In summary, the initial scoping

interviews contributed to the aims of the research (first exercise of Stage-II, part-2) in two key ways:

(1) First, they confirmed the selection of the five initial characteristics; and

(2) Second, they identified an additional characteristic that had not been a primary consideration from the review of literature.

In the second exercise of Stage-II (part-2) of this research, sixteen in-depth interviews were carried out. Interviewees were grouped into two cases (case-I and case-II) of eight personnel of one urban-based government organisation (City District Government, Lahore). This process was specifically designed to better understand the characteristics that had been identified by the combination of literature review and scoping interviews, and to further examine and substantiate the framing of variables needed to support change within Pakistani urban local governments in the context of climate adaptation learning and action. Interviews were conducted with the representatives of Lahore City District Government (senior and middle management staff), University of Engineering and Technology-Lahore, and NGOs. The interviewees were selected on the basis of their expertise and relevance to the aims of the research.

The interview notes were converted into data matrices (research issue, response and theme), so that a pattern matching process could be established. Each data matrix was divided into two sections. The data matrices were then populated to analyse the data. The upper section was for the data gathered from case-I and the lower section was for the data gathered from case-II. Each of the sections was comprised of 8 cells, used to display the views of each respondent. Each cell was further divided into a space for each of the 8 respondents. In each of the spaces the key response from that person was recorded and from this a pattern matching process, as suggested

by Yin (1994), was carried out by identifying either the most common comment, or any dissenting comment made concerning that question.

6.5 Key Findings from the Data of Stage-II (part-2)

The key findings arising from the analysis are discussed below by presenting the most notable comments and arguments that were associated with each of the pre-defined characteristics. The semi-structured nature of the interviews not only allowed views and commentary on the framing and detail of the six identified characteristics but also its applicability to the ‘reality’ of urban Pakistani local governments and how the framing may be affected by changes to its current situation. Overall, the general consensus was a high degree of support for the framing of the characteristics i.e. leadership for adaptation, vision for adaptation, culture for adaptation, good governance for adaptation, innovation and creativity for adaptation, and resources for adaptation in urban Pakistani local governments in order to bring about change in the context of climate change adaptation learning and action. However, they also introduced a strong caveat that current urban Pakistani local government strategies are not explicitly placing any attention on how to support these important characteristics, so that adaptation related actions could be started.

The case study interviewees indicated that the characteristic of effective *leadership for adaptation* learning and action was highly valued in Pakistani context. One of the academic interviewees noted that contrary to mitigation (actions that generate benefits which are largely global) - adaptation generates benefits that are largely local. This indicates that if Pakistani urban local governments start adaptation learning and action, they would capture benefits for themselves from most of their initiatives, establishing a strong motivation to adapt. This also makes clear why a wide range of local adaptation plans and actions are being observed throughout the world to manage and reduce climate risks. But why then do we, however, observe

adaptation learning and action deficits in Pakistani urban local government? Why doesn't self interest motivate Pakistani local government leaders to do more to protect their areas from climate hazards? Some interviewees mentioned that urban Pakistani local government leaders could find several barriers to obstruct adaptation learning and action, including: competing priorities that put demands on scarce resources, insufficient financial resources that could limit capacity to adapt (especially in small urban Pakistani local level environment offices), lack of knowledge, weak local governance, degraded natural resources, inadequate infrastructure, and distorted incentives. Barriers such as these could hamper what local government leaders should do for climate adaptation learning and action in urban areas of Pakistan. However, some interviewees also thought that interventions by Pakistani urban local government leaders can create 'enabling conditions' that could better make stakeholders overcome the barriers and take adaptation actions to help save their areas. Hence, enabling the process for climate adaptation learning and action is also a key adaptation that Pakistani urban local government 'leaders' could make.

Overall, the perceptions of the interviewees for the first characteristic indicate that a key ingredient for successfully learning and action of adaptation is the presence of effective local leadership that is enthusiastic to advance adaptation objectives further - in other words presence of a local adaptation champion. The local adaptation leaders in Pakistan could be the head of a local area from the political domain, or any other public functionary who is eager and committed to initiate and advance its local adaptation agenda by kicking off many actions, such as (on the basis of literature review in Chapter 5):

- (1) Initiate assessments of current climate change trends and future projections for their area of jurisdiction based on available local resources;*

- (2) *Initiate undertaking climate risk and vulnerability assessments of their area of jurisdiction (some interviewees mentioned that district office environment, Lahore as well as all other local environment offices in Punjab have not yet collected and analysed this information and would therefore have to develop these assessments from scratch);*
- (3) *Initiate identifying priority areas where adaptation learning and actions should be focused;*
- (4) *Initiate crafting adaptation learning plans using current and new tools;*
- (5) *Initiate adaptation actions utilising various applicable tools;*
- (6) *Initiate developing, implementing, monitoring, reviewing, and modifying local-level adaptation learning and action programmes within their normal development budgets;
and*
- (7) *Initiate community participation (involving persons at risk-the intended beneficiaries) in the process of adaptation learning and action, which can increase the effectiveness of adaptation to climate change in urban local areas of Pakistan.*

The author argues that a general benefit of participating in climate change adaptation learning and action programmes is that it could facilitate climate risks being placed in context with other complex social settings and could provide opportunities to solutions that can be shared to achieve various objectives. While initiating the above-mentioned actions, Pakistani urban local government leaders may also engage stakeholders in order to learn from their indigenous knowledge and to identify vulnerable areas and some potential practical climate adaptation initiatives. This engagement process is vital to bring local actors together and to give them learning and sharing opportunities, so that they could get an insight into the projected climate change impacts and potential adaptation strategies. Some of the interviewees also noted that it is

essential to build 'will' of Pakistani urban local government leaders so that they allocate sufficient financial resources for planning and implementation of adaptation strategies, because some of the adaptation actions may require significant funding or politically disliked. Moreover, some of the adaptation learning and action strategies may need some trade-offs on which the stakeholders would also require to be planned. Interviewees also pointed out that the Pakistani urban local leaders should initiate assessments of the adaptive capacity of their local area to adapt to climate change impacts. In urban Pakistani local governments, there are presently no plans for assessing the adaptive capacity of different sectors, but this is a gap that could be addressed through effectual local leadership for adaptation.

Interviewees also pointed out that in Pakistan, especially in the urban local governments, there is an embedded supposition that only those at the executive levels need to implement the vision, as those at junior levels require simply carrying out their routine work as they are just workers whose work is to 'do', rather than to 'think'. In Pakistani urban local governments this supposition also appears to have been embraced. As a result some of those who take action in accordance with the vision are involved in the process of planning and developing their local government's vision. Unfortunately, many subordinates working for the environmental protection in urban Pakistani local governments are even not aware of what the big picture is for the environmental protection and climate adaptation, nor their role within that bigger picture because they have no idea of the vision (based on the authors' personal experience while working with many Pakistani local governments). Thus, if the rationale of the organisational vision is to give direction and guidance in a specific context, such as learning and action for climate change adaptation, then it appears feasible that those who are supposed to implement the vision should also participate in its development (Hamel, 2000). In the case of urban Pakistani local

governments, the author argues that the *vision for climate adaptation* should be based on three interlinked guiding principles (derived from Lim et al. (2005) – discussed in Chapter 5):

- (1) Adaptation activities (learning and action) in urban Pakistani local governments are planned on the basis of learning from the current past climate inconsistency and extreme events;
- (2) Adaptation activities (learning and action) in urban Pakistani local governments are strongly connected to the development processes, and planned within the on-going local level planning and development programmes; and
- (3) Adaptation activities (learning and action) in urban Pakistani local governments are taking place at different scales, primarily with the help of Pakistani local government environment staff.

Once the vision for climate change adaptation learning and action in urban Pakistani local governments is formulated and understood by the staff, strategies to adapt to climate change can be developed in a straight-forward manner.

The in-depth interviewees also mentioned that Pakistani urban local governments, as with all other public sector organisations working in Pakistan, have an exclusive and exceptional organisational culture. It is the culture that influences the way in which Pakistani staff working at the local level proceeds or is encouraged to proceed, corresponding to achieving both personal and organisational aims. Moreover, there is a very strong connection between the ethics, customs and actions of the stakeholders related to the urban Pakistani local governments. One of the interviewees, having vast working experience for environmental protection in Pakistan, thought that the current organisational culture within the urban Pakistani local governments would

prevent them from changing for climate adaptation as their culture does not encourage, support and value learning and action for climate change in most instances. Many researchers (Fazey et al., 2007; Ogbonna and Harris, 1998) argue that to build up an apposite organisational culture, one that encourages and gives value to learning and action, a paradigm shift is needed for those who show the way (leaders) before that new paradigm could be established. Hence, the development of an apposite organisational *culture for adaptation* in urban Pakistani local governments would need more than just time, but the setting up of an entirely novel set of collective values to make certain that this cultural change can be attained; as this set of commonly shared values requires to embrace trusting each another, empowering others and to create innovation (Glanz, 1999). The goal of all this is to develop a value of learning for climate adaptation in urban Pakistani local government staff, and to convert them into what Collins (2001) names as ‘learning person’, which will then facilitate individual and shared learning for climate adaptation to happen more readily (Ahmed, 2008; Aram and Noble, 1999).

Assessing the means of urban Pakistani local governments’ ability, capacity and willingness (*good governance for adaptation*) to plan for learning and implementing climate change adaptation programmes were also seemed high valued during the in-depth interviewing. This is consistent with what has been argued by Devas (2001) that the level to which an urban local government is able to supply poor communities with essential infrastructure and facilities is dependent on two aspects: first, on the local government’s capacity and capability to fulfil their responsibilities – this time and again depends on good connections with higher levels of government - and secondly on the responsiveness of local government to the requirements of poor communities. As briefly mentioned in Chapter 5, Tanner et al. (2009) and Fernandes (2007) have linked good governance for environmental protection and climate change (devolution and independence; answerability and transparency; responsiveness and flexibility; participation and

inclusion; and experience and support) with national level actions to facilitate greater decentralised legal, institutional and financial space for urban local areas in order for the local government to be effective and more accountable to their citizens. However, Musharraf's 2001 decentralisation experiment in Pakistan indicates that such devolution to local government is only effective when ample time is also provided to build up local capacity, capability and appropriate accountability mechanisms.

The need for increased *innovation and creativity for adaptation* were also thought essential in urban Pakistani local context for climate change adaptation learning and action during the in-depth interviewing. Most of the interviewees mentioned that due to continued funding cuts in the recent past, the load on the staff at urban Pakistani local governments (particularly environment staff) has increased significantly. This has created a crisis for the development of innovation and creativity for environmental protection and climate change adaptation in urban Pakistani local governments, as there has been a loss of both the time to think and reflect; yet this time is a precursor to increase innovation and creativity and the loss of organisational slack (especially having sufficient staff and resources to develop and implement new ideas, practices and processes for climate adaptation). This loss of thinking time, also pointed out by Janjua and Rehman (2008), is one of the most devastating impacts for environment professionals of urban Pakistani local governments to move towards local resilience. Further, as Noharia and Gulati (1996) argue, innovation and creativity are lost if there is too little organisational flexibility, if resources are insufficient and not available in a timely manner. Hence, providing urban Pakistani local government professionals with ample thinking time is also a key determinant of the level to which innovation and creativity demonstrated in urban Pakistani local governments for climate change adaptation.

The interviewees also considered that urban Pakistani local governments need to be funded sufficiently (*resources for adaptation*) by the internal (federal and provincial governments) and external (international donors) bodies, so that they could initiate and implement any climate adaptation learning and action plans. Importantly a recurring theme in relation to urban Pakistani local governments was the impact that a lack of funding has on environmental and climate change actions; all the interviewees commented on this characteristic. For instance, one of the interviewees noted: “limited funding is putting huge constraints on our local government to work more effectively on environmental and climate change plans.” Another interviewee noted: “we have had a cut in financial resources for environmental protection, which has meant less work on climate change as well.” Across the interviews the most common theme that emerged from the in-depth interviewing for this characteristic was the lack of availability of funding for implementing any environmental and climate change adaptation related actions in urban Pakistani local governments. The interviewees indicated that Pakistani provincial and federal governments can play an important role in advancing the urban climate change adaptation actions by providing more funding mechanisms for local governments. Specifically, Pakistani local governments require resources for carrying out actions related to the regional level climate related impact assessments, analysis of risks, and any planning actions thereafter. However, expanding programmes that attract funds from various national and international sources can help encourage and enable urban Pakistani local governments to adapt ahead of climate impacts as opposed to in their wake.

6.6 Some Final Comments for Stage-II of the Research

Much of what has emerged from the literature review has been corroborated through field observations during Stage-II of the research. If applied carefully and willingly, then the learning organisation characteristics may help bring about change for climate change adaptation activity in

urban Pakistani local governments. Six interconnecting issues become evident from this piece of research (Stage-II) and steer our conceptual and real world evidence to climate change adaptation learning and action by Pakistani urban local governments:

- *Presence of effective local leadership.* The local adaptation leaders in Pakistan could be the head of the relevant authority in the local area, or other public functionaries who are committed to initiate and advance its local climate change adaptation agenda by initiating actions, such as: creating enabling conditions for taking the climate change adaptation process forward; initiating risk and vulnerability assessments; and engaging stakeholders.
- *Vision for climate adaptation.* The vision in urban Pakistani local governments could be based on three interlinked guiding principles: (1) adaptation activities (learning and action) are planned on the basis of learning from current knowledge of past climate inconsistency and extreme events; (2) adaptation activities (learning and action) are strongly connected to development processes, and planned within the on-going local level planning and development programmes; and (3) adaptation activities (learning and action) are taking place at different scales within the urban local areas, primarily with the help of Pakistani local government environment staff.
- *Culture within the urban Pakistani local governments.* The current culture within the urban Pakistani local governments does not encourage, support or value learning and action for climate change in most instances. The development of an apposite culture for adaptation in urban Pakistani local governments would need more than just time, but the setting up of an entirely novel set of collective values to make certain that this cultural change can be attained.

- *Adaptation attached to a 'good governance' agenda.* One of the important characteristics, amongst others, for successfully learning and implementing adaptation in urban Pakistani local governments is the presence of attributes of 'good governance' at the local level including: devolution and independence; answerability and transparency; responsiveness and flexibility; participation and inclusion; and experience and support. A key part of the vision and leadership for adaptation should include plans to develop a more understanding and supportive culture.
- *Innovation and creativity for adaptation.* With an effective leadership, vision, and governance, many innovative actions could be planned and implemented in order to move the adaptation agenda forward. The urban Pakistani local governments could initiate adaptation innovativeness through various means - from academic institutions to religious organisations, from scientific communities to cultural and artistic groups, from community and indigenous workers to public intellectuals.
- *Adaptation funding.* There is a lack of availability of funding for implementing adaptation strategies in urban Pakistani local governments. Pakistani provincial and federal governments can play an important role in advancing the urban resilience by providing funding mechanisms for local adaptation actions. Specifically, resources are required for carrying out actions related to the regional level climate related impact assessments, analysis of risks, and any planning actions thereafter. Developing programs and projects that attract funds, nationally and internationally, could also help encourage and enable Pakistani local governments to adapt ahead of climate impacts as opposed to in their wake. Additionally, any provincial and federal legislation that are proposed to combat climate change directly or indirectly could also help advance adaptation priorities by providing additional financial support at the local level.

As the author indicates it is critical to understand that progress towards the learning and action for climate change adaptation in urban Pakistani local governments is likely to be incremental, rather than an overnight transformation. However, in the urban Pakistani local level context, learning and action for climate adaptation should not be ignored or disregarded. Climate change adaptation needs to be esteemed and incorporated into the local government level functions and the work life of the employees. Moreover, a process of learning and action for climate change adaptation at the urban local government level in Pakistan should be gradually strengthened to establish a clear adaptation paradigm, and planned as a voyage, or steady pursuit for evolving adaptation.

6.7 Summary

This Chapter (part-2 of Stage-II) examined the framing of key characteristics for climate change adaptation learning and action in the urban Pakistani local government context. In start, the Chapter analysed some initial scoping interviews. This analysis was then furthered by the primary data collated through a series of interviews with the City District Government of Lahore, as the chosen case study for this Stage of the research. These interviews were in-depth and semi-structured that examined conceptual evidence and findings in the urban Pakistani local government context. A total of 21 Pakistani professionals, working in a variety of roles for local governments, were subject to the interview process. The Chapter used an actor-based approach to examine some of the key conceptual ideas in the urban Pakistani local context. From a critical analysis of the real world evidence, the author identified six discrete characteristics that could be used to frame the context of climate change adaptation learning and action in the urban Pakistani local government context. These have been categorised as: leadership for adaptation, vision for

adaptation, culture for adaptation, good governance for adaptation, innovation and creativity for adaptation, and resources for adaptation.

The next Chapter will examine various adaptation efforts that local areas (local governments, municipalities, cities) have initiated around the globe, and test the above mentioned six key characteristics. This exercise will help understand how local areas are approaching climate change adaptation planning and how their experiences could present climate change adaptation options for the urban local governments in Pakistan. The transferable lessons would be the building blocks for a local level climate change adaptation strategy in the Pakistani context.

CHAPTER 7: LEARNING FROM EXPERIENCE: DERIVING LESSONS FROM LOCAL LEVEL ADAPTATION ACTIVITIES

7.1 Orientation to the Chapter

This Chapter explains the design for Stage-III of the research. Specifically, it outlines the methodology and research tools that the author used to generate data during this Stage of the research. Further, this Chapter presents and analyses the data generated from Stage-III of the research.

7.2 Background of Stage-II & Overview of Stage-III (part-1 and part-2)

In the previous Stage-II of this research, the author identified and discussed opportunities for climate adaptation learning and action in urban Pakistani local governments by making a comparison with some of the core learning organisation characteristics, spotlighting predominantly on those characteristics that were believed to be the most significant and pertinent to the Pakistani context. Thematic analysis of the data collected in Stage-II (in-depth interviewing of 21 Pakistani professionals related to the urban local governments) helped developing a model (change model for climate adaptation) comprising six different key elements that could bring about change in the context of climate adaptation learning and action within Pakistani urban local governments. As discussed earlier, this model for change encompassed six elements, including: leadership for adaptation, vision for adaptation, organizational culture for adaptation, good governance for adaptation, innovation and creativity for adaptation, and resources for adaptation.

Now in this Chapter (Stage-III, part-1 and part-2), the author goes beyond the analysis of a single case study experience to depict the assortment of adaptation efforts that local areas (local

governments, municipalities, cities) have initiated around the globe, and test those six key elements that were identified earlier in this research. This exercise (Stage-III, part-1 and part-2) helped understand how local areas (local governments, municipalities, cities) were approaching adaptation planning and how they could present climate change adaptation options (lessons) for urban local governments in Pakistan. The transferable lessons will be considered as the building blocks for a local level climate change adaptation strategy in the urban Pakistani local context.

7.3 Experiences from the Local Level Adaptation Actions in Different Parts of the World

The elements of the change model for climate change adaptation had been verified in Pakistani context by the data assembled in Stage II of the research. In order to assess the broad applicability of this model to local governments (cities, municipalities) where climate change adaptation had been already planned, and to gain insight into the range of climate change adaptation strategies (frameworks, plans), various climate adaptation actions around the globe were examined in this Stage. The search for these actions was carried out primarily through the Internet searches (via the Google search engine) as well as AdaptNet weekly publications (the author has been the editor of AdaptNet since November 2006; details about AdaptNet are given in Appendix K).

The author applied numerous key search words all through this exercise. In certain cases where English was not the working language of those local governments (cities, municipalities), similar translations of these key search words were also utilised. However, this linguistic restraint was rooted entirely on the author's capacity and capability to study and interpret the information attained in the Internet search. On the basis of their perceptible connection to the subject matter,

these preliminary findings for each search were then further scrutinised (details below). All these searches were made between June and September 2009.

The results indicated that the building and execution of climate change adaptation strategies (frameworks, plans) for local areas (local governments, municipalities, cities) were still at an early phase. Specifically, the author found 10 local areas (local governments, municipalities, cities), corresponded to both developed and developing countries, to be at the forefront in climate change adaptation actions. Symbolising the global south were the adaptation learning and action initiated by:

(1) Albay (Philippines)

(2) Cape Town (South Africa)

(3) Durban (South Africa)

From the global north, local areas (local governments, municipalities, cities) included:

(1) Chicago (USA)

(2) London (UK)

(3) Washington (USA)

(4) New York (USA)

(5) Boston (USA)

(6) Halifax (UK)

(7) Vancouver (Canada)

A few of the above mentioned local areas seemed to be at the forefront, even these have had only started analysing climate impacts and identifying adaptation options in the past few years. However, some common themes (lessons) related to the learning dimension of adaptation could be taken out from the know-how and practice of these early local areas working on climate change adaptation action.

In the first part of this Chapter (Stage-III, part-1), the author examined (through primary data) those local areas that were located in Asia and Africa (relatively closer to the Pakistani context) to find any transferable lessons. The lessons from the know-how or practice of these various local areas were considered to support the structure or process for adaptation planning in urban Pakistani local governments. Hence, three local areas were included in the first section of this chapter (Stage-III, part-1):

(1) Albay (Philippines)

(2) Cape Town (South Africa)

(3) Durban (South Africa)

The rationale for selecting these three case areas was:

(1) These were some of the first Asian and African local areas (local governments, municipalities, cities) that to date had established (or establishing) a local level adaptation process to respond to climate change; and

(2) Primary data required for this Stage of research was thought to be available from the key persons for these areas through author's personal contacts via AdaptNet weekly publications.

However, the author also considered that the nature and type of ‘content’ would also be the cornerstone for any effective climate adaptation planning and implementation action in urban Pakistani local governments. Therefore, in the second part of this Chapter (Stage-III, part-2), he also made an attempt to develop more insight (through secondary data) about the specifics of adaptation plans using publicly available local adaptation strategies (frameworks, plans) from the 10 identified local areas (local governments, municipalities, cities). The lessons obtained from this exercise would support the ‘content’ for adaptation planning in urban Pakistani local governments.

7.3.1 Experiences Supporting the Structure or Processes for Adaptation Planning (Stage-III, part-1)

Local areas (local governments, municipalities, cities), around the globe, have begun climate change adaptation planning and action without consideration of their nationwide frameworks being prepared (Smith et al., 2010). The author is of the view that these initial actions or practices are required to be examined and documented before suggesting any climate change adaptation actions for urban Pakistani local governments. Utilising the experiences of the selected local areas (Albay, Cape Town, Durban), this section initially exhibits a comparative analysis of the current (up to the year of 2010) efforts for climate change adaptation planning in these local areas in connection with some of inter-linked questions that the author considered vital to be answered.

The three local cases in this section provide variety in three dimensions, by:

(1) Climate zones;

(2) Political/administrative settings; and

(3) Current conditions of work on climate adaptation planning and action.

Nonetheless, they all are large local areas that can be expected to advance their climate change adaptation actions in the future as well. With the aim of evaluating their current climate change adaptation planning actions, the author selected three criteria by which to consider their similarities and dissimilarities in planning processes and structures. These criteria were:

(1) Background information;

(2) Drivers of climate change adaptation planning (focusing on the six elements of the change model for climate change - leadership for adaptation, vision for adaptation, organizational culture for adaptation, good governance for adaptation, innovation and creativity for adaptation, and resources for adaptation); and

(3) Adaptation strategy - steps involved and mechanisms used.

By examining these three case examples, this Stage (Stage-III, part-1) helped test the key elements of the change model for climate adaptation that were identified earlier in this research. Also, as stated earlier, this exercise suggested some transferable lessons supporting the processes for designing a local level climate adaptation strategy for urban local governments in Pakistan.

7.3.1.1 Details of Questionnaire Survey (Stage-III, part-1)

A questionnaire was designed (Appendix L) and administered to those members of the above mentioned three local areas who could be identified as having an involvement in climate change adaptation planning and action in their areas. Therefore, the following seven professionals (experts) were identified for part-1 of Stage-III of this research;

(1) Albay (03 persons);

(2) Cape Town (03 persons); and

(3) Durban (01 person).

The above mentioned participants were selected as a result of:

(1) The review of adaptation literature related to Albany, Cape Town, and Durban; and

(2) Discussions with the author's PhD supervisors.

As the responses were not meant to be a representative sample but were the part of a process to collect information at a broader level, this small sample provided sufficient responses for that purpose. The scale and length of the questionnaire was kept to a minimum. In accordance with the criteria as described above, the questionnaire was also divided into three sections, including:

(1) Section-I: The general background information;

(2) Section-II: Drivers of climate change adaptation planning (focusing on the six elements of the change model for climate change - leadership for adaptation, vision for adaptation, organizational culture for adaptation, good governance for adaptation, innovation and creativity for adaptation, and resources for adaptation); and

(3) Section-III: Adaptation strategy and mechanisms used.

Specifically, three focal questions were asked during the questionnaire survey:

(1) First, (Section-I) what is the background of your local area for which climate adaptation strategy (framework, plan) has been developed?

(2) Second, (Section-II) what aspects and/or elements were considered critical in guiding the development of your local level adaptation strategy (framework, plan), and what were their relevance to the elements of the change model for climate adaptation proposed in

this research? Here the respondents were requested to select from options provided and, to allow individual options, a further category of “other” was also provided.

(3) Third, (Section-III) what mechanisms and/or tools were prescribed and used in your local adaptation strategy (framework, plan)?

During the month of October 2009, the questionnaires were disseminated by email. The body of the email explained the purpose of the survey, and provided instructions on ‘how’ and ‘who’ should complete the questionnaires. The respondents were asked to return the questionnaires back to the author through email replies. Through this process, the author gained information (at a broader level) to derive lessons from the current local level climate change adaptation activities in these local areas (Albay, Cape Town, Durban). As mentioned earlier, a total of seven respondents took part in the questionnaire survey, including: three respondents from Albay (Philippines); three respondents from Cape Town (South Africa); and one respondent from Durban (South Africa). However, as the responses were not meant to be a representative sample but were the part of a process to collect information at a broader level, these returns provided sufficient responses for that purpose.

7.3.2 Data Analysis and Discussion (Experiences Supporting the Structure or Processes for Adaptation Planning)

This section (Stage-III, part-1) is a synthesis of findings of the comparative analysis based on the responses received from the questionnaire survey. Following the criteria and the structure of the questionnaire itself, the analysis also contains three sections:

(1) First, on the basis of the responses received, the background information has been discussed about the selected cases such as population, administrative bodies executing the adaptation strategies (frameworks, plans), and the existence of nation-wide and/or

local adaptation frameworks, strategies and action plans. Here, the author not only attempted to draw attention to the diversity, but also some mutual connecting themes between these three cases. This section also elucidated the particularised exposure of these local areas to climate change impacts, presenting the climate related trends and existing local driving forces;

(2) In the second section of the analysis, the author turned to adaptation planning processes and looked at (on the basis of responses received), what adaptation planning processes these local governments/cities used; what motivated them to start adaptation action; what were the key drivers of change for climate adaptation in their local areas; and what were their relevance to the elements of the change model for climate adaptation proposed in this research; and

(3) The third section discussed about mechanisms that were identified and used in these three local areas to implement adaptation strategies or plans. It also brought to light the primary players engaged with the adaptation processes in these three local areas.

Finally, the author provides the synthesis across all three cases of some options that could inform adaptation planning and action in urban Pakistani local governments. It also pulls out some transferable lessons for designing a local level climate adaptation strategy in Pakistani context.

The summary data on the basis of individual responses for each section of the questionnaire are provided in Appendices M, N and O.

7.3.2.1 Section-I: Background Information about the Selected Cases

General Background of Albay (Philippines)

Albay is located in the Bicol Region in Luzon - between the provinces of Camarines Sur on the north and Sorsogon on the south (Albay Provincial Disaster Coordinating Council, 2009). It is bounded by the Lagonoy Gulf and Camarines Sur on the north-northwest; the Pacific Ocean on the east; the province of Sorsogon on the south; and the Buriyas Pass on the southeast (MICRODIS, 2009). Albay has a land area of 2,550 square kilometres (Albay Provincial Disaster Coordinating Council, 2009). About 50% of its total land area is mainly devoted to agriculture – with coconut and coco-based products as its major commodities, followed by corn and rice (MICRODIS, 2009). As of May 2000, Albay has a total population of about 1.2 million, which makes it the 22nd most populous province in the country (Albay Provincial Disaster Coordinating Council, 2009). The details of Albay's climate and recent natural disasters are summarised in Appendix P.

General Background of Cape Town (South Africa)

Cape Town is the second most populous city in South Africa, forming part of the metropolitan municipality of the City of Cape Town (City of Cape Town, 2009). According to the official website of City of Cape Town (2009), it is the provincial capital of the Western Cape, as well as the legislative capital of South Africa. Cape Town is famous for its harbour as well as its natural setting in the Cape floral kingdom, including such well-known landmarks as Table Mountain and Cape Point. The map of Cape Town as well as its climate information has been mentioned in Appendix Q.

General Background of Durban (South Africa)

Durban is the third most populous city in South Africa, forming part of the eThekweni metropolitan municipality (City of Durban, 2009). City of Durban (2009) indicates that Durban is famous as the busiest port in Africa. It also indicates that Durban is a major centre of tourism due to the city's warm subtropical climate and beaches. According to a 2007 survey, the city has a population of almost 3.5 million (City of Durban, 2009). Durban's land area of 2,292 square kilometres is comparatively larger than other South African cities, resulting in a somewhat lower population density of 1,513 inhabitants per square kilometre (3,918.7/sq mile) (Wikipedia, 2009). The Durban's map and its climate details are summarised in Appendix R.

Section-I: Comparative Study – Specific Background Information about the Selected Cases

The responses received for this part of the questionnaire survey indicate that across these three local case areas, population varies between 1.2 million (Albay) to 3.5 million (Cape Town and Durban). These three case areas have a commonality that these are all densely inhabited and correspond to large urban clusters. On account of their varying average annual rainfalls, average annual temperatures and physical locations, the climatic zones for these three case areas varies from tropical climate in Albay with subtropical climate in Durban (very hot, humid summers and mild to warm winters), and to Mediterranean climate in Cape Town.

The responses collected pointed-out that, with Durban and Cape Town being coastal locations and Albay being mainly located in a non-coastal area, the study provides an opening to examine climate change adaptation strategies that are planned both for coastal and urban areas. So, these three local areas would not only be influenced by the sea level rise, but would also have an effect by other elements (or factors), such as: disasters (volcanic eruption, typhoons), temperature rise, precipitation changes, and extreme events (storms, floods).

According to the questionnaire responses received from Albay, Cape Town and Durban, no approved national level climate change adaptation strategies (frameworks, plans) exist in their respective countries. However, the local areas of Albay, Cape Town, and Durban have on their own initiated local climate change adaptation actions. One of the respondents from Albay reported that their climate change adaptation plan was approved in August, 2007 and the Centre for Initiatives and Research on Climate Change Adaptation (CIRCA) was currently implementing it with the help of different stakeholders. Similarly, one of the respondents from Cape Town intimated that on the desire of the City of Cape Town, some local researchers and academics developed a framework for climate change adaptation action for their city in 2006, but the final version of their framework was still being prepared. The questionnaire response from Durban indicated that one of their local municipal officials developed the necessary measures for designing an adaptation strategy for Durban (titled as, Headline Adaptation Strategy) in 2006. However, at present, various sector specific municipal climate change adaptation plans were still being developed in Durban.

One of the questions of the questionnaire survey in Section-I (background information) of Stage-III (part-1) was to analyse how concerned the local areas of Albay, Cape Town and Durban were about issues (such as, water, public health, energy, ecosystem, and human settlement) in relation to adapting to climate change. The collected responses in this question indicate that all the respondents from Albay considered that their local government was currently “very concerned” or “concerned” about the impacts of climate change in “water”, “human settlement” and “public health” sectors. However, respondents from Cape Town considered “energy”, “water”, “ecosystem” and “public health” areas that their city government was “very concerned” or “concerned”. The respondents from Cape Town also considered “human settlement” – an area where their city government was “slightly concerned” to deal with it in relation to climate change

impacts. Similarly, the respondent from Durban considered that EThekweni Municipality (Durban's municipality) was "very concerned" or "concerned" about the impacts of climate change in "water", "energy", "human settlement" "ecosystem" and "public health" sectors.

The questionnaire responses also revealed that all three case areas were likely to cope differently with the major stresses on water availability in response to climate change. The specific apprehensions were:

(1) Shortage of water supply

(2) Contamination of water

(3) Infiltration of salt water

(4) More demand for water, and

(5) Increasing reliance on various external water supply means.

As two of the respondents from Cape Town and one respondent from Durban noted that in the case of both Cape Town and Durban there were unequivocal signs of potential future differences (or conflicts) between various social sectors and community clusters due to climate change. The health sector effects due to climate change were another worry that existed in almost all three case areas. In general, this was due to the air pollution (Albay), and effects of increasing temperatures and the vector-borne diseases (Albay, Cape Town and Durban). The questionnaire responses revealed that in Cape Town and Durban, two increasing concerns were coastal as well as inland flooding. This could have many implications, directly or indirectly, on various settled groups, and could create severe problems and discontinuities in various urban social services of these areas. The respondents from Albay also indicated that their area was highly vulnerable to natural disasters specifically to typhoons and volcanic eruption, flash floods and mudslides.

Albay already deals with the quandary of people living in hazard zones and vulnerable areas. Hence, local government of Albay has established various resettlement areas to cater for the victims of natural disasters. As a primary knock-on effect, higher energy demand was also identified as one of the main issues in Cape Town and Durban.

The collected responses for this section of the questionnaire survey indicate that the in-land migration to critical areas and associated land use changes are one of the main issues in these three case areas. Another major factor came out from the questionnaire responses for this section was the presence of exceedingly unjust (in relation to various climate-related risks) across communities and areas in all three case areas, which could enhance further vulnerabilities there. The questionnaire responses also indicate that climate change related effects do not just revolve around coastal areas, but these are also evident in non-coastal areas as well. Overall, the responses received from all three case areas for section-I of the questionnaire survey (Stage-III, part-1) highlight a common theme indicating that various local conditions strengthen the likely impacts of climate change in an urban local area (local government, municipality, city).

In conclusion, one of the key transferable lessons from the responses received for this section (Stage-III, part-1) is that the effects of climate change require to be examined with reference to underpinning various local settings and related elements.

7.3.2.2 Section-II: Drivers of Adaptation Planning

In this section of the questionnaire survey, the author was interested to understand what factors have been important in guiding the development of the local climate change adaptation strategies (frameworks, plans) in all three case areas. To help understand this, respondents' views were sought about the elements of the change model for climate adaptation (leadership for adaptation,

vision for adaptation, organizational culture for adaptation, good governance for adaptation, innovation and creativity for adaptation, and resources for adaptation) in section-II of the questionnaire survey.

As noted by Yin (1994), the purpose of developing a procedure for case study research is to make certain future imitation of the methodology and ensure reliability of the research. It also permits other investigators to follow the methodology and then to identify any discrepancy within the findings (Yin, 2003). As Urbano and Toledano (2009), Shipman (1997), Yin (1994), and Eisenhardt (1989) all argue that preparing a procedure is essential in multiple case study design. Consequently, the author developed a procedure in the questionnaire design that provided a basis for the analysis of the results (Table 7.5), and which that encompassed the following two steps:

- (1) Firstly, a research statement for each of the six elements of the change model for climate adaptation was developed. The respondents were asked to indicate if they agreed or otherwise with those statements; and*
- (2) Secondly, if agreed, the respondents were given space to explain those elements (follow-up information) in relation to their local area's experience that they felt had been important in guiding the development of their local climate adaptation plans.*

<i>Elements of the Change Model for Climate Adaptation</i>	<i>Research Statement</i>	<i>Agree/ Disagree</i>	<i>Explain the characteristic in relation to your area (Follow up information)</i>
Leadership for adaptation	To initiate/implement any adaptation plan, local governments/city governments/municipalities need an appropriate and effective <i>leadership</i> , one that facilitates and/or empowers stakeholders and enables them to learn, develop and implement various climate adaptation actions.	Yes/No	If yes, can you please tell me how leadership manifested in your local government /city government / municipality that guided the development of local adaptation plan? Also, explain who were those leader(s) / champion(s), what did they do; how they initiated the local adaptation plan/adaptation process?, etc.
Vision for adaptation	To initiate/implement any adaptation plan, local governments/city governments/municipalities need a <i>vision</i> (for direction and guidance), based on some principles, that is both commonly held and defined by all staff members.	Yes/No	If yes, can you please tell me how your local government / city government / municipality's vision helped bringing change in the context of climate adaptation learning and action? Also, please explain the vision; guiding principles, etc.
Culture for adaptation	To initiate/implement any adaptation plan, local governments/city governments/municipalities need an <i>organisational culture</i> (process) that not only supports but, values and encourages learning and action for climate adaptation.	Yes/No	If yes, can you please tell me what type of culture your local government / city government / municipality demonstrated that helped bringing change in the context of climate adaptation learning and action?
Good governance for adaptation	To initiate/implement any adaptation plan, local governments/city governments/municipalities need characteristics of <i>good governance</i>	Yes/No	If yes, can you please tell me how each of the good governance components relates to, and helped, implementing

	(devolution and independence; answerability and transparency; responsiveness and flexibility; participation and inclusion; and experience and support) that support effective climate adaptation learning and action.		climate adaptation learning and action in your local government/city government/municipality?
Innovation and creativity for adaptation	To initiate/implement any adaptation plan, local governments/city governments/municipalities need to establish enabling conditions and then identify local area specific climatic impacts, risk and vulnerability assessments, and develop adaptation strategies to maximize the use of their staff's innate <i>innovation and creativity</i> .	Yes/No	If yes, can you please tell me how your local government/city government/municipality is making the best use of the staff's innate innovation and creativity for climate adaptation learning and action?
Resources for adaptation	To initiate/implement any adaptation plan, local governments/city governments/municipalities need to be <i>funded sufficiently</i> by the internal (federal and/or provincial governments) and external (international donors) bodies.	Yes/No	If yes, can you please tell me what impact, if any, have funding constraints had on your local government/city government/municipality's ability to carry out its adaptation activities?

Table 7.1: Procedure in the Questionnaire Design

Similar to the 2-step procedure developed in the design of the questionnaire survey for this part (section 7.3.2.2; 2nd paragraph), a two-step methodology was also used to analyse the questionnaire findings:

- (a) *First, the comments from respondents (related to each element of the change model for climate adaptation) were highlighted;*
- (b) *Second, each of the elements was discussed separately on the basis of the comments received.*

This provided a clearer understanding of the ‘reality’ of all the three local areas (local governments, cities, municipalities), and helped understand what factors have been important in guiding the development of their local level adaptation strategies (frameworks, plans).

Leadership for Adaptation

One of the most important features to appear from the questionnaire survey was a high level of importance given to this element. All the respondents (7 out of 7) indicated that the theme of effective leadership for climate change adaptation learning and action was highly valued in their urban local context.

Specifically, the respondents were asked:

“Can you please tell me how leadership manifested in your local government / city government / municipality that guided the development of a local adaptation plan? Also, explain who were those leader(s) / champion(s), what did they do; how they initiated the local adaptation plan/adaptation process, etc.”

Case-1: Albay (Philippines)

Amongst the respondents of Albay (Philippines) there was a general level of agreement that the leadership for climate change adaptation in Albay was strong, strategically focused, and participatory. In Albay, the leadership at the higher level of local government was enthusiastic to start and move forwards their climate change adaptation learning and action. As one of the respondents noted:

“At the initiative of the Governor, Albay has a strong drive to address climate change. Also, several of his staff has an understanding about the climate change and the vulnerability of Albay to present and future climate risks.”

So, in Albay's case the analysis is that the presence of an 'adaptation leader' is very essential. It could be a governor or mayor of that local area.

Case-2: Cape Town (South Africa)

All three respondents from Cape Town showed a high level of importance to this element of the change model for climate adaptation. One of the respondents from Cape Town mentioned:

“There was an individual - (public servant) - with experience in mitigation who was aware of adaptation issues and commissioned a framework for climate change adaptation study.”

This indicates that an 'adaptation leader' could also be a public servant working at the municipal level who enthusiastically advances efforts to enhance community resilience to climate change.

Case-3: Durban (South Africa)

The respondent from Durban noted:

“The initial climate adaptation initiatives in Durban were owing to the work of one of its employees (again a public servant), who was dedicated as well as eager to explore this area, and she initiated developing the Durban's first adaptation strategy.”

So far, adaptation efforts carried out in Durban demonstrate how progressive and forward-looking local public servants can assist their local areas (local governments, municipalities, cities) becoming more resilient to climate change impacts. The responses indicate that Durban designed its first climate change adaptation strategy under the guidance and advice of its deputy head of environmental management department to underscore how Durban's local sectors should start responding to unavoidable climate change. Most importantly, Durban incorporated climate change into its long-term city planning, addressing the vulnerability of key sectors such as health,

water and sanitation, coastal infrastructure, disaster management and biodiversity. Hence, the case of Durban also indicates that the departmental leaders (local government or municipal staff) can help stimulate public interest in local climate adaptation learning and action.

A Summation of the Comments on Leadership for Adaptation

Overall, the perceptions of the questionnaire respondents for the first element of the change model for climate adaptation indicate that a key ingredient for successfully learning and implementing adaptation is the presence of effective ‘leadership’ at the local level that is enthusiastic to advance adaptation objectives further - in other words presence of a local adaptation champion.

A local climate change adaptation leader could be the head of a local area from the political domain, or any other public functionary who is eager and committed to initiate and advance its local adaptation agenda. Getting the backing of a high profile political or public employee can boost attention and awareness of broad community in adaptation learning and action. As one of the respondents from Albay suggested:

“Get an elected local official or public servant on board as sponsor of adaptation actions. Even if they are not very energetic, they will assist.”

Vision for Adaptation

The questionnaire responses from Albay and Durban are more consistent for this element of the change model for climate adaptation as all of the four respondents from these two areas felt the need for a vision for initiating climate change adaptation learning and action. However, two out of three respondents from Cape Town viewed that there was no need for vision. The respondents were given additional space for explanation, but they did not explain the reason for not supporting this element. However, even with this divergence of views, the responses still give a

very respectable level of support (five out of seven) for this element of the change model for climate adaptation.

Specifically, the respondents were asked:

“Can you please tell me how your local government / city government / municipality’s vision helped bringing change in the context of climate adaptation learning and action? Also, please explain the vision; guiding principles etc.”

Case-1: Albay (Philippines)

All three respondents from Albay showed a high level of importance to this element of the change model for climate adaptation.

One of the respondents from Albay mentioned:

“The Provincial Government of Albay believes that climate change is real and that it threatens the existence of man-from his ecosystem to his livelihood production, even up to his cultural heritage. It is a major hindrance to the attainment of the United Nations’ Millennium Development Goals (MDGs) and the Human Development Index (HDI), making the alleviation of poverty much harder to be done. Moreover, with the leadership & vision of the Governor, they believe that climate action is a politically feasible platform for governance and that it is an investment with huge economic returns, thus they align their climate action with the MDGs.”

So, in this case it appears that the vision of Albay is in fact embedded into the strategic plans and acts as a series of principles to guide people's behaviour for climate change adaptation learning and action.

Case-2: Cape Town (South Africa)

As mentioned earlier, two out of three respondents did not agree with the statement that local governments / city governments / municipalities need a vision in order to initiate and implement any adaptation plan. The respondents were given additional space for explanation, but they did not explain the reason for not supporting this element. However, one of the remaining respondents from Cape Town thought:

“Because of the climate change threats and extreme events the city of Cape Town responded and developed a vision of survival in a warmer world.”

Hence, this response indicates that adaptation actions or activities could be planned on the basis of learning from current and past climate inconsistency and extreme events.

Case-3: Durban (South Africa)

The respondent from Durban noted:

“Durban designed its strategy that established a direct linkage of climate change to its various municipal departments, and identified the climate change impacts on various key sectors such as human health, urban infrastructure, water, business, coastal areas and agriculture. In this strategy, Durban in fact integrated climate change considerations into its numerous planning actions that ultimately helped bringing change in the context of climate adaptation.”

So, in this case the presence of a vision is important, and one of the guiding principles for local areas (local governments, municipalities, cities) could be to plan the climate change adaptation activities (learning and action) within the on-going planning and development programs, because climate change adaptation activities take place at different scales within the local areas.

A Summation of the Comments on Vision for Adaptation

The author examined views of the questionnaire respondents for this element of the change model for climate adaptation, which indicate that another important element for successfully learning and implementing climate change adaptation is the presence of 'vision' at the local government, city and/or municipality level.

In the case of climate adaptation learning and action at the urban local level (local government, municipality, city), the respondents suggested that the vision could be based on some guiding principles, including:

- (1) Adaptation activities should be planned on the basis of learning from current and past climate inconsistency and extreme events (on the basis of responses from Cape Town);*
- (2) Adaptation activities (learning and action) should be planned within the on-going planning & development programs (on the basis of responses from Durban); and*
- (3) Adaptation activities (learning and action) should take place at different scales within the urban local areas (local governments, municipalities, cities) with the help of local residents (on the basis of responses from Albay).*

The author considers that once the vision for climate adaptation learning and action at any local government, municipality, or city is formulated, strategies to adapt to climate change can then be developed straight-forwardly.

Culture for adaptation

The support for the third element of the change model for climate adaptation was also very high. Six out of seven respondents considered that in order to initiate or implement any adaptation strategy (framework, plan), local areas (local governments, municipalities, city governments) need an organisational culture (process) that not only supports but, values and encourages learning and action for climate adaptation. This number (six out of seven) is a very strong indicator of the overall agreement for this element of the change model for climate adaptation.

Specifically, the respondents were asked:

“Can you please tell me what type of culture your local government / city government / municipality demonstrated that helped bringing change in the context of climate adaptation learning and action?”

Case-1: Albay (Philippines)

Overall, all three respondents from Albay indicated that Albay’s Government has set up a novel set of interdisciplinary and multi-sector initiatives to make certain that a cultural change could be attained for climate adaptation learning and action.

One of the respondents from Albay clearly stated:

“The Albay’s Government through CIRCA (Centre for Initiatives and Research on Climate Adaptation) employs a holistic strategy that embraces different

organizations in various fields of discipline and interest, such as in the arts and culture, academe, religion, agriculture, and sciences. Through consolidation of interdisciplinary and multi-sector initiatives, consultation, dialogues, seminars, and wide range of fora from inter-agency to multi-stakeholder communication and information, the province will be able to meet its climate adaptation objectives.”

There are two common themes that emerge from the response of Albay:

- (1) The first is that the organisational culture of Albay was not especially supportive for adaptation learning and action in start;*
- (2) The second is that Albay initiated some novel set of actions (e.g. establishing an institution for this purpose – CIRCA (Centre for Initiatives and Research on Climate Adaptation); consultation, dialogues, seminars, and wide range of forums for inter-agency to multi-stakeholder communication and information; and involving academics for mainstreaming adaptation into the educational curricula), so that a culture can be attained for climate adaptation learning and action in Albay.*

Case-2: Cape Town (South Africa)

As mentioned earlier in the start of discussing this element, one of the respondents from Cape Town was not in agreement with the statement that local areas (local governments, municipalities, cities) need an organisational culture that not only supports but, values and encourages learning and action for climate adaptation. Again, the respondents were given additional space for explanation, but the respondent who did not agree with this element of the change model for climate adaptation did not provide any reason for not supporting this statement. However, even with this one divergence of view, other responses received from Cape Town still

give a very respectable level of support (two out of three) for this element of the change model for climate adaptation.

One of the respondents from Cape Town noted:

“Increased awareness amongst local leadership of climate change has lead to an increased understanding of the importance of a sustainable future within the context of a changing world and greater risk; this has built up a culture for adaptation work in Cape Town.”

Case-3: Durban (South Africa)

The respondent from Durban thought:

“Culture is important - it influences the way in which staff proceed (or is encouraged to proceed) for achieving adaptation goals. Also, I feel climate change adaptation actions have a strong connection with the social norms of a particular area.”

So, in the case of Cape Town and Durban views support the presence of an organisational culture as an important ingredient for climate adaptation learning and action. The views suggest that to build up an apposite organisational culture (one that encourages, supports and gives value to learning and action for adaptation) will first require a paradigm shift of those who show the way – leaders - before that a new paradigm could be rooted into the whole local area (local government, municipality, city).

A Summation of the Comments on Culture for Adaptation

Overall, the majority of respondents (six out of seven) showed a high degree of support for this element of the change model for climate adaptation. They were of the view that the urban local governments, municipalities, or city governments working in different parts of the world have an exclusive and exceptional organisational culture. It is the culture that influences the way in which

staff working at local level proceeds or is encouraged to proceed, corresponding to achieving the organizational aims for adaptation learning and action. There was another view that climate change adaptation learning and action have a strong connection between the ethics, customs and actions of a particular local area. Albay's response indicate that to build up an apposite organisational culture, one that encourages, supports and gives value to learning and action will first need a paradigm shift of those who show the way (leaders) before that new paradigm could be established. Hence, the development of an apposite organisational culture for climate change adaptation in any local governments would need more than just time, but the setting up of an entirely novel set of collective actions or initiatives to make certain that this change can be attained.

Good Governance for Adaptation

This element of the change model for climate adaptation (as with Leadership, Vision, and Culture) also received a high level of support from all three case areas. Of the seven respondents, six of them considered that in order to initiate or implement any adaptation plan, local areas (local governments, municipalities, cities) need characteristics of good governance (devolution and independence; answerability and transparency; responsiveness and flexibility; participation and inclusion; and experience and support) that support effective climate adaptation learning and action. The level of consistency for this element of the change model for climate adaptation amongst respondents shows its credibility as well.

Specifically, the respondents were asked:

“Can you please tell me how each of the good governance components (devolution and independence; answerability and transparency; responsiveness and flexibility; participation and inclusion; and experience and support) relates

to, and helped, implementing climate adaptation learning and action in your local government/city government / municipality?”

Case-1: Albay (Philippines)

All three respondents from Albay showed a high level of agreement to this element of the change model for climate adaptation.

One of the respondents from Albay mentioned:

“I think quality of local government matters a lot for climate adaptation learning and action.”

So, in the case of Albay the view is that the quality of government especially at the local level (local government, municipality or city level) has potentially significant impact in the context of climate adaptation learning and implementation of adaptation strategies.

Case-2: Cape Town (South Africa)

As mentioned earlier in the start of discussing this element, one of the respondents from Cape Town was not agreed with the statement that in order to initiate or implement any adaption strategy (framework, plan), local areas (local governments, municipalities, cities) need characteristics of good governance that support effective climate adaptation learning and action. Again, the respondents were given additional space for explanation, but the respondent who was not agreed with this element of the change model for climate adaptation actually did not provide any reason for not supporting this statement. However, both other respondents from Cape Town were agreed with this statement, as they thought that their City of Cape Town was trying to establish elements that the author had raised.

Case-3: Durban (South Africa)

On this element of the change model for climate adaptation, the respondent from Durban commented:

“Please keep in mind that the extent to which urban local governments or cities are able to provide residents with climate resilient infrastructure and strategies is in fact reliant on the local government’s capacity and capability.”

A Summation of the Comments on Good Governance for Adaptation

All views from the questionnaire respondents regarding this element of the change model for climate adaptation (good governance for adaptation) were examined, which indicate that almost all respondents considered that one of the important elements (amongst others) for successfully learning and implementing adaptation is the presence of ‘good governance’ at the local government, municipality, or city level. As discussed earlier in this thesis (Chapter 5), attributes of good governance include:

- (1) Devolution and independence;*
- (2) Answerability and transparency;*
- (3) Responsiveness and flexibility;*
- (4) Participation and inclusion; and*
- (5) Experience and support.*

The respondents from Albay considered that in the context of climate change adaptation learning and implementation of adaptation strategies, the quality of government especially at the local level has potentially significant impact. The literature also supports these views. As Huq et al (2007: p.6) consider that in well governed cities ‘good provision for storm and surface drainage can easily be built into the urban fabric, along with complementary measures to protect flooding’.

Also, Huq et al (2007: p.6) consider that ‘in poorly governed cities this does not happen, and it is common for buildings and infrastructure to be constructed that actually disrupt drainage channels’. This indicates the essential role of local public sector in facilitating adaptation learning and action to climate change. Nonetheless, little of the current literature on learning for adaptation has attempted to identify the general factors relevant to better adaptation performance at the urban local level. The respondent from Durban pointed out to the importance of local government’s ‘capacity’ and ‘capability’. These elements are also consistent with what has been argued by Devas (2001) that the degree or level to which urban local areas (local governments, municipalities, cities) are capable to supply poor communities with climate resilient infrastructure and facilities is dependent on two aspects: first, on the local government’s capacity and capability to fulfil their responsibilities – this could also depend on good connections with higher levels of government - and secondly on the responsiveness of local governments to the requirements of poor communities.

Innovation and Creativity for Adaptation

Once more, the questionnaire responses for this element of the change model for climate adaptation (innovation and creativity for adaptation) indicated that the support for ‘innovation and creativity’, both individual and case wise was very high, demonstrating a high degree of credibility for this element. Six out of seven respondents showed support for this element of the change model for climate adaptation. The majority of respondents viewed that the local areas (local governments, municipalities, cities) are needed to establish enabling conditions first by use of their staff’s innate innovation and creativity, and then they could identify local area specific climatic impacts, risk and vulnerability assessments, and develop adaptation strategies.

Specifically, the respondents were asked:

“Can you please tell me how your local government/city government/municipality is making the best use of the staff’s innate innovation and creativity for climate adaptation learning and action?”

Case-1: Albay (Philippines)

Again, all three respondents from Albay showed a high level of importance to this element of the change model for climate adaptation (innovation and creativity for adaptation).

One of the respondents from Albay stated:

“Albay has started many innovative programs including: creation of CIRCA (Centre for Initiatives and Research on Climate Adaptation); bringing together various local sectors for adaptation actions; and initiating various interdisciplinary and multi-sector initiatives.”

Case-2: Cape Town (South Africa)

While there was one divergence of views in the case of Cape Town, there were still some important points made. For example, one of the respondents having not supportive views about this element of the change model for climate adaptation said:

“Individuals can still drive a plan if the government as a collective has not established enabling conditions through innovative ideas.”

However, another respondent from Cape Town commented:

“I am agreed with this element of the change model for climate adaptation, which is very important. However, we are still trying to establish enabling conditions.”

This is the reason we are not yet successful in implementing adaptation strategies through some action plan.”

Case-3: Durban (South Africa)

The respondent from Durban stated:

“I consider that ‘innovation and creativity’ is essential for climate adaptation learning and action. However, in the case of eThekweni Municipality we have a limited number of staff with extra work load on them. This is becoming a big hurdle for any innovation and creativity for adaptation in Durban.”

A Summation of the Comments on Innovation and Creativity for Adaptation

The most important theme to emerge is that with an effective leadership (as in the case of Albay) many innovative actions could be planned and implemented in order to move adaptation learning and action agenda forward within any local area (local government, municipality, city). Albay’s leadership considered that the peril of the changing climate had already begun that could affect every unit of the society in their area as well. So, they felt the necessity to establish some climate change adaptation programs especially designed to address the diverse needs of their area to sustain progress in the onset of environmental degradation. With this, CIRCA (Centre for Initiatives and Research on Climate Adaptation) was created in Albay, making it the founder LGU (local government unit) initiative in the Philippines and the Asia-Pacific region that deal both with climate adaptation and mitigation. The responses from Albay indicate that the Government of Albay was the first to take this paradigm shift from the usual local government operations to climate adaptation actions. Not only that the establishment of CIRCA is, in itself, already an innovative venture, it’s (CIRCA) strategies are groundbreaking as well. Albay’s scope of operation related to adaptation, for instance, encompasses almost all sectors of the area - from academic institutions to religious organizations, from scientific communities to cultural and

artistic groups, from community and indigenous workers to public intellectuals. One of the respondents from Albay informed the author telephonically that the foremost in their climate change adaptation innovativeness is in the areas of education, public information, and creative communication. He added that, through the efforts of CIRCA (Centre for Initiatives and Research on Climate Adaptation), climate change adaptation and mitigation measures, along with environmental awareness, are also now being integrated into the academic curricula of the primary and secondary schools in Albay. This innovation is noteworthy as climate adaptation learning is being integrated to all basic subjects in the elementary and secondary levels for better adaptation action in Albay.

Resources for Adaptation

Like Leadership, it will be fair to state that this last element of the change model for climate adaptation (Resources for Adaptation) was also not at all contentious one. All respondents (seven out of seven) showed a high degree of support for this element. They considered that the local areas (local governments, municipalities, cities) need to be funded sufficiently by the internal (federal or provincial governments) and external (international donors) bodies, so that they could initiate, as well as implement, any adaptation learning and action plans.

Specifically, the respondents were asked:

“Can you please tell me what impact, if any, have funding constraints had on your local government / city government / municipality’s ability to carry out its adaptation activities?”

Case-1: Albay (Philippines)

In relation to this element of the change model for climate adaptation (resources for adaptation), all three respondents from Albay indicated that Albay's Government allocated sufficient funds for climate change adaptation learning and action.

One of the respondents from Albay stated:

“The governor believes that the budget is the best articulation of public policy and is an instrument for its execution, thus, the government of Albay allocate an appropriate amount of funds for its climate change adaptation learning and action programs from the regular allocation from the annual provincial budget (IRA); access to calamity fund for the operations; and intermittent but steady flow of National Government Agencies, Non-government Organizations; and International Organizations for capacity building and training.”

Case-2: Cape Town (South Africa)

The most obvious theme to recur in Cape Town was the impact that a lack of funding has on adaptation learning and action, with all three respondents from Cape Town commenting on this issue.

For instance, one of the respondents from Cape Town noted:

“Limited funding is putting huge constraints on our municipality to work more effectively on adaptation plans.”

Another respondent from Cape Town noted:

“We have had a cut in financial resources for climate change.... which has meant less work on adaptation as well.”

Similarly, one other respondent from Cape Town observed:

“Funding cuts in Cape Town have certainly impacted on adaptation planning and actions.”

Case-3: Durban (South Africa)

Like many others, the respondent from Durban also observed:

“The funding constraints have had a huge impact on eThekweni Municipality, as the work load has been increased, funding in absolute terms has decreased. However, our staff is still being asked to do more with fewer incentives.”

A Summation of the Comments on Resources for Adaptation

The most common theme that emerged from the responses received for this element of the change model for climate adaptation was the lack of availability of funding for implementing adaptation strategies in all three case areas. This was commented by all of the respondents. The responses received also indicate that the provincial and federal governments can play an important role in advancing the urban resilience by providing more funding mechanisms for local adaptation actions. Specifically, resources are required for carrying out actions related to the regional level climate related impact assessments, analysis of risks, and any planning actions thereafter. Expanding programmes that attract funds like the IRA and calamity funds given to Albany can also help encourage and enable communities to adapt ahead of climate impacts, as opposed to the following in their wake. Additionally, any provincial and federal legislation that

are proposed to combat climate change directly or indirectly can also help to advance adaptation priorities by providing additional financial support at the local level.

Overall, the collected responses in section-II of the questionnaire survey indicated that the majority of respondents confirmed different key elements of the change model for climate change adaptation. While almost all of the elements were considered by the majority of respondents to be important for bringing about change in the context of climate adaptation learning and action, the group certainly indicated that some of these elements were more important than others, including:

- (1) Leadership for adaptation;*
- (2) Culture for adaptation;*
- (3) Good governance for adaptation;*
- (4) Innovation and creativity for adaptation; and*
- (5) Resources for adaptation.*

7.3.2.3 Section-III: Mechanism/Approaches Used, and Actors Involved

In the last section of the questionnaire survey, the author was specifically interested to explore:

- (1) Who were the principal agencies in-charge for implementation of adaptation strategies (frameworks, plans) in Albay, Cape Town, and Durban?*
- (2) What were the main steps involved in their local climate adaptation strategies (frameworks, plans) in all three case areas?*
- (3) Who were moving the adaptation strategies (frameworks, plans) forward in these three case areas?, and*

(4) How involvement of numerous stakeholders was being organised in Albay, Cape Town, and Durban?

The received responses indicate that across all the three examined cases (Albay, Cape Town, and Durban) the lead responsibility for initiating and implementing the adaptation learning and action is attached to governments. Further, as mentioned earlier in this Chapter, in all these case areas local-level responsibility for a climate change adaptation lies almost autonomously from their nationwide strategies (frameworks, plans). The respondents from Cape Town and Durban provided information that the primary in-charge organisations for adaptation actions were the government departments responsible for the environmental affairs in their local areas (Environmental Resource Management Department in Cape Town, and Environment and Management Unit in EThekweni Municipality of Durban). This indirectly relates to the presence of robust proactive environmental strategies in these local areas. However, in Albay, the climate change adaptation programmes are generally being run by the Governor's Office (political domain). This is primarily owing to the Governor's personal involvement and interest with the adaptation learning and action in his area. Also, for the case of Albay, the Center for Initiatives and Research on Climate Change Adaptation (CIRCA) is also authorised to carry on suitable adaptation actions in various sectors guided predominantly by the Governor's Office.

The responses received for section-III of the questionnaire survey (Stage-III, part-1) also indicated that in all three case areas, the principal methods or systems for bringing various stakeholders together for climate change adaptation learning and action were primarily their adaptation strategies or adaptation frameworks itself. However, the methodologies for implementing their adaptation strategies (frameworks, plans) were different from case to case. For instance, in Cape Town and Durban, officials from the various government departments were

put together in a number of small working groups to implement particular projects in order to move forward their climate change adaptation agendas. In the case of Albay, the local climate change adaptation action plan prescribed the formation of some dedicated interdisciplinary and multi-sector committees under the guidance of the Governor's Office and directions from the Center for Initiatives and Research on Climate Change Adaptation (CIRCA). The questionnaire responses also indicated that the ways in which these three case areas brought together various stakeholders (community, civil society and business) for adaptation learning and action were also diverse from case to case. For instance, Cape Town initiated some broader public participation initiatives for adaptation learning and action under its various local public sector projects that include:

(1) Media assistance;

(2) Community meetings; and

(3) Public lectures and workshops.

The overall aims of the above mentioned 'public participation initiatives' were to improve local conditions as well as bring change for climate change adaptation learning and action in Albay. Moreover, in Albay, various dedicated multi-stakeholder and interdisciplinary committees explicitly invited the private sector, civil society, science and academics, as well as the religious communities to participate for the adaptation learning and action. Across all the three case areas, the author observed that the stakeholders' involvement for climate change adaptation learning and action was generally top-down. This was due to the general assumption (as informed by one of the respondents from Cape Town) that adaptation learning and action are best dealt with by the government sectors. Moreover, one could also argue here that an inadequate community

involvement in these case areas could also be a reason for having a top-down stakeholders' involvement for adaptation learning and action.

On the basis of collected responses in section-III of the questionnaire survey (Stage-III, part-1), the author also examined how all three case areas handled climate information within different groups in their areas, and produced relevant information for adaptation learning and action. Identifying adaptation options to deal with climate change challenges were highlighted in all three adaptation strategies (frameworks, plans). Hence, these local areas sought help from the available researches related to their regional areas for coping with the indecision of local climate impacts and identification of suitable adaptation options.

However, on the basis of collected responses in Section-III, the author also observed some basic differences within these three case areas while using regional climate information to identify local adaptation strategies. For instance, Cape Town and Durban developed links with various climate experts and academics to find out their local climate change effects. In Albay, such exercise to know more about localised effects of climatic changes were initiated primarily by establishing a new local research based institution - CIRCA (Center for Initiatives and Research on Climate Change Adaptation). The questionnaire responses for this Section indicate that the Albay planned and initiated a process to elicit local knowledge through a series of stakeholders' consultations with the assistance of many local and international organizations. For instance, CIRCA developed numerous public and private partnerships with UNDP, World Bank, ADB, European Commission, World AgroForestry Centre, University of the Philippines Los Banos, Bicol University, Department of Education, Commission on Higher Education, Civil Service Commission, Department of Interior and Local Government, and others. Clearly, all the three

case areas benefited from ‘accessible’ presence of various international, national, and local research institutions in their areas.

The responses collected in this section of the questionnaire survey indicate that the Albay followed a five-step-principle in its adaptation initiatives:

- (1) Make it a goal;*
- (2) Ordain policies;*
- (3) Build institutions;*
- (4) Execute programs and projects; and*
- (5) Nurture partnerships and mobilize resources.*

The ‘Headline Adaptation Strategy’ of Durban identified some planning areas relevant to the climate change impacts first, and then explored adaptation options for their key sectors. Cape Town suggested various steps in its adaptation framework, including:

- (1) Assessment of current climate trends and future projections;*
- (2) Undertaking a vulnerability assessment;*
- (3) Strategy formulation;*
- (4) Development of adaptation options;*
- (5) Evaluation of priority adaptation strategies;*
- (6) Programme and project scoping and design;*
- (7) Implementation; and*

(8) Monitoring and evaluation of interventions.

Overall, the responses from all three case areas suggest carrying out climate change risk assessments as well as vulnerability assessments in any proposed adaptation strategies (frameworks, plans). Further, these cases stress the need to institutionalise climate change into the local governments/cities' day-to-day operations, and planning and decision-making.

7.3.3 Some More Lessons Supporting the Structure or Processes for Adaptation Planning

In the previous sections of this Chapter (Stage-III, part-1), the author outlined a number of lessons from three different local areas of Africa and Asia (Albay, Cape Town and Durban). In the section below (still part-1 of Stage-III), through secondary data, he further investigated and explored some more lessons from the experience of ten various local level adaptation activities being carried out in different local areas (local governments, municipalities, cities) of the world, including:

- (I) Vancouver*
- (II) Cape Town*
- (III) London*
- (IV) Washington*
- (V) Durban*
- (VI) New York*
- (VII) Halifax*
- (VIII) Boston*

(IX) *Albay*

(X) *Chicago*

The analysis of these local areas was undertaken to provide some guidance for the structure of adaptation planning in urban Pakistani local government context. Using the 6 criteria that guided the Part I of survey, the results from the ten cities included:

7.3.3.1 Leadership, Vision and Resources

As mentioned earlier in this Chapter, political or executive leaders can put climate change adaptation on the agenda and keep it there for its successful implementation. According to the King County (2009), one of their “executives” (public servant) showed leadership and helped initiated adaptation actions in King County, Washington. Bulkeley and Schroeder (2008) write that “London’s mayor” was enthusiastic about climate change issue and worked a lot about it in London. They further mention that the mayor demonstrated his leadership qualities for adaptation and made certain that London is mainstreaming adaptation and mitigation planning actions into its various local-level sectors. Similarly, Parzen (2009) highlighted that a firm back-up and constant encouragement from “Chicago’s mayor” and “two public officials” from the Chicago’s Department of Environment (DOE) assisted climate change adaptation actions administratively and financially in Chicago with their focused vision and strong leadership abilities.

In connection with the need of resources for climate change adaptation efforts, Roberts (2009) viewed that, not surprisingly, examples indicate that those local governments (municipalities, cities) that have hired or allocated staff to lead impacts and climate change adaptation programmes have a more sophisticated adaptation processes than those who have simply added these tasks to other responsibilities of environmental or other staff, or who have depended on

voluntary efforts of people inside or outside their local governments or cities. Roberts (2009) further added that the London authority assisted their staff in the form of providing monetary benefits to those who were dedicatedly to working on climate adaptation learning and action, and made sufficient resources available for carrying out adaptation research and communication work in London. By looking at the relatively weak and disconnected progress towards climate change adaptation learning and action in some local governments (municipalities, cities) such as Pune, Santiago, and Pearl River Delta, the author argues that for those local governments (municipalities, cities) that did not receive a strong, regular and consistent support from their local political leaders or local government public leaders, then the climate change adaptation learning and action efforts were adversely affected.

In summary, better implementation of adaptation actions in such local governments (municipalities, cities) may need the deliberate presence of adaptation leaders in order to move adaptation agendas effectively.

7.3.3.2 Culture for Adaptation

On the basis of review of literature related to ten above mentioned local areas, the author considers that the development of a supportive culture (process) for climate adaptation in any local governments (municipalities, cities) require more than just time, but the setting up of an entirely novel set of collective actions or initiatives to make certain that this change can be attained. London could be used to illustrate the point. According to the LCCP (2009), London established a culture for climate adaptation by creating a network (London Climate Change Partnership - LCCP) of various local governments and other interested parties. LCCP (2009) indicates that London also took part in various regional networks, including:

- a) *Three Regions Climate Change Group;*
- b) *East of England Regions Group; and*
- c) *South East England Regions Group.*

LCCP (2009) informs that one of the purposes for establishing the LCCP was to develop an apposite culture for climate adaptation learning and action in Greater London Authority.

Similarly, Climate Teams of King County, Washington are another example. According to the King County (2009), climate teams were created to move the climate change adaptation learning and action in the county area. These teams included officials from various county-level government offices. The broader purpose for creating such teams was to:

- (a) *Establish a culture for climate adaptation;*
- (b) *Enhance government functions for climate change actions; and*
- (c) *Develop various adaptation (mitigation as well) programs within the county.*

The above mentioned examples of London and King County clearly show that these local areas set up some new climate-related initiatives, which were significant for developing a culture for climate adaptation and advancing the adaptation agenda forward in their respective areas.

7.3.3.3 Climate Studies and Identification of Likely Impacts

Examples from various local governments (municipalities, cities), including Chicago, London, New York, Boston, Halifax and Vancouver indicated that the strong urban adaptation learning and action involved (and in some cases initiated by) a team of researchers, academic or scientists dedicated to working with the local governments on the issues of climate impacts and adaptation

options. The author observed that these researchers, academic or scientists were involved with various institutions, including:

- (d) Government institutions;*
- (e) Universities;*
- (f) Research institutes; and*
- (g) Other private sector, NGOs and climate related networks.*

The author also found that these researchers, academic or scientists presented:

- (a) Explanations of the climate change science;*
- (b) Undertook various regional level climate-modelling to consider local level climatic changes precisely;*
- (c) Worked with local government/city officials and interested parties to spot possible climate change impacts; and*
- (d) Assisted in identifying and assessing various climate adaptation strategies and options*

Therefore, it is clear from the experiences of Chicago, London, New York, Boston, Halifax and Vancouver that the local governments (municipalities, cities) can augment their own staff resources for the investigation of climate impacts and planning of adaptation strategies by drawing on the skills and knowledge of scientists and researchers in other institutions. The examples from Chicago, London, New York, Boston, Halifax and Vancouver also make clear that early scrutiny of climate change impacts is an important stage in establishing any adaptation programmes, but there is definitely a need for comprehensive and thorough research on precise areas of vulnerability to climate change so as to design ways that are worthwhile and present

benefits as well. As said by Roberts (2009) ‘this may require tracking the effects of recent extreme weather events, documenting what the response was, how much it cost and then assessing whether proposed adaptation solutions would have prevented the effects’.

7.3.3.4 Innovation and Creativity for Adaptation

The need for increased innovation and creativity is also an essential element in any urban local governments for climate adaptation learning and action. The adaptation processes of London, New York, Boston and Vancouver, almost all took an account of well designed information and awareness programmes as a part of their innovative efforts initiated by the local leaderships to strengthen consciousness of impacts due to climate change and provide assistance for adaptation within their local governments (municipalities, cities) and amongst the broader community. The author found that the innovative approaches adopted by these local areas (local governments, municipalities, cities) included:

- (a) Making and distributing climate related fliers and leaflets;*
- (b) Preparing charts of local areas at risk;*
- (c) Creating and publishing climate related bulletins and circulars;*
- (d) Designing and mounting websites related to climate change; and*
- (e) Holding local events, forums about climate change impacts and available local options.*

The LCCP (2009) indicated that the London Climate Change Partnership used to regularly update their website and upload papers, articles and other relevant material onto it to facilitate acceptability of adaptation options within the community groups quickly and promptly. Halifax-Climate SMART (2009) also informed that the Halifax municipality was publishing a newsletter (titled as ‘Naturally Green’) on quarterly basis since spring 2007 to report on environmental news

and initiatives within their region. 'Naturally Green' is being published on-line as well as in print form, so that it could be delivered to all households in the municipality (Halifax-Naturally Green, 2009).

Moreover, the author also observed that Cape Town, London, Washington, New York, and Halifax, all these local governments (municipalities, cities) sought regular support from 'media' to disseminate their climate related work across regions. For example, one of the mayors of London and a chair of the London Climate Change Partnership have had involved in the release of most reports by the London Climate Partnership (LCCP, 2009). The City of Chicago (Chicago-CCX, 2009) and King County (2009) have also taken concrete steps in increasing the media interest to climate change impacts and generating awareness and understanding of the key climate change issues in order to prepare for their regions.

These experiences suggest that providing technical information to the media in easy, interesting, and innovative ways (by using analogies or stories) gets the message across quickly.

7.3.3.5 Developing the Adaptation Strategies (Frameworks, Plans)

Examples from various local governments (municipalities, cities) also indicated that longer research studies that result in no concrete actions can set back the climate change adaptation agenda if participants become exhausted and doubtful. This appeared to be the case in Boston where the mayor initiated work on climate change plan in 2000, and finally Boston was able to get its climate change plan issued in 2007 (Roberts, 2009). Adaptation actions can be started before all precise climate change scientific information is made available, as they are considered worth doing anyway (Dessai et al., 2008). Experience of local governments, municipalities or cities (Vancouver, Cape Town, London, Washington, Durban, New York, Halifax, Boston, Albany

and Chicago) indicated that the logical approach for any local governments, willing to initiate climate change adaptation actions from scratch, could be to establish some institutional mechanisms first for taking the adaptation process forward; make targeted efforts to get adaptation on the local agenda, and then identify areas of highest likely impacts - assessed by potential climatic disruption, cost, and/or sufferings.

7.3.4 Experiences Supporting the Content for Adaptation Planning (Stage-III, part-2)

In the first part of this Chapter (Stage-III, part-1), the author outlined a number of lessons based on three different local areas of Africa (Cape Town, Durban) and Asia (Albay) through primary data collection, as well as from the experience of ten various local level adaptation activities (secondary data) being carried out in different parts of the world, including: Vancouver, Cape Town, London, Durban, New York, Halifax, Boston, Albay and Chicago. The lessons from the experience of these various local level adaptation activities will guide the process for adaptation planning in urban Pakistani local government context (Chapter-8 – adaptation strategy in Pakistani context).

However, as mentioned earlier in the start of this Chapter, the author also considered that the nature of the ‘content’ of any strategy to be the cornerstone of effective adaptation planning and implementation. A range of local level climate change adaptation studies or reports put emphasis on various aspects (WHAT, WHEN, WHERE & HOW) of climate related risks and show the starting points for designing any local level climate change adaptation strategies. Therefore, in the second part of this Chapter (Stage-III, part-2) the author will now explore publicly available local climate change adaptation strategies from ten different local areas (local governments,

municipalities, cities) of the world, including, Vancouver, Cape Town, London, Durban, New York, Halifax, Boston, Albany and Chicago. The experience gained will provide guidance for development of the ‘content’ for climate change adaptation strategies in the urban Pakistani local government context.

7.3.4.1 Providing Basic Information

The author reviewed various studies related to the climate change impacts and adaptation option conducted by (or conducted for) the above mentioned ten local case areas, including:

- (1) *London’s Warming by UKCIP (2002);*
- (2) *Climate Change and a Global City-New York: An Assessment of the Metropolitan East Coast Region by US Global Change Research Program (2000);*
- (3) *Infrastructure Systems, Services and Climate Change: Integrated Impacts and Response Strategies for the Boston Metropolitan Area by US EPA (2004);*
- (4) *Framework for Adaptation to Climate Change in the City of Cape Town (2006);*
- (5) *Climatic Future for Durban (Phase I of the Study, 2004);*
- (6) *Climate Change and the Greater Vancouver Regional District (2000);*
- (7) *Climate Change Impacts and Adaptation Strategies for Urban Systems in Greater Vancouver City of Vancouver (2003); and*
- (8) *Adapting to a Changing Climate in Halifax Regional Municipality by Halifax Regional Municipality (2005).*

The author found that five (London, New York, Boston, Cape Town & Durban) of the ten local areas (local governments, municipalities, cities) reviewed had carried out some thorough studies related to the climate change impacts for their local areas to endow with the fundamental knowledge and know-how required for designing their local climate change adaptation strategies (frameworks, plans). These studies included:

- (1) *London's Warming by UKCIP (2002);*
- (2) *Climate Change and a Global City-New York: An Assessment of the Metropolitan East Coast Region by US Global Change Research Program (2000);*
- (3) *Infrastructure Systems, Services and Climate Change: Integrated Impacts and Response Strategies for the Boston Metropolitan Area by US EPA (2004);*
- (4) *Framework for Adaptation to Climate Change in the City of Cape Town (2006); and*
- (5) *Climatic Future for Durban (Phase I of the Study, 2004).*

Less thorough studies related to the climate change impacts prepared by the other local areas included in this part of the research were:

- (1) *Climate Change and the Greater Vancouver Regional District (2000);*
- (2) *Climate Change Impacts and Adaptation Strategies for Urban Systems in Greater Vancouver by City of Vancouver (2003); and*
- (3) *Adapting to a Changing Climate in Halifax Regional Municipality by Halifax Regional Municipality (2005).*

Even though differences in the details, almost all of the thorough studies investigated their existing *built, natural, and human systems* of the local areas first, so that they could further examine how changes in climate may disturb their certain local settings. These studies emphasised that the climate change is one stressor amongst numerous others that the urban local governments (municipalities, cities) have to cope with. The increase in population density, notable under-funding of infrastructure and other related aspects were also appeared to be the grave concerns for these local areas. Almost all of the studies highlighted the call for a further scrutiny for a better awareness of how changes in climate might interrelate with other local-level urban stressors. For instance, Greater London's climate study incorporated a detailed depiction of existing state of affairs and climate-related pressures for most of their sectors (UKCIP, 2002). This report highlighted that the increasing temperature especially in hot seasons in London could result a major change or alteration in transport sector and deepen the existing stressors on the current road networks (UKCIP, 2002). Further, the author noted that the New York also carried out a comprehensive investigation about the current local circumstances and pressures on various sectors vulnerable to climate change impacts (US Global Change Research Program, 2000).

Almost all thorough climate studies (London, New York, Boston, Cape Town & Durban) attempted to make available data related to local climate change patterns over the past 5-10 decades. Some of the local areas particularly sought assistance from researchers, academic or scientists as well for further scrutinising their local level climate patterns. For instance, the Greater London investigated a wide range of climate related variables and explored various key climate trends for their area (UKCIP, 2002). The author also noted that the climate studies he examined all incorporated a major portion on climate related scenarios for the future, employing various climate models. These reports indicate that there is uncertainty about the extent of the impacts to come, as climatologists in these areas still do not know what the emissions will be in

future exactly. Most of the studies (London, New York, & Cape Town) reviewed for this part of the research (Stage-III, part-2) addressed this issue by incorporating numerous emission scenarios and describing estimated range of changes in temperature, precipitation, sea-level rise and other effects that are likely to take place in the next 5-10 decades. The New York, London, Boston and Cape Town studies all incorporated a series of downscaling experiments as well (downscaling is carried out by using some statistical and dynamical techniques to derive robust regional climate change projections), which permitted them to be more precise in their future climate change scenarios.

The author found that the climate adaptation studies for the local governments (municipalities, cities) he reviewed indicated that potential impacts related to climate change differ from area to area and even within areas. For instance, sea-level rise impacts on coastal local governments (municipalities, cities) would depend on many elements, including:

- (a) *Geologic aspects (settling or sinking of a body of rock or sediment);*
- (b) *Existing trends of storms; types of existing coastal infrastructure;*
- (c) *Available technologies/systems in place (such as early warning systems).*

Therefore, identifying impacts due to climate change in coastal local governments (municipalities, cities) require a thorough review of all such elements.

Likewise, impacts due to the temperature rise (climate change) in any urban local governments (municipalities, cities) would be dependent on many elements, including:

- (a) *Location of the area;*

- (b) Existing trends of winds;*
- (c) Nearness to any water bodies;*
- (d) Tree patterns and availability;*
- (e) Location of various buildings;*
- (f) Spaces between the buildings;*
- (g) Transport patterns and energy usage; and*
- (h) Health and other social circumstances of population, etc.*

Several of the studies the author reviewed in this part of the research had conducted a preliminary review of their vulnerable areas for climate impacts (using vulnerability assessments), chose several areas for study, and then investigated them in more depth. Each of the studies had interesting features that may be worth replicating by various Pakistani local governments. For instance, the Greater London scrutinised the broadest array of impacts caused by climate change (UKCIP, 2002). The researchers who prepared this study not only examined climate change impacts on London's various areas (health, coastal risks, water, energy, and other), but they also explored impacts that most other studies did not look into. They reviewed likely climate change impacts on: ways of life of Londoners, its past or historical culture, peace and security, leisure and tourism. The author found that New York also scrutinised a range of areas where climate change is likely to have major impacts, including: health, water, energy, transportation, and coastal infrastructure (US Global Change Research Program, 2000). However, Boston embraced a diverse methodology and presented some cost estimation of the likely impacts of climate change and any potential disruptions (US EPA, 2004). Halifax adopted a risk assessment methodology to assess impacts due to climate change (Halifax Regional Municipality, 2005). It

utilised already available work in the area to spot potential climate change impacts on numerous metropolitan sectors, and estimated the severity and probability of the likely impact. The author also noted that for the Vancouver study (City of Vancouver, 2003), a summary was presented of likely climate change impacts on its different urban local sectors, including: energy, health, people's security, and infrastructure. For every sector, Vancouver prepared a synopsis of both positive and negative impacts. The purpose was to demonstrate the ways in which climate change causes impacts on various sectors, as well as to show how adaptation action could be brought in at different steps to lessen these impacts.

7.3.4.2 Identifying adaptation options

All the local areas (Vancouver, Cape Town, London, Durban, New York, Halifax, Boston, Albany and Chicago) identified a range of climate change adaptation options to lessen vulnerability to climatic impacts in their particular local areas. A few of the local areas (local governments, municipalities, cities) also conducted in-depth vulnerability studies, and designed (or still designing) more explicit and detailed adaptation strategies for their respective local areas. For instance, London has designed a number of area-specific and in-depth adaptation strategies for their numerous local systems, such as: buildings, transport, and finance (LCCP, 2009). On the other hand, a few local areas have, however, designed adaptation strategies that are quite general (Durban, Halifax, and Greater Vancouver). The author found that adaptation strategies identified by numerous local areas, that he analysed for this part of the research, were of two quite *similar* and *interrelated* types, including:

- *Adaptation strategies for vulnerability reduction* - London's energy related plans to minimise energy usage, Vancouver's water related plans to minimise water usage, London and New York's urban heat related plans to minimise urban heat impacts, Halifax's transportation plans to replace in-danger transportation infrastructure,

London's land-use plans to create green spaces in low areas, New York's coastal plans to mark as well as prepare plans for coastal-risk zones, Halifax's awareness raising plans to inform residents about vector-borne diseases; and

- *Adaptation strategies for increasing resilience* - New York's water related plans to broaden/expand alternative water supply mechanisms, Vancouver's energy related plans to broaden/expand local-level energy sources, New York's infrastructure related plans to establish strict design criteria for effective storm-water systems, Boston's energy related plans to broaden/expand existing energy base).

Overall, most of the climate change impacts and adaptation studies reviewed for this part of research did not recommend any particular choice for specific types of 'content for adaptation planning'. Further, for the most part, the local areas (local governments, municipalities, cities) identified adaptation strategies by sectors, rather than by categories. However, there were still a number of lessons related to the content for the local level adaptation planning in Pakistani context, as most of the local areas adopted the following technical steps during their climate change adaptation planning:

(1) Scanning of local level climate change impacts on the basis of all available data;

(2) Conducting studies of various vulnerable sectors; and

(3) Assessing risks and vulnerabilities to identify priority impacts and adaptation options.

7.4 Summary

From the experiences reviewed in this Chapter (Stage-III, part-1) it is apparent that designing the climate change adaptation strategies and integrating them into the local level development

planning processes is not a simple process that can be accomplished easily in urban Pakistani local governments, or other cities. For instance, as noted by Roberts (2009), Boston continuously made efforts to assess its climate change impacts and identify adaptation strategies for about six years before issuing its first draft adaptation plan. This is not to suggest that climate change adaptation strategies cannot be developed and implemented in the short-term. Rather, climate change adaptation strategies are unlikely to be initiated and implemented in true sense in a local government (municipality, city) unless some of the enabling conditions for adaptation, specially the elements of the change model for climate adaptation (leadership for adaptation, vision for adaptation, culture for adaptation, innovation and creativity for adaptation, good governance for adaptation, & resources for adaptation) are established (or are being established). It also fortifies the urge for committed and devoted institutional setups to lead and direct the local adaptation agenda all the way through various impediments.

Further, drawing on the available reports (Stage-III, part-2), the author also analysed various examples of local level adaptation initiatives from the developed and developing world to explore experiences related to the 'content' for adaptation strategies. The analysis found that there are numerous tools that could be advantageous for local level adaptation planning in local governments (municipalities, cities) undertaking adaptation planning, such as Pakistan. These tools include: scanning of local level climate change impacts on the basis of all available regional climate data; conducting studies of local level vulnerable urban sectors; and assessing risks and vulnerabilities to identify priority impacts and adaptation options.

Overall, adapting to climate change is not a process that is 'similar' for every situation. Whilst the climate change impacts will differ from region to region, the institutional setups, coordination mechanisms, stakeholders' involvement, and tools for adaptation options could also be diverse

from area to area. Hence, climate change adaptation strategy for urban Pakistani local governments (next Chapter) will require to be tailored to its local circumstances, as well as under the aspirations of various lessons learnt during this Chapter.

CHAPTER 8 – A LOCAL CLIMATE ADAPTATION STRATEGY IN URBAN PAKISTANI CONTEXT

8.1 Orientation to the Chapter

This second-to-last Chapter deals with two objectives that were put forward in the start of this research: first, to design a strategy for building capacity to adapt to climate change impacts at the urban local government level in Pakistan; and second, to discuss the strategy itself by proposing some initial practical actions for urban Pakistani local governments to help assess the practicality for implementing such a strategy. Specifically, based on the change model for climate adaptation developed in Stage-II (chapters 5 and 6), as well as lessons learnt from Stage-III of this research (chapter 7), this Chapter portrays and discusses an integrated local level adaptation strategy for tackling climate change impacts in urban Pakistani context, besides taking into account the concept of ‘climate adaptation as a learning process’. The strategy is worthwhile for replicating adaptation learning and action across diverse urban local government categories areas in Pakistan – with differing topographies, characteristics, vulnerabilities, and climate risks.

8.2 Designing a local adaptation strategy in urban Pakistani context

Designing a climate adaptation strategy is essential so as to guide the adaptation actions for urban Pakistani local governments. As the climate changes and extreme events are becoming more frequent in Pakistan (Chapter 3), it is crucial to identify climate impacts on urban Pakistani local sectors, and the resultant vulnerabilities in those areas. This will help focus attention on where the key actions might lower the impacts of climate change, and assist Pakistani urban local

governments to adapt, rather than to react (make corrective actions) when the loss has already been taken place.

However, after analysing all responses during Stage-II of this research (Chapters 5, 6), as well as looking at the experiences of some of the local areas around Asia, Africa and the globe (Chapter 7), the author considers that preparing for climate change is not a generic process. Whilst the climate change impacts differ from area to area, the arrangement of organisations, inter and intra-organisational coordination and methods accessible to the local leadership are also exclusive. Therefore, any adaptation strategy in urban Pakistani local government context will need to be designed predominantly to its local circumstances, and this will be assisted by integrating the knowledge and experiences that were obtained in the earlier Stages of this research. Thus, building on the discussions of ‘organisational learning’ in the previous parts of this research, in this Chapter the author proposes a learning-based adaptation strategy from an institutional perspective for urban Pakistani local governments.

This adaptation strategy in urban Pakistani local government context encompasses four discrete elements (derived from Stage-II and III of this research), the inclusion of these elements are construed as indicators of learning and, in turn, building the capacity to adapt successfully. The elements are:

- (1) Establishing the context through leadership, vision and culture;*
- (2) Setting the foundation through innovation and creativity;*
- (3) Creating governance related propitious conditions; and*
- (4) Developing, implementing, and reviewing adaptation actions.*

These four elements are interrelated, and based on six elements of the change model for climate adaptation identified earlier in this research (Stage-II and III) for framing the context of climate change adaptation learning and action. While designing this adaptation strategy for urban Pakistani local governments, the author's emphasis is not with the constant articulation of capacity built, but rather with the underlying learning and institutional factors that help shape adaptive capacity. This approach will not only clarify the methodical focus of this thesis, but would also provide a pragmatic direction to urban Pakistani local governments for starting and strengthening adaptation actions.

The four elements of the strategy are discussed below. During this discussion, some goals and actions within these elements have also been suggested to facilitate their implementation. The suggested goals and actions, on the whole, are meant as a guide only to attaining the intent of each element and not as firm requisites.

8.2.1 Element-1: Establishing the context through leadership, vision and culture

Initiating climate adaptation learning and action in urban Pakistani local governments should not be visualised only through a technological lens (concerning new local urban infrastructure, transfer of technology, urban structural modifications). Whereas a technological approach may be essential to successful adaptation in urban Pakistani local governments at a later stage, it will not be useful without first establishing the context and a supportive organisational culture for adaptation. Or in other words, the author acknowledges that analysing and managing climate-related risks in urban Pakistani local government context will entail a sophisticated technological and methodical knowledge, contrarily adaptation efforts would be incommensurate to the risks - either inadequate or over planned. However, he also considers that building up the social and

institutional capabilities through learning and prudent policy making for adaptation actions are even more important in urban Pakistani local governments for utilising and transmitting words into deeds. Moreover, one of the key lessons from the earlier Stages (I, II, and III) of this research is the significance of establishing effective institutional mechanisms at the urban local government level in Pakistan to support adaptation learning and action. Therefore, establishing the context in urban Pakistani local governments should be considered as one of the fundamental adaptation actions itself, entitled to be given all due consideration.

8.2.1.1 Leadership & vision for adaptation

As a starting point in urban Pakistani local governments, the local leaders (e.g., administrators, commissioners, and/or district coordination officers) could take immediate steps to seek the support of all their executive district officers (EDOs) for initiating the local government-wide climate change adaptation actions. Such adaptation actions should aim to augment the urban Pakistani local governments' capability to uphold their innate leadership in efficiently analysing, minimising and managing climate-related risks, and in turn, grasping various local level opportunities.

Based on the understanding developed during the Stage-I, II and III of the research, the author believes that for urban Pakistani local governments to start any adaptation actions, it is important to secure a high level commitment from their local leaders (e.g., administrators, commissioners, and/or district coordination officers) by declaring that adaptation is one of the primary needs to their local governments. Based on the discussions about the leadership and vision for climate adaptation (Stage-II and III), a strong adaptation leadership and vision from the urban Pakistani local leaders is required as well to outweigh the administrative hurdles and risk aversion, particularly related to the multifaceted Pakistan-related management issues that split various

organisational authorities. Also, in urban Pakistani local governments, conflicting goals and enmities of stakeholders can also restrain inter and intra-departmental harmonisation required (Stage-II and III) for designing and implementing pragmatic climate adaptation actions. Therefore, the author considers that one of the most effectual and realistic means for practicing that leadership in urban Pakistani local governments could come from increasing their (Pakistani local governments) capacity for local governance itself, and putting together climate adaptation into their local level planning and developmental programs and actions.

The strong local leadership with a clear vision has also shown to be essential in the initiation of climate adaptation actions in various local areas studied for this piece of research (Stage-II and III). Therefore, on the basis of data collected and analysed in the previous parts of this research, the author considers (also discussed in chapter 6) that the vision for climate adaptation in the context of urban Pakistani local governments could be based on three interlinked guiding principles:

(1) Adaptation activities (learning and action) in urban Pakistani local governments are planned on the basis of learning from current past climate inconsistency and extreme events;

(2) Adaptation activities (learning and action) in urban Pakistani local governments are strongly connected to the development processes, and planned within the on-going local level planning and development programmes; and

(3) Adaptation activities (learning and action) in urban Pakistani local governments are taking place at different scales within the local governments, primarily with the help of Pakistani local government environment staff.

Once the vision for climate adaptation learning and action in urban Pakistani local governments is formulated by the political and public-sector local leadership and understood by the staff as well, strategies to adapt to climate change can then be developed. However, the author also considers that it is important to note that the local leadership for adaptation can also come from other players (actors) related to the urban Pakistani local governments. Interviews conducted with the respondents from Cape Town in Stage-III of this research indicated that the academics and researchers working in various local organisations demonstrated a leading role in linking up government staff and the universities for the climate adaptation actions in Cape Town. However, in Durban, the leadership leading to the creation of adaptation actions to climate change came from the local public sector employees. Therefore, the presence of a visionary leadership is crucial for the creation of adaptation initiatives to climate change at the urban Pakistani local government level.

8.2.1.2 Culture for adaptation

A supportive organisational culture and well-coordinated departmental working process for initiating climate adaptation learning and action is also very important in urban Pakistani local government context. For instance, the impacts of climate change are affecting a wide range of urban Pakistani local systems, with a number of effects that cleave the rigid local departmental lines and authorities. However, at the same time, many cross-departmental differences in urban Pakistani local government authorities are leading to many administrative and resource deficits and, in turn, could be restricting any such climate adaptation initiatives. As a consequence of the multi-dimensional form of climate impacts, a supportive and well-coordinated local level departmental working culture and process established in urban Pakistani local governments can help move the adaptation efforts forward. Based on the discussions related to the present working culture and process in Pakistani local governments (Chapter-3), as well as adaptation efforts in

Albay and Durban (Chapter-7), one of the practical ways to establish a well-coordinated and supportive departmental working culture and process for climate adaptation in urban Pakistani local governments is that:

- (1) Firstly, each urban Pakistani local government could identify their climate risk-related priorities through its all executive district officers (e.g. infrastructure susceptibilities; urban ecosystem's dreadful conditions; planning inadequacies). During this exercise, each executive district officer could contemplate giving attention to adaptation actions, and subsequently pinpoint priority areas rooted in his/her local administrative jurisdictions.*
- (2) For each priority areas, urban Pakistani local governments could then explore which related organisations and partners might play a role in moving forward the adaptation actions, and could combine them into various local working groups.*
- (3) Such urban Pakistani local working groups could then advance the adaptation actions, help assist cross-departmental workings, and make the most out of their teamwork.*
- (4) Finally, a single local-level office (e.g. district office environment) within these working groups could be designated to operate as the 'coordinator' with the aim of pushing forward adaptation agenda efficiently in urban Pakistani local governments.*

As a result of such organisational culture and process, various urban Pakistani local working groups could develop workable adaptation actions easily that their local governments can take to build their adaptive capacity.

As mentioned earlier in Chapter-6, precise and applicable climate change information at the urban Pakistani local government level is also the cornerstone of creating a supportive organisational culture and a well-coordinated departmental working process. However, in Pakistan, climate data is generally produced at a larger scale - federal or provincial levels - and is mostly available to only those levels. Therefore, such information is generally not available at the Pakistani local government level - the level at which local decisions take place. Additionally, climate change information in Pakistan is often not straightforwardly available to both authorities and common man (discussed in Chapter-3). Therefore, it is complex to combine such climate data with information that is vital for the urban Pakistani local decision-making processes, such as social and developmental information. Also, the language mismatch between the climate researchers (Pakistani organisations and scientists work mostly at federal or provincial levels) and the local policy makers (Pakistani local government decision makers) makes decoding and applying climate knowledge more complicated. Therefore, in urban Pakistani local government context, some 'ready to go' climate information (climate analysis and data that are clear, reasonable and comprehensible to assist local decision making) is also required for creating a supportive organisational culture and well-coordinated departmental working process for initiating climate adaptation actions.

With no such handy arrangements, it will be a grave challenge for urban Pakistani local governments to determine where local finances should be directed to best protect their local areas in the context of climate adaptation. Regarding this, there can be numerous options that the country-level climate information in Pakistan could be made more 'ready to go' for adaptation efforts at the local government level. However, for this, Pakistani federal government should also assist filling in the climate information gaps within particular provinces and local governments. One of the most salient steps that Pakistani federal government can initiate in relation to creating

a supportive and well-coordinated local level departmental working culture and process is to downscale current climate impact know-how to a scale that is appropriate to the local government decision-making actions. Pakistan Meteorological Department, Islamabad could take this initiative by downscaling Pakistan-specific know-how of climate impacts from global climate models (GCMs) to provincial scales, and subsequently analysing those impacts at the local government level. However, Pakistani provincial governments could also play a part in such initiatives to downscale climate impacts to their local areas with the federal government. For this, conducting climate impact assessments are one of the key initial steps for urban Pakistani local governments to move towards creating a culture and process and, in turn, endowing with the relevant information for local policy makers to improve climate resilience of their areas.

Overall for the first element of the strategy, the author considers that a key ingredient for successfully learning and action of adaptation in urban Pakistani local governments is the presence of effective local leadership that is enthusiastic to advance climate adaptation objectives with a clear vision and by creating a supportive organisational culture and a well-coordinated departmental working process. The local adaptation leaders in urban Pakistani local governments could be the head of any local area from the political domain, or any other public functionary who is eager and committed to initiate and advance its local adaptation agenda by kicking off many actions (discussed in Chapter-7), such as: (1) initiate assessments of current climate change trends and future projections for their area of jurisdiction based on available links and resources; (2) initiate undertaking climate risk and vulnerability assessments of their area of jurisdiction; (3) initiate identifying priority areas where adaptation learning and actions should be focused; and (4) initiate crafting adaptation learning and action plans using current and new tools, which can increase the effectiveness of adaptation to climate change in urban local areas of Pakistan.

8.2.2 Element 2: Setting the foundation through innovation and creativity

The second element of the strategy is to initiate some creative and innovative actions as an effort to set the foundation for climate adaptation in urban Pakistani local governments. Based on the understanding developed during the Stage-II and III of the research, the creative and innovative actions that urban Pakistani local governments can initiate are:

- (1) Working in partnerships with Pakistani local or provincial universities;*
- (2) Networking to share adaptation information, knowledge & practices;*
- (3) Connecting stakeholders and local residents on a continuing basis; and*
- (4) Involving Pakistani provincial and federal governments in support of adaptation actions.*

However, the role of stakeholders and local residents, their extent of participation and their longer-term affiliation would differ considerably in each of the urban Pakistani local governments. This would also rely (to a certain extent) on who is in fact driving the local adaptation agenda in each of the urban Pakistani local governments, and the level of the availability of their human and financial resources.

8.2.2.1 Working in partnerships with local or provincial universities

The work carried out earlier in this research (Chapters 5 & 6) indicates that, in Pakistani context, creating an adaptation strategy at urban local government level should be closely attached to learning and building knowledge about climate change impacts and exploring suitable openings to adapt. Due to the value given to the accessibility of precise and explicit climate data and projections at the urban Pakistani local government level (discussed earlier in this chapter), working in partnerships with local and provincial universities can be one of the valuable

preliminary means for urban Pakistani local governments to acquire information and knowledge about climate change impacts from a dependable source. The partnerships with local and provincial universities would also permit urban Pakistani local governments to direct their local resources more effectively, whilst using local information and knowledge. The relationship of urban Pakistani local governments with the local and provincial universities would also help progress adaptation actions. The lessons derived from Stage-III (Chapter-7) indicate that as a result of such partnerships:

- (1) Urban Pakistani local governments could develop some local adaptation guidebooks to help prepare their areas for climate change;*
- (2) Urban Pakistani local governments could utilise (depending on the level of their relationships and availability of financial resources) the skills and knowledge of local climate experts in their adaptation initiatives; and*
- (3) Urban Pakistani local governments could work with researchers and academics to find out the climate change impacts at the local level.*

These sorts of partnerships will assist urban Pakistani local governments to deal with their local vulnerabilities by offering information (explicitly appropriate to their requirements) from researchers and academics with which they have established partnerships and can significantly improve the features of their local adaptation actions.

8.2.2.2 Networking to share adaptation information, knowledge & practices

The previous parts of this research (Chapters 6 & 7) also indicate that the importance of creating networks for flow of information and knowledge amongst urban Pakistani local governments could also take the part of progressing adaptation agenda in Pakistan. Therefore, the adaptation

related discussions and succeeding communications amongst urban Pakistani local governments could drive their local governments gradually to move further with their area-specific adaptation planning, and for all urban Pakistani local governments to concentrate more focus on adaptation as part of their overall local policy and planning. Such participatory procedures could assist urban Pakistani local governments to learn about each others knowledge and understanding about adaptation. In urban Pakistani local government context, the author argues that the significance of these connections and communications in carrying on adaptation actions - predominantly with comparable urban local governments - cannot be stressed too strongly.

8.2.2.3 Connecting stakeholders and local residents on a continuing basis

In urban Pakistani local government context, setting up local consultative groups comprising of members from different local areas and sectors (government, academic, NGO, and private) could also be elemental in setting the foundation for advancing adaptation learning and action. Such local consultative groups would assist in accelerating urban Pakistani local adaptation actions by integrating the knowledge of members into actions in which they are skilful. Involving professionals from various local areas would also present a realistic, functional, and sector-specific methodology turning aside an absolute (or too much) attention on climate change as entirely an environmental problem instead as one of the essentials for urban Pakistani local government planning and developmental actions. This action (formulating local consultative groups) would provide members a feeling of ownership of their climate adaptation strategy and action plans (developed in later stages) by engaging them from the beginning. Based on the lessons derived from the case of Albay and Durban (Chapter-7), the author considers that such multi-stakeholder local consultative groups for adaptation in urban Pakistani local governments could turn out to be the most effectual if grouped into task forces (similar to what the Chief Minister of Punjab has initiated at the provincial level in Pakistan for many other social sectors)

or working committees, and structured task-wise (e.g. decreasing urban heat) or sector-wise (e.g., infrastructure, water, health). All of this would assist getting cooperation from various local actors to make sure that urban Pakistani local governments are taking adaptation actions on the basis of extensive local dialogues and information sharing.

8.2.2.4 Involving provincial and federal governments in support of adaptation actions

Pakistani provincial and federal governments can also assist urban local governments in the preliminary development stage of their climate adaptation actions by initiating country-level discourse on the experiences gained from recent adaptation actions in the nearby countries' local governments, and underscoring the best available climate adaptation knowledge. This adaptation sharing exercise would help facilitate more informed actions in urban Pakistani local governments that are merely starting to seek suitable approaches to build their adaptive capacity by revealing them to the best available knowledge. It will also help urban Pakistani local governments to utilise current know-how of climate adaptation actions from the other nearby areas to plan and materialise their own action plans, and getting from the most successful practices and reducing needless experimenting. Additionally, through provincial and federal environmental protection agencies (EPAs), Pakistani provincial and federal governments can also advocate the comprehension of climate adaptation amongst the urban local governments by designing various sorts of advertising and outreach informational materials that elucidate the significance of adaptation actions as one of the climate change coping strategies (similar to the Asian and African case areas discussed in Stage-III of the research). Such materials will also assist urban Pakistani local governments to get community-backing effortlessly on climate adaptation actions. Also, it would help broaden financial funding opportunities within and outside the urban Pakistani local governments.

Overall, in climate adaptation context, the author considers that urban Pakistani local governments should look beyond the traditional working rapport, which begins at the federal and provincial levels and works down to the local level, to embracing a creative and collaborative working rapport (collaborating local and provincial universities, networking, and engaging stakeholders and communities) where urban Pakistani local actors are considered as rightful learning and change catalysts for adaptation. This relationship utilising explicit creative and collaborative approaches (mentioned above) will possibly make urban Pakistani local actions more helpful to climate adaptation.

8.2.3 Element 3: Creating governance related propitious conditions

With the purpose of better synchronising, assisting and executing this climate adaptation strategy at the urban local government level in Pakistan, the author also considers creating some governance related enabling conditions (good governance for adaptation) at the urban local level in Pakistan. The lessons learnt from the previous parts of this research (Stage-II and III) indicate that such enabling conditions could be better created by systematically putting together climate adaptation actions into the programmes and routines of the urban Pakistani local governments. The author considers that a successful adjustment of climate adaptation into the programmes and routines of the urban Pakistani local governments will be contingent upon numerous aspects mentioned in element-2 of this Strategy, such as: working in partnerships with local or provincial universities; networking to share adaptation information, knowledge and practices; and connecting stakeholders and local residents on a continuing basis. However, as stated above, it will also rely on some governance related aspects as well, such as:

(1) Modifying developmental programmes of urban Pakistani local governments;

(2) Modifying rules and laws of urban Pakistani local governments; and

(3) Modifying routines of urban Pakistani local private organisations and businesses working in those areas.

By taking up such governance related aspects, urban Pakistani local governments could achieve maximum benefit of opportunities for climate adaptation into their local government operations.

8.2.3.1 Modifying developmental programmes of urban Pakistani local governments

Generally, in urban Pakistani local government context, planning for the annual developmental programmes involves designing of locally motivated developmental programmes to complement the provincial and federal government's annual area-specific developmental programmes (e.g. sanitation, health, forests, agriculture). The author's personal experience, while working in many urban Pakistani local governments as assistant director and district officer environment, informs that such developmental programmes involve various strong and influential local actors (political, knowledgeable, community focused), and offer numerous opportunities within which many adaptation actions could be easily incorporated. However, it is vital that Pakistani provincial or federal level developmental programmes are compatible with the general stages developed for the local developmental programmes in urban Pakistani local governments (e.g. making initial know-how of present local developmental conditions; developing aims and goals; identifying short, medium, and long term developmental outcomes; and suggesting various explicit actions to achieve overall aims and goals). But in urban Pakistani local governments, the scope and time-frames of planning for the developmental programmes are smaller and, in turn, attempt for more focused results suitable to their local conditions. Consequently, the learning requirements, tools, and stakeholders and local residents' involvement for climate adaptation actions at the urban local government level could also be fairly diverse compared with the actions at Pakistani provincial or federal levels. However, as a starting point, as well as similar to the Asian and

African case areas discussed in Chapter-7, the author considers that climate change concerns (local climate risks and vulnerabilities, and managing practices) could be best included into the developmental programmes of urban Pakistani local governments. For this, some common stages in urban Pakistani local developmental programmes and their parallel possible (conceivable) steps where climate change concerns could be included are in Table 8.1:

<i>Current common stages in urban Pakistani local developmental programmes</i>	<i>Possible steps including climate change concerns</i>
Making available initial know-how of present local developmental conditions.	Making available initial know-how of present local developmental and climate-sensitive living conditions.
Developing aims and goals related to local development.	Developing aims and goals related to local development by making analysis of whether achieving developmental aims and goals will increase or decrease local vulnerabilities to climate change.
Identifying short, medium, and long term developmental outcomes.	Identifying short, medium, and long term developmental outcomes by considering whether climate change-related information has been incorporated effectively.
Suggesting various explicit actions to achieve overall developmental aims and goals.	Suggesting various explicit actions to achieve overall developmental aims and goals by ensuring climate-related jeopardies are being considered in each of the suggested actions.

Table 8.1: Pakistani Local Developmental Programmes & Possible Climate Change Integration

8.2.3.2 Modifying rules and laws of urban Pakistani local governments

The previous parts of this research (Stage-II and III) had clearly indicated that urban Pakistani local governments could initiate and extend climate change adaptation learning and action by ensuring that there is sufficient information available about climate change and its likely local impacts. This, primarily, should contain information on historical and present local climate

situation, climate risks, and vulnerabilities. Hence in the case of urban Pakistani local governments (similar to the Asian and African case areas discussed in Chapter-7), one of the most important aspects is to ensure supportive legal provisions required to collect, manage and examine such information which will help urban Pakistani local governments to be aware of their historical and present local climate situation, climate risks, and vulnerabilities. Therefore, urban Pakistani local governments could modify their local rules and laws to help assist collecting, managing and examining information related to climate change impacts, as discussed in Chapter-7. For instance, this can add in provisions in local rules and laws to make certain that:

- *Urban Pakistani local government related legislations provide motivations, incentives, and restrictions on use of various local services (e.g. energy and water usage);*
- *Urban Pakistani local government related legislations prohibit (or limit) new developmental activities in climate-sensitive regions (e.g. steep hilly and flood-prone risky areas) in order to provide climate resilient housing at reasonably priced to their local residents;*
- *Urban Pakistani local government related legislations provide directions for constructing climate-resilient infrastructure (e.g. novel building designs, supplies and practices) by taking care of climate related-risks that do not put extra resources on; and*
- *Urban Pakistani local government related legislations help support transforming urban livelihoods towards more climate-resilient.*

The urban Pakistani local government adaptation plans, developed in a later stage, could incorporate numerous precise provisions in their local rules and laws on the similar lines mentioned above in order to move further towards adaptation leaning and action.

8.2.3.3 Modifying routines of urban Pakistani local private organisations and businesses

In urban Pakistani local government context (similar to the case of Albay discussed in Chapter-7), the author also considers that private organisations and businesses which are already operating could facilitate adaptation learning and action by incorporating, focusing, and managing climate-sensitive aspects into their own routines. On the basis of lessons derived from Stage-III of the research, this can comprise:

- *The private organisations and businesses running in the jurisdiction of urban Pakistani local governments determine to start: supporting climate risk management techniques in their daily working; targeting local populations and businesses that are particularly in danger of climate change impacts; and caring about how climate change may change their own actions;*
- *The private organisations and businesses running in the jurisdiction of urban Pakistani local governments start focusing on various climate-related matters, for instance: where they should invest for longer term outcomes (does a potential investment involve any climate-risks?); is material/supply dependent on sectors vulnerable to climate change in some way? And whether product requirement with the passage of time would increase or decrease by climate change. The paybacks, thus, will go on the private sectors and businesses self interests, and would also add to the overall urban Pakistani local community resilience-building;*
- *The private organisations and businesses, especially ‘finance organisations’, running in the jurisdiction of urban Pakistani local governments start establishing some financial mechanisms that encourage and assist adaptation actions. For instance, introducing some local attractive investment options (loan and saving schemes - in the case of Albay, Cape*

Town and Durban), whose availability is contingent to the managing of some types of climate-sensitive local actions that concurrently build up local adaptive capacity.

However, in order to commence all above, urban Pakistani local governments should create various ways and means that stimulate, support and reinforce climate adaptation actions in urban Pakistani local private organisations and businesses.

8.2.4 Element 4: Developing, implementing, and reviewing adaptation actions

The final element of the strategy is to develop, implement, and review various adaptation actions related to the urban Pakistani local governments. As discussed earlier in Chapter-3 of the research, climate change uncertainty could turn out to be one of the primary stumbling blocks for urban Pakistani local governments while developing such adaptation actions. However, based on the lessons derived from the adaptation efforts of ten various local case areas (Chapter-7), one of the first ways to deal with the uncertainty of climate change at the urban local government level in Pakistan could be to identify some ‘Pakistan-specific precautionary adaptation options’, particularly as initial adaptation actions. Such ‘Pakistan-specific precautionary adaptation options’ could provide benefits to urban Pakistani local governments whether anticipated climate changes materialise or not in the Pakistani local context. For instance, similar to the cases of Cape Town and Durban discussed in Chapter-7, an urban Pakistani local government making plans to decrease day-time temperatures in its urban areas may consider promoting green roofs (growing grass and vegetation on roofs) in order to have shield, reversing the temperature, and decreasing urban heat island effects as well. The green roofs option could also assist cooling the urban Pakistani local areas, as well as reducing the impacts of intense precipitation, revamping the area, enhancing ambient air quality, and decreasing energy costs. Such initial adaptation actions in urban Pakistani local areas are not very costly as well, and their benefits are observed

irrespective of the actual level of climate change. The author argues that such initial adaptation actions kicked off by the urban Pakistani local governments would neither ignore climate change science nor would consider it as a decisive factor in local management. In its place, such actions would ensure careful and vigilant management of climate-sensitive aspects in urban Pakistani local areas, as they give extra attention to areas that are vulnerable to climate change.

8.2.4.1 Climate risk assessments through vulnerability mapping

The previous parts of this research (Chapters 3, 6 and 7) also indicate that one of the key elements in developing any urban local level adaptation actions is to carry out climate risk assessments through vulnerability mapping. The aim for carrying out such vulnerability mappings in urban Pakistani local governments should be finding out some local priority areas for adaptation learning and action. As soon as this has been carried out, urban Pakistani local governments could then methodically plan, develop and implement their explicit adaptation actions. Moreover, they could also then assess their advancements in executing the adaptation actions they have planned, and ascertain whether they are progressing systematically towards their overall aim of climate resilient urban areas.

In order to better understand the present and future vulnerabilities to climate change, initially (similar to the case of Albay discussed in Chapter-7), urban Pakistani local governments could incorporate climate change concerns into the already available (existing) local vulnerability mappings. For instance, local vulnerabilities previously identified for emergencies, disasters or other purposes (civil defence offices in each urban Pakistani local governments have already conducted some of these mappings). The specific climate change related vulnerability mappings can subsequently be conducted to explore what particular adaptation actions an urban Pakistani local government may require to take to deal with the climate change (discussed in Chapter-3). In

this connection, one of the first steps urban Pakistani local governments could take is vulnerability mapping of their present and future infrastructure (built, human and natural systems) to climate-related extreme happenings. The author argues that having understanding of the extent of climate vulnerability by urban Pakistani local governments would offer one of the starting points for setting up adaptation preferences and, in turn, reinforcing the local adaptation leaning and action in urban Pakistan. Conducting a climate vulnerability mapping in the urban Pakistani local government context would have need of inputs from past climate data, local information and practices, as well as potential social and economic local situations. Based on the lessons learnt from the adaptation efforts of ten various local case areas (Chapter-7), the author considers that a vulnerability mapping in any urban Pakistani local government should include carrying out at least six key steps as mentioned below. In smaller urban Pakistan local governments, these steps can be conducted by utilising human and financial resources either from available local funding or by funds arranged via Pakistani provincial or federal governments. However, for larger urban Pakistani local governments, a range of regional or global funding options could also be searched for while carrying out this exercise.

- *Involve local leadership (who makes decisions in a specific local sector) and relevant community groups (natives who would be affected by climate change in a specific local sector) in a broader study to find out an urban Pakistani local government's present vulnerabilities to climate change by considering all already available (existing) local vulnerability mappings (e.g. Pakistani local civil defence offices discussed above);*
- *Find out present climate vulnerabilities of an urban Pakistani local government in its various sectors by considering its environmental, organisational, and economic dimensions. For instance, environmental (weather-related severe events), organisational*

(change model for climate adaptation proposed in this research) and economic (changes related to local level businesses);

- *Decide priority sectors that require more focus by examining where an urban Pakistani local government has been weak in previous weather-related severe events;*
- *Visualise long-term environmental, organisational and economic situation of an urban Pakistani local government and potential climate change (provided by academics and experts - element-2 of this Strategy), and identify subsequent future consequences on its various sectors;*
- *Find out future expected vulnerabilities given the method highlighted in preceding step with the help of urban Pakistani local government working groups (element-1 of this Strategy);*
- *Uncover how present vulnerabilities can best be dealt with in this regard. At this point, various ways and means could also be planned to build adaptive capacity particular to the situation of that urban Pakistani local government as a response to rising vulnerabilities or exploring new prospects for moving towards resilience.*

The author considers that the above mentioned vulnerability mapping should be a reiterated action with a regular monitoring and re-assessing to make certain that climate adaptation leaning and action is going along with what is being observed in climate change context in urban Pakistani local governments. Moreover, new climate change related information, specific to urban Pakistani local governments, should also be incorporated into the local government planning and implementation as and when it turns out to be accessible. As a result of carrying out vulnerability mappings, urban Pakistani local governments will have explored various local sectors that entail clear focus in relation to policy and implementation related transformations. As

soon as vulnerable sectors have been identified, urban Pakistan local governments can then develop and put into practice their particular climate adaptation actions.

8.2.4.2 An initial set of adaptation actions

On the basis of the literature reviewed and the lessons learnt in the previous parts (Stage-II and III) of this research, an initial array of adaptation actions that urban Pakistani local governments could categorise have also been suggested in this Chapter (Table 8.2). Nonetheless, the majority of these initial adaptation actions will need a thorough assessment by various urban Pakistani local consultative groups (element-2 of this Strategy) as well to find out explicit adaptation actions that could better respond to their local climate change effects.

Priority Sector	Initial urban Pakistani local government related adaptation actions
Urban development	<ul style="list-style-type: none"> • Mark hazard areas and regulate new developments in these areas. • Consider hazards in relation to urban flooding, hot spells, severe storms, and other climate related consequences on present and future infrastructure. • Reinforce building rules and laws to reduce temperature gains during hot spells. • Ensure storm drainage systems function properly with sufficient capacity to cope with run-off from heavy rainfall. • Construct car parks at ground-floor levels in flood risk areas while developing new commercial plazas. Upper levels should be used either for commercial or residential purposes. • Ensure optimal use of natural lighting and natural ventilation in new urban developments. • Initiate efforts to save energy and reduce runoff by promoting green roofs (green roofs add insulation in winter and absorb heat in summer).
Urban ecosystems	<ul style="list-style-type: none"> • Manage and look after existing parks, trees, streams, canals, rivers, etc. • Manage and look after green areas in lowlands in order to better prepare for the potential floods. • Ban new developments in present green areas. • Grow varied types of climate-resilient bushes and trees. • Improve situation of roadside trees (enhance area around roots, control soil

	<p>compaction, proper care and watering) for their continued growth and existence.</p> <ul style="list-style-type: none"> • Observe and restrain insidious species (rats, mice, cockroaches, etc.) that can increase with changing climate.
Urban health	<ul style="list-style-type: none"> • Initiate civic education programmes on climate-related health impacts - infectious diseases, heat dissipation, air pollution related respiratory problems, etc. - and related precautionary measures. • Initiate measures to reduce infectious diseases, including: health related warning systems; controlling active infestations; controlling other elements that cause the spread of disease-carrying pests (such as, stagnant water). • Initiate measures to reduce heat dissipation, including: tree plantation along the streets; more parks and green areas; green roofs; some basic heat alert systems through media. • Initiate measures to reduce air pollution related respiratory problems, including: limiting transport emissions; restricting products that emit volatile organic matters; environmental protection related warning systems.
Urban energy	<ul style="list-style-type: none"> • Plan and initiate energy conservation, management, and efficiency related approaches to decrease energy requirements. • Extensive street tree plantations and their regular look after, and promoting green roofs to decrease urban temperatures and ever increasing energy requirements for air conditioning. • Modify rules and laws related to buildings for decreasing energy requirements. • Downscaling Pakistani PM Program on Alternative Energy to the level of urban Pakistani local governments for reducing the current energy crisis.
Urban municipal services	<ul style="list-style-type: none"> • Plan and execute sustainable urban drainage systems (e.g., permeable pavements, green roofs) to enhance storage of rain water. • Increase managing capacity of rain water sewers to help deal with severe weather related incidents. • Establish land-use planning and zoning systems for protecting urban infrastructure in flood prone areas.

Table 8.2: An Initial Array of Adaptation Actions in Urban Pakistani Local Government Context

The planning and execution of such climate adaptation actions (mentioned above) will depend on a range of available (and in some instances new) policies and programmes, which urban Pakistani

local governments have responsibility for. The policies and programmes (methods) required by the urban Pakistani local governments to execute appropriate climate adaptation actions will be subject to the scale and size of the local governments and the powers they keep. Nevertheless, based on the Table 8.2, a few basic methods are:

- (1) Rules and laws related to the buildings;*
- (2) Legislations related to the new urban developments;*
- (3) Civic educational and awareness programmes;*
- (4) Energy conservation, management, and efficiency related approaches;*
- (5) Sustainable urban drainage systems; and land-use planning and zoning systems.*

8.3 Actionable items related to the elements of this strategy

The following are simple, step-by-step actions (based on the points of the previous Sections) that urban Pakistanis local governments can follow as a strategy to achieve the change needed for climate adaptation. The context as well as the description of each of the actions mentioned below is available in Sections 8.2.1 to 8.2.4 of this Chapter.

- Urban Pakistani local leaders (e.g., administrators, commissioners, and/or district coordination officers) take immediate steps to seek the support of all their executive district officers (EDOs) for initiating the local government-wide climate change adaptation actions (actions that aim to augment the urban Pakistani local governments' capability to uphold their innate leadership in efficiently analysing, minimising and managing climate-related risks, and in turn, grasping various local level opportunities).

- Urban Pakistani local leadership sets out a vision based on three interlinked guiding principles: (1) adaptation activities (learning and action) are planned on the basis of learning from current knowledge of past climate inconsistency and extreme events; (2) adaptation activities (learning and action) are strongly connected to development processes, and planned within the on-going local level planning and development programmes; and (3) adaptation activities (learning and action) are taking place at different scales within the urban local governments, primarily with the help of Pakistani local government environment staff.
- Under the leadership and vision for climate adaptation, urban Pakistani local governments establish a well-coordinated and supportive departmental working culture and process for climate adaptation, such as: (1) urban Pakistani local governments identify their climate risk-related priorities through its all executive district officers (e.g. infrastructure susceptibilities; urban ecosystem's dreadful conditions; planning inadequacies). During this exercise, each executive district officer contemplates giving attention to adaptation actions, and subsequently pinpoints priority areas rooted in his/her local administrative jurisdictions; (2) for each priority areas, urban Pakistani local governments then explore which related organisations and partners might play a role in moving forward the adaptation actions, and combine them into various local working groups; such urban Pakistani local working groups then advance the adaptation actions, help assist cross-departmental workings, and make the most out of their teamwork; and (3) a single local-level office (e.g. district office environment) within these working groups be designated to operate as the 'coordinator' with the aim of pushing forward the climate adaptation agenda efficiently in urban Pakistani local governments.

- Pakistani federal and provincial governments also assist in relation to creating a supportive and well-coordinated local level departmental working culture and process by downscaling current climate impact know-how to a scale that is appropriate to the local government decision-making actions. For example, Pakistan Meteorological Department, Islamabad take this initiative by downscaling Pakistan-specific know-how of climate impacts from global climate models (GCMs) to provincial scales, and subsequently analysing those impacts at the local government level. Further, Pakistani provincial governments also play a part in such initiatives to downscale climate impacts to their local areas with the federal government.
- Urban Pakistani local governments start working in partnerships with the local and provincial universities to acquire information and knowledge about climate change impacts from a dependable source. As a result of such partnerships: (1) urban Pakistani local governments develop some local adaptation guidebooks to help prepare their areas for climate change; (2) urban Pakistani local governments utilise (depending on the level of their relationships and availability of financial resources) the skills and knowledge of local climate experts in their adaptation initiatives; and (3) urban Pakistani local governments work with researchers and academics to find out the climate change impacts at the local level.
- Urban Pakistani local governments create networks (Pakistani, regional and international) for flow of information and knowledge and progressing adaptation agenda in Pakistan.
- Pakistani federal and provincial governments also assist urban local governments in the preliminary development stage of their climate adaptation actions by initiating country-level discourse on the experiences gained from recent adaptation actions in the nearby

countries' local governments, and underscoring the best available climate adaptation knowledge.

- Through provincial and federal environmental protection agencies (EPAs), Pakistani federal and provincial governments also advocate the comprehension of climate adaptation amongst the urban local governments by designing various sorts of advertising and outreach informational materials that elucidate the significance of adaptation actions as one of the climate change coping strategies.
- Urban Pakistani local governments set up local consultative groups comprising of members from different local areas and sectors (government, academic, NGO, and private) in order to set the foundation for advancing adaptation learning and action. Such multi-stakeholder local consultative groups for adaptation in urban Pakistani local governments would turn out to be the most effectual if grouped into task forces (similar to what the Chief Minister of Punjab has initiated at the provincial level in Pakistan for many other social sectors) or working committees, and structured task-wise (e.g. decreasing urban heat) or sector-wise (e.g., infrastructure, water, health).
- Urban Pakistani local governments modify their local rules and laws to help assist collecting, managing and examining information related to climate change impacts. For instance, this can add in provisions in local rules and laws to make certain that: (1) urban Pakistani local government related legislations provide motivations, incentives, and restrictions on use of various local services (e.g. energy and water usage); (2) urban Pakistani local government related legislations prohibit (or limit) new developmental activities in climate-sensitive regions (e.g. steep hilly and flood-prone risky areas) in order to provide climate resilient housing at reasonably priced to their local residents; (3)

urban Pakistani local government related legislations provide directions for constructing climate-resilient infrastructure (e.g. novel building designs, supplies and practices) by taking care of climate related-risks that do not put extra resources on; and (4) urban Pakistani local government related legislations help support transforming urban livelihoods towards more climate-resilient.

- Private organisations and businesses operating under the jurisdiction of urban Pakistani local governments facilitate adaptation learning and action by incorporating, focusing, and managing climate-sensitive aspects into their own routines: (1) the private organisations and businesses running in the jurisdiction of urban Pakistani local governments determine to start; supporting climate risk management techniques in their daily working, targeting local populations and businesses that are particularly in danger to climate change impacts, and caring about how climate change may change their own actions; (2) the private organisations and businesses running in the jurisdiction of urban Pakistani local governments start focusing on various climate-related matters, for instance: where they should invest for longer term outcomes (does a potential investment involve any climate-risks?); is material/supply dependent on sectors vulnerable to climate change in some way? And whether product requirement with the passage of time would increase or decrease by climate change. The paybacks, thus, will go on the private sectors and businesses self interests, and would also add to the overall urban Pakistani local community resilience-building; and (3) the private organisations and businesses, especially finance organisations running in the jurisdiction of urban Pakistani local governments start establishing some financial mechanisms that encourage and assist adaptation actions. For instance, introducing some local attractive investment options (loan and saving schemes - in the case of Albay, Cape Town and Durban), whose

availability is contingent to the managing of some types of climate-sensitive local actions that concurrently build up local adaptive capacity.

- Urban Pakistani local governments start identifying some ‘Pakistan-specific precautionary adaptation options’, particularly as initial adaptation actions. For instance, similar to the cases of Cape Town and Durban, an urban Pakistani local government making plans to decrease day-time temperatures in its urban areas may consider promoting green roofs (growing grass and vegetation on roofs) in order to have shield, reversing the temperature, and decreasing urban heat island effects as well. The green roofs option could also assist cooling the urban Pakistani local areas, as well as reducing the impacts of intense precipitation, revamping the area, enhancing ambient air quality, and decreasing energy costs.
- Finally, urban Pakistani local governments carry out some very basic climate risk assessments through vulnerability mapping: (1) involve local leadership (who makes decisions in a specific local sector) and relevant community groups (natives who would be affected by climate change in a specific local sector) in a broader study to find out an urban Pakistani local government’s present vulnerabilities to climate change by considering all already available (existing) local vulnerability mappings (e.g. vulnerability assessments conducted by Pakistani local civil defense offices); (2) find out present climate vulnerabilities of an urban Pakistani local government in its various sectors by considering its environmental, organisational, and economic dimensions. For instance, environmental (weather-related severe events), organisational (change model for climate adaptation proposed in this research) and economic (changes related to local level businesses); (3) decide priority sectors that require more focus by examining where an urban Pakistani local government has been weak in previous weather-related severe

events; (4) visualise long-term environmental, organisational and economic situation of an urban Pakistani local government and potential climate change (provided by academics and experts - element-2 of this Strategy), and identify subsequent future consequences on its various sectors; (5) find out future expected vulnerabilities given the method highlighted in preceding step with the help of urban Pakistani local government working groups (element-1 of this Strategy); and (6) uncover how present vulnerabilities can best be dealt with in this regard. At this point, various ways and means could also be planned to build adaptive capacity particular to the situation of that urban Pakistani local government as a response to rising vulnerabilities or exploring new prospects for moving towards resilience.

In conclusion, the author argues that getting ready for climate change in urban Pakistani local government context does not need to begin every thing from just zero. A number of methods, some from the above mentioned, could be applied immediately with minor adjustments to execute climate adaptation actions that urban Pakistani local governments are already exercising in their daily routine functioning. In other words, urban Pakistani local governments are already exercising a large number of plans and programs that could be utilised with slight modifications, as possible opportunities for executing relevant climate adaptation actions.

The author considers that as urban Pakistani local governments start exploring how they might utilise various appropriate methods to execute climate adaptation actions, it is vital for them (in the long run) to take into account how such methods are currently being used in their local government functions and whether these methods could be utilised with minor or major adjustments for climate adaptation. For instance, one urban Pakistani local government realises that its local government functions and routines do not allow it enough flexibility required to

modify its policies and programmes (methods) to the changing scenarios. One way to accommodate this impasse is to adjusting its rules and laws (including standard operating procedures - SOPs) to incorporate such provisions that could make those rules and laws modifiable under various changing conditions. Thus, consistent functioning on policies and programmes in urban Pakistani local governments should be carried out to improve their adjustability in the climate adaptation context, and also for addressing various other organisational barriers that can restrict the success of climate adaptation endeavour. Similar to the various general characteristics of urban planning and development in Pakistani local governments, the climate adaptation actions are also not a one-time phenomenon. A number of adaptation actions will require to be executed in stages - few may need a consistent effort of number of years to execute successfully. However, in the meantime, urban Pakistani local governments must re-evaluate all of their policies, programmes and actions from time to time to determine their usefulness as the new understanding and awareness on climate change impacts and their subsequent adaptation options becomes apparent. To end with, getting hold of steady and consistent cooperation and collaboration from all stakeholders, as mentioned earlier in this chapter, will also be a fundamental aspect of executing this Strategy.

8.4 Summary

Based on the understanding developed during Stage-I, II and III of this research, this chapter suggests some key elements of a climate adaptation strategy that could enable urban Pakistani local governments to move from words to adaptive actions. The strategy is based on the literature review, data collected, and analysed during the all three Stages of this research. The author believes that the majority, if not all, of the aspects mentioned within various elements of this Strategy are likely to be essential and elementary for any urban Pakistani local government

adaptation planning actions. However, varied scenarios will need diverse unification of elements. On the other hand, any urban Pakistani local government adaptation planning actions that give attention to only one or two elements of this Strategy are highly likely to be unsuccessful in enabling the urban Pakistani local governments to move from words to actions successfully. Almost all elements of this Strategy are significant and important in dealing with the specific climate adaptation related barriers in different urban Pakistani local governments. Lastly, to give attention specifically on any one of the elements of the Strategy, or particular components of them, or to overlook completely any one element of the Strategy will also most probably heading off towards devastation in adaptation learning and action in urban Pakistani local governments.

It is vital to emphasise once again that any successful climate adaptation actions at the urban Pakistani local government level will require a consistent effort of number of years. Nevertheless, climate adaptation learning and action process in urban Pakistani local governments should have a firm determination behind it by the local leadership to take on risks and accept inaccuracies, and a commitment and enthusiasm to its continual advancement and perfection. To conclude, this climate adaptation strategy is believed to be a practical and functional tool for recognising, executing, and appraising the adaptation requirements of any urban Pakistani local governments, on a methodical basis, and to helping and providing with assistance of dealing with the climate-related risks.

CHAPTER 9 - RESEARCH FINDINGS, CONTRIBUTION TO KNOWLEDGE & FUTURE DIRECTIONS

9.1 Scope

This final Chapter has three sections. The first section highlights a brief overview of the research findings, from all three Stages of this research, and with the integration of the literature reviewed over a four year period. The findings are provided corresponding to the research objectives and questions outlined in chapter-1 of this thesis. The second section is about the major contributions made by this piece of research, (1) the contributions to theory and research, and (2) the contributions to practice. The third and final section draws a range of recommendations, as overall opportunities for future research work on the topic.

9.2 Main Research Findings

The overall goal of this research was to explore opportunities for climate change adaptation at the local government level in Pakistan and to develop a strategy for building capacity to adapt to climate change impacts. This led to ten main research objectives (Chapter-1). These objectives were addressed in the form of 3 Stages of the research (Stage-I, II and III), and which are reported in specific chapters of this thesis, as indicated in Table 9.1;

Objective No.	Stage-I	Chapter No.
1	<i>To review the climate variability and its impacts for Pakistan</i>	2
2	<i>To identify the key predicted impacts of climate change and any anticipated vulnerability to these particular impacts for Pakistani local governments</i>	2
3	<i>To examine the theoretical background of adaptation to climate change by reviewing the scholarly interpretations of adaptation meanings and</i>	3

	<i>types</i>	
4	<i>To identify the potential climate change adaptation actions (strategies) specifically for Pakistani local governments through literature review, and place them under the different themes</i>	3
5	<i>To identify barriers and challenges to climate change adaptation at the local government level in Pakistan through primary data collection (this initial exercise will bring refinement in this research, and would help guiding the detailed direction of the research)</i>	4
Objective No.	Stage-II	Chapter No.
6	<i>To begin another extensive review of the literature (on the basis of the results of Stage-I of this research) to establish the theoretical basis for Stage-II of the research, and to formulate research issues for further examination</i>	5
7	<i>To collect and analyse data in Stage-II of the research</i>	6
Objective No.	Stage-III	Chapter No.
8	<i>To understand how local areas (local governments, municipalities, cities) around the globe are approaching adaptation planning, and how they could present adaptation options (lessons) for local governments in Pakistan (Stage-III)</i>	7
Objective No.	Climate adaptation strategy in Pakistani context	Chapter No.
9	<i>To design a strategy for building capacity to adapt to climate change impacts at the local government level in Pakistan</i>	8
10	<i>To discuss the strategy itself by proposing some initial practical actions for Pakistani local governments to help assess the practicality for implementing such a strategy</i>	8

Table 9.1: Relation of Chapters to Research Objectives

9.2.1 Research Objectives 1-5 (Stage-I)

These research objectives were addressed thoroughly in Chapters 2, 3 and 4 (Stage-I). The overall findings for this Stage of the research are briefly provided in the following paragraph.

The analysis (in accordance with the ranking of barriers against the criteria) of all diverse data collected during Stage-I of the research indicated that the lack of information, education, or training (learning dimension) as the key barrier to climate change adaptation at the local government level in Pakistan. This recognised the need to understand climate adaptation as an iterative learning process in Pakistani context. The multiple approach adopted during Stage-I of this research opened up a path for the next Stage (Stage-II) of this research. Specifically, the findings of Stage-I suggested the author to explore the literature once again to the extent that could enable him to identify the characteristics of Pakistani local government's capacity to change for learning in the context of climate adaptation action, and to present a broad picture of change for climate adaptation learning and action within the Pakistani urban local governments.

9.2.2 Research Objectives 6-7 (Stage-II)

These research objectives were addressed thoroughly in Chapters 5 and 6 (Stage-I). The overall findings for this Stage of the research are briefly provided in the following paragraphs.

The analysis of all diverse data collected during Stage-II of the research indicated that if applied carefully and willingly, then the learning organisation characteristics (leadership, vision, culture, good governance, innovation and creativity, and resources) might help bring about change for climate adaptation activity in urban Pakistani local governments. Further, this Stage of the research also found that progress towards the learning and action for climate change adaptation in Pakistani urban local governments was likely to be incremental, rather than an overnight transformation. However, in the urban Pakistani local level context, learning and action for climate change adaptation should not be ignored or disregarded. Rather, a start must be made.

The results in Stage-II also found that climate change adaptation in urban Pakistani local governments was needed to be esteemed and incorporated into the local level functions and the work life of the employees. Moreover, the results suggested that a process of learning and action for climate change adaptation at the urban local government level in Pakistan should have been gradually strengthened to establish a clear adaptation paradigm, and planned as a voyage (or steady pursuit) for evolving adaptation actions.

9.2.3 Research Objective 8 (Stage-III)

This research objective was addressed in Chapter 7 (Stage-III). The overall findings for this Stage of the research are briefly provided in the following paragraphs.

Stage III indicated that designing the climate adaptation strategies and integrating them into the local level development planning processes was not a simple process that could be accomplished easily in urban Pakistani local governments. Further, it suggested (first part) that adaptation strategies were unlikely to be implemented in true sense in any urban Pakistani local governments unless some of the enabling conditions for adaptation, specifically the elements of the change model for climate adaptation (leadership for adaptation, vision for adaptation, culture for adaptation, good governance for adaptation, innovation and creativity for adaptation, and resources for adaptation), are established (or are being established). The Stage-III (first part) also fortified the urge for committed and devoted institutional setups to lead and direct the local adaptation agenda all the way through various Pakistan related institutional impediments. Regarding the second part of the Stage-III (lessons supporting the ‘content’ for adaptation planning in urban Pakistani local governments) the analysis found that there were numerous tools that could be advantageous for local level adaptation planning in urban Pakistani local

governments undertaking adaptation planning. These tools included: scanning of local level climate change impacts on the basis of all available local or regional climate data; conducting studies of local level vulnerable urban sectors; and assessing risks and vulnerabilities to identify priority impacts and adaptation options.

9.2.4 Research Objectives 9-10 (adaptation strategy in Pakistani context)

In the second last chapter of this research (Chapter 8), the author finally dealt with two primary research questions (objectives 9 & 10) that were put forward in the start of this research: first, to design a strategy for building capacity to adapt to climate change impacts at the urban local government level in Pakistan; and second, to discuss the strategy itself by proposing some initial practical actions for urban Pakistani local governments to help assess the practicality for implementing such a strategy.

Therefore, based on the elements of change model for climate adaptation developed in Stage-II (Chapters 5 & 6), as well as lessons learnt from Stage-III (chapter 7) of the research, the author portrayed and discussed an integrated local level adaptation strategy for tackling climate change impacts in urban Pakistani context, besides taking into account the concept of ‘climate adaptation as a learning process’. The strategy encompassed four discrete elements (and eleven sub elements), and which were reported in chapter 8 of this thesis. The author believes that this proposed strategy is worthwhile for replicating adaptation learning and action across diverse urban local government categories areas in Pakistan – with differing topographies, characteristics, vulnerabilities, and climate risks. Also, he considers that this adaptation strategy is a practical and functional tool for recognising, executing, and appraising the adaptation requirements of any

urban Pakistani local governments, on a methodical basis, and could help providing assistance for dealing with the climate-related risks.

Overall, this is what the thesis has found and is summed up as follows:

- *Presence of effective local leadership.* The local adaptation leaders in urban Pakistani local governments could be the head of any local area from the political domain, or any other public functionary who is eager and committed to initiate and advance its local adaptation agenda by kicking off many actions, such as: (1) initiate assessments of current climate change trends and future projections for their area of jurisdiction based on available links and resources; (2) initiate undertaking climate risk and vulnerability assessments of their area of jurisdiction; (3) initiate identifying priority areas where adaptation learning and actions should be focused; and (4) initiate crafting adaptation learning and action plans using current and new tools, which can increase the effectiveness of adaptation to climate change in urban local areas of Pakistan.
- *Vision for climate adaptation.* The vision in urban Pakistani local governments should be based on three interlinked guiding principles: (1) adaptation activities (learning and action) are planned on the basis of learning from current knowledge of past climate inconsistency and extreme events; (2) adaptation activities (learning and action) are strongly connected to development processes, and planned within the on-going local level planning and development programmes; and (3) adaptation activities (learning and action) are taking place at different scales within the urban local governments, primarily with the help of Pakistani local government environment staff.

- *Culture within Pakistani urban local government.* The current organisational culture and departmental working process within Pakistani urban local governments do not encourage, support or value learning and action for climate change in most instances. A supportive organisational culture and well-coordinated departmental working process for initiating climate adaptation learning and action is very important in urban Pakistani local government context. However, the development of such culture and departmental working process for adaptation in urban Pakistani local governments would need more than just time, but the setting up of an entirely novel set of collective actions to make certain that this change can be attained.
- *Innovation and creativity for adaptation.* With an effective leadership, vision, and culture/departmental working process, many innovative actions could be planned and implemented in order to move the adaptation agenda forward. Pakistani urban local governments could initiate adaptation innovativeness through various means: working in partnerships with Pakistani local or provincial universities; networking to share adaptation information, knowledge & practices; connecting stakeholders and local residents on a continuing basis; and involving Pakistani provincial and federal governments in support of adaptation actions.
- *Adaptation attached to a 'good governance' agenda.* One of the important characteristics, amongst others, for successfully learning and implementing adaptation in urban Pakistani local government is the presence of governance related propitious conditions, including: modification of developmental programmes of urban Pakistani local governments; modification of rules and laws of urban Pakistani local governments; and modification of routines of urban Pakistani local private organisations and businesses working in those areas.

- *Adaptation funding.* There is a lack of availability of funding for implementing adaptation strategies in urban Pakistani local government. Pakistani provincial and federal governments can play an important role in advancing the urban resilience by providing funding mechanisms for local adaptation actions. Specifically, resources are required for carrying out actions related to the regional level climate related impact assessments, analysis of risks, and any planning actions thereafter. Developing programs and projects that attract funds, nationally and internationally, could also help encourage and enable local government to adapt ahead of climate impacts as opposed to in their wake. Additionally, any provincial and federal legislation that are proposed to combat climate change directly or indirectly could also help advance adaptation priorities by providing additional financial support at the local level.

9.3 Major Contributions Made by this Thesis

In this section, the author discusses the major contributions of this research work. First, he discusses thesis's contributions to theory and research. The second part describes briefly the contributions to practice.

9.3.1 Contributions to Theory and Research

The value of this thesis, in terms of climate change adaptation theory and research, rests on two critical elements. Initially, it reflects on the applicability of the learning organisation paradigm to the climate change adaptation agenda, by providing a theoretical underpinning to the organisational learning and learning organisation concepts. Subsequently, it applies a learning perspective to the climate change adaptation debate in the context of urban Pakistani local governments. Further, from a critical analysis of the conceptual evidence, this thesis identifies a

framing of six key characteristics for climate change adaptation learning and action often attributed to a learning organisation (stating it as a ‘change model for climate adaptation’). These characteristics (or elements) are categorised as: leadership for adaptation, vision for adaptation, organisational culture for adaptation, good governance for adaptation, innovation and creativity for adaptation, and resources for adaptation. The author believes that these six framing characteristics would be of potential relevance to bring about change for climate change adaptation learning and action in urban Pakistani local governments. However, he also considers that the majority, if not all, of the elements of this ‘change model for climate adaptation’ are likely to be essential and elementary for any urban Pakistani local government adaptation planning actions. Nonetheless, varied scenarios will need diverse unification of these elements. On the other hand, any urban Pakistani local government adaptation planning actions that give attention to only one or two elements of this ‘change model for climate adaptation’ are highly likely to be unsuccessful in enabling the urban Pakistani local governments to move successfully from words to adaptive actions.

9.3.2 Contributions to Practice

The research work carried out in this thesis has also numerous practice related contributions towards climate adaptation actions. For instance, this thesis is one of the first attempts in the context of urban Pakistani local governments that takes a comprehensive inventory of what is going on in field of climate adaptation and what sort of existing information is available in Pakistan. Further, it makes an analysis of what the major sources of resistance to climate change adaptation are, and what strategies could be used in urban Pakistani local governments to lower those resistances.

This thesis also examines some of the key conceptual ideas in the urban Pakistani local context, and designs a local level adaptation strategy for building capacity to adapt to climate change impacts at the urban local government level in Pakistan. Further, the thesis discusses the proposed strategy itself by proposing some initial practical actions for urban Pakistani local governments to help assess the practicality for implementing such a strategy. The author believes that this thesis could prove to be a practical and functional tool for recognising, executing, and appraising the adaptation requirements of any urban Pakistani local governments, on a methodical basis, and to provide assistance for dealing with the climate-related risks.

Importantly, the findings of this thesis could also be replicated in local governments of other Asian developing countries. Likewise, the results presented in this thesis are helpful in enabling different research organisations and international donor agencies to better understand the impacts of climate change in Asian developing countries by providing them with a pragmatic and functional adaptation strategy to work together for better implementation of climate change adaptation actions at local levels.

Overall, one of the strengths of this thesis is that it is an attempt to bridge the gap between the theoretical and practical aspects of organisational change for climate adaptation which could enable climate adaptation learning and action in any urban Pakistani local governments. However, grasping such an opportunity in real world practice will still be a major challenge, particularly in the urban Pakistani local government context, due to various Pakistan related institutional impediments (discussed in Chapter 8 of this research). The thesis responds to this knowledge gap through designing and executing a 3-Stage research methodology. Further, it is an experimental attempt to bring together a wide variety of fields, including climate adaptation, organisational learning, learning organisation, and planning and development for better enabling

climate adaptation actions in any urban Pakistani local governments. In so doing, the author considers that he has, in this thesis, addressed the research objectives that he initially planned to address.

9.4 Recommendations and Future Work: Recognising the Limitations of the Research

Conceivably, due to the wide-ranging features of this thesis, it could be argued that the further research opportunities are also extensive and, as a result, cannot be explicitly identified all at once. Nonetheless, the author believes that there are some research opportunities that are obvious and clear, and can be pointed out at this stage, and so are discussed here.

- *The first of these is that the four discrete elements of the local adaptation strategy, proposed in Chapter 8 of this research, are something that can be further researched as a part of a comprehensive research study involving a larger sample of both the staff and the urban local governments within Pakistan. Moreover, as the size of sample in this thesis (Stage-I, II and III) is somewhat small, but repeatedly very coherent, a wider study could be carried out involving a number of Pakistani local governments, from all other provinces as well, to extend the level of dependability and generalisability of the current findings.*
- *The second of these future research opportunities is that, an additional research study could also be carried out relating to various rural Pakistani local governments as well, to examine how reliable the findings are in relation to the urban Pakistani local governments. These outcomes could then be brought together and compared with the findings from a wider research study mentioned earlier in the above paragraph involving*

a number of Pakistani local governments from other provinces to offer a greater opportunity of comparison of the findings.

- *The third is that the scope of any future research work be extended to include a large number of stakeholders to be involved in each of the three Stages, especially in the first part of Stage-III, and therefore a broader set of views can be achieved from respondents. When this is combined with a wider research study of a larger number of local governments, indicating a wider number of local governments from all of the Pakistani provinces, then the outcomes will be more consistent, dependable and of greater generalisability. This would then offer the researchers with a more consequential view of the implications of the proposed change model for climate adaptation (Chapters 5 & 6) and the adaptation strategy (Chapter 8).*
- *The fourth of these future research opportunities is that, the type of the individual respondents has not been considered in each of the three Stages. For instance, the interactions of the respondent's gender, level of education, age, political views, personal experiences and many of other variables that have not been greatly or explicitly considered in this research. Moreover, these variables most likely have had a mild effect on the views of each respondent and might have affected the answers they gave in relation to the proposed six elements of the change model for climate adaptation, as well as the ratings of each research statements (Chapter 6). However, this is one of the aspects that could be taken care of in future research studies.*
- *Fifthly, the author considers that, in Pakistani context, those persons who recognise that they are included in a research study generally act in a different way from those persons who, in fact, do not be acquainted with that they are included in any research study. In*

this research, while there is a high level of uniformity in results, and especially in Stage-I and II a very high level of uniformity, could be due to the reasons that the respondents saw themselves as being different. The author considers that this may be the case but that the extent to which it had an impact is less likely, as there were a satisfactorily large enough number of persons to lessen that possibility. Furthermore, as the respondents were kept in ignorance of who was drawn in the research and when they were to be interviewed in each of the three Stages, the possibility that they could have discussed in any significant details to one another their remarks, is highly unlikely. Even so, this is a variable that could be further studied and examined, in relation to the outcomes of this research study.

- *Lastly, the most evident and understandable broadening of this research would be to employ the author's proposed change model for climate adaptation to other local governments within or outside the Pakistan, especially in the other developing countries of Asia, to test the broader validity and acceptability of the elements of change model for climate adaptation as well as the adaptation strategy to ascertain the relative significance of their various parts. Also, the adaptation strategy developed in this thesis has not been tested, so an evaluation of a strategy developed using this approach could be undertaken to verify this piece of research or to modify it.*

To bring the thesis to its conclusion in final and last couple of sentences, the author argues that at this point, the findings presented in this thesis are broadly correct, but realises that further research may endow with different comprehension and understanding of the topic. Further, he believes that the preceding outcomes and discussions during Stage-I, II and III have answered, with enough clarity and profundity, the initial research objectives outlined in Chapter 1 of this research.

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APPENDICES

Appendix A: Names of the Interviewees-Stage I

02 Local Climate Change Experts

Dr. Anwar Baig (A)

Dr. Khawaja (B)

02 Academics

Prof. Dr. Ishtiaq Qazi (C)

Prof. Dr. A. R. Saleemi (D)

Elected Local Government Functionaries

District Nazim Rawalpindi (E)

Tehsil Nazim Rawal Town (F)

Public Local Government Functionaries

DCO-Rawalpindi (G)

EDO-Municipal Services (H)

EDO-Agriculture (I)

Appendix B: Final Questionnaire (Stage-I)



**Design and Social Context Portfolio
School of Global Studies, Social Science and Planning
GPO Box 2476V
Melbourne VIC 3000
Australia**

Dear
.....
.....

My name is Saleem. I am undertaking a PhD at RMIT University. The title of my research is *Opportunities for Climate Change Adaptation in Developing Countries – A Case Study of Local Governments in Pakistan*. Associate Professor Ian Thomas (Program Director Environment and Planning) and Dr. Martin Mulligan (Senior Research Fellow) are

supervising this research. Please read this sheet carefully and be confident that you understand the contents before deciding whether to participate.

Climate change is an issue that is being addressed at every level of government and society along two primary tracks: *mitigation* and *adaptation*. *Mitigation* of climate change refers to activities which reduce the greenhouse gases (GHGs) that result in global warming while *adaptation* refers to adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. *Mitigation* and *adaptation* are two alternative but important and complementary policy responses to climate change. The principal difference between the two response strategies is that *mitigation* attempts to prevent the climate change problem from occurring in the first place, while *adaptation* aims to cope with the problems of climate impacts which have not or are not going to be prevented either before, during or after they occur. Therefore, *mitigation* tries to reduce the source of the problem of climate change and hence the impact, while *adaptation* tries to reduce the consequences of those impacts.

The overall goal of this research is to explore opportunities for climate change adaptation at the local government level in Pakistan, and develop an action plan (strategies / policies / tools) for building capacity to adapt to climate change impacts. For achieving the goal, six objectives have been formulated:

find out threats and opportunities due to climate change at the local government level in developing countries and Pakistan; find out the best practice climate change adaptation models from current international practice; identify current adaptation activities in other countries, especially Asian / developing countries; identify barriers to climate change adaptation at the local government level internationally and in Pakistan; address key barriers and explore opportunities / develop an action plan (strategies / policies / tools) for building capacity to adapt to climate change impacts; formulate proposals necessary to maintain a long-term action plan for the inevitable climate change that will occur in Pakistan.

As part of my research I am conducting a survey. The survey uses a five point Likert scale (see attached) and some open ended questions. The survey should take approximately 30 minutes to complete. The purpose of the survey is to; collect initial primary data for the current levels of understanding and awareness of climate change impacts; identification and prioritisation of the potential threats, opportunities, barriers and adaptation strategies

The survey should be returned to the concerned channel from where you have received it. Once I receive the survey it will be saved on my laptop and any identifying features will be removed. Participation will form part of aggregated data. Identification of participants will not be made known.

There are no perceived risks outside your day-to-day activities. If you have any concerns that information provided during the questionnaire survey might entail some special risk, please do not hesitate to let me know. We can ensure that the information is not recorded or used in a manner that might entail risk to you or to others. Participation in this survey is voluntary and you can withdraw at any stage. If you decide to withdraw, any information you have provided will not be used. No personal identifiable information will be sought and your anonymity is fully guaranteed.

Information obtained will only be used for academic research purpose. Results may be presented in research papers, conferences, and forums. If you are willing to participate in this survey, please sign this form below. If you have any questions about the research, you may contact the senior research supervisor, Associate Professor Ian Thomas, on ian.thomas@rmit.edu.au

Yours Sincerely

<p>Saleem (Muhammad Saleem Janjua) PhD Candidate, RMIT University Melbourne, Australia</p>	<p>Supervisor: Associate Professor Ian Thomas Program Director Environment and Planning RMIT University Melbourne, Australia</p> <p>Supervisor: Dr. Martin Mulligan Senior Research Fellow RMIT University Melbourne, Australia</p>
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Questionnaire

1. Background Information

a) Which of the following best describes your affiliation?
(Please choose only one of the following)

Local govt. elected member

Local Government civil servant

Please write down the name of your organisation/office;

b) In which province of Pakistan your organisation operates?
(Please choose only one of the following)

Punjab

Sindh

N.W.F.P

Baluchistan

2. Current Levels of Understanding and Awareness of Climate Change Impacts

a) What changes in temperature over time, have you seen in the climate in your area?
(Please choose only one of the following)

- No changes Getting warmer Getting cooler Do not know

b) What changes in rainfall over time, have you seen in the climate in your area?
(Please choose only one of the following)

- No changes Getting drier Getting wetter Do not know

c) Do you think human activities contribute to these changes?
(Please choose only one of the following)

- Yes No Do not know

d) How would you rank your own awareness of the impacts climate change could have in your area?
(Please choose only one of the following)

- Not at all informed Slightly informed Informed Very well informed

e) Where have you most often read or heard about things to do with climate change? (You can select more than one)

- School education Work place Newspaper/radio/TV/magazines Other

If other, please explain here;

3. Identification and Prioritisation of the Current Actions, Potential Threats and Opportunities

a) On a scale of one to four where one “Not at all concerned” and four is “Very concerned”, how concerned is your local govt. about the impacts of climate change in the following sectors in your area?

Agriculture 1 2 3 4
Not at all concerned Slightly concerned Concerned Very concerned

Safe drinking water 1 2 3 4
Not at all concerned Slightly concerned Concerned Very concerned

Biodiversity 1 2 3 4
Not at all concerned Slightly concerned Concerned Very concerned

Health 1 2 3
4
Not at all concerned Slightly concerned Concerned Very concerned

Forestry 1 2 3
4
Not at all concerned Slightly concerned Concerned Very concerned

b) Does your organisation’s current policies, strategies and plans include provision for climate change mitigation?

Yes No Not sure

If ‘Yes’, please explain;

c) Does your organisation’s current policies, strategies and plans include provision for climate change adaptation?

Yes

No

Not sure

If 'Yes', please explain;

4. Barriers and innovation

a) Does Disaster Risk Reduction / Emergency Planning in your local government take climate change adaptation into account?

Yes

No

If 'Yes', please explain;

b) Thinking about actions/strategies that could be taken to adapt to climate change, on a scale of one to four where one is "strongly disagree" and four is "strongly agree", please express your views

It may cost money

to do these things 1 2 3 4
Strongly disagree Disagree Slightly disagree Strongly agree

It may be inconvenient 1 2 3 4
Strongly disagree Disagree Slightly disagree Strongly agree

Needs more information

about how & why to do it 1 2 3 4
Strongly disagree Disagree Slightly disagree Strongly agree

It is wastage of money 1 2 3 4
Strongly disagree Disagree Slightly disagree Strongly agree

Involves technological

Appendix D: Data Analysis – Professional Affiliation

Number of respondents	Professional affiliation	Percentage
24	LG elected members	40%
36	LG civil servants	60%

Table D.1: Stage-I Data Analysis-Professional Affiliation

Appendix E: Data Analysis – Understanding & Awareness

Changes in temperature over time

Number of respondents	Changes in temperature	Percentage
05	No changes	8%
35	Getting warmer	58%
11	Getting cooler	18%
09	Do not know	15%

Table E.1: Stage-I Data Analysis-Understanding & Awareness: Change in Tem

Changes in rainfall over time

Number of respondents	Changes in rainfall	Percentage
06	No changes	10%
26	Getting drier	43%
21	Getting wetter	35%
07	Do not know	12%

Table E.2: Stage-I Data Analysis-Understanding & Awareness: Change in Rainfall

Human activities and climatic changes

Number of respondents	Human activities contribute to climate change	Percentage
42	Yes	70%
07	No	12%
11	Do not know	18%

Table E.3: Stage-I Data Analysis-Understanding & Awareness: Human Activities

Own awareness of the impacts climate change

Number of respondents	Own awareness	Percentage
14	Not at all informed	23%
36	Slightly informed	60%
09	Informed	15%
01	Very well informed	2%

Table E.4: Stage-I Data Analysis-Understanding & Awareness: Own Awareness

Most often read / heard about things to do with climate change

Number of respondents	Mode of climate change information	Percentage
08	School education	13%
04	Work place	7%
46	Newspaper/radio/TV/magazines	77%
2	Internet	3%

Table E.5: Stage-I Data Analysis-Understanding & Awareness: Most Often Read or Heard

Appendix F: Data Analysis – Current Climate Change Actions, Potential Threats and Opportunities

a) On a scale of one to four where one “Not at all concerned” and four is “Very concerned”, how concerned is your local govt. about the impacts of climate change in the following sectors in your area?

Agriculture

Number of respondents	Agriculture-Local Govt concern	Percentage
05	Not at all concerned	8%
06	Slightly concerned	10%
29	Concerned	48%
20	Very concerned	33%

Table F.1: Stage-I Data Analysis-Current Climate Change Actions: Agriculture

Safe drinking water

Number of respondents	Safe water-Local Govt concern	Percentage
09	Not at all concerned	15%
07	Slightly concerned	12%
27	Concerned	45%
17	Very concerned	28%

Table F.2: Stage-I Data Analysis-Current Climate Change Actions: Safe Water

Biodiversity

Number of respondents	Biodiversity-Local Govt concern	Percentage
21	Not at all concerned	35%
25	Slightly concerned	42%
11	Concerned	18%
03	Very concerned	5%

Table F.3: Stage-I Data Analysis-Current Climate Change Actions: Biodiversity

Health

Number of respondents	Health-Local Govt concern	Percentage
12	Not at all concerned	20%
10	Slightly concerned	17%
23	Concerned	38%
15	Very concerned	25%

Table F.4: Stage-I Data Analysis-Current Climate Change Actions: Health

Forestry

Number of respondents	Forestry-Local Govt concern	Percentage
14	Not at all concerned	23%
21	Slightly concerned	35%
16	Concerned	17%
09	Very concerned	15%

Table F.5: Stage-I Data Analysis-Current Climate Change Actions: Forestry

b) Organization's current policies, strategies and plans include provision for climate change mitigation?

Number of respondents	Organisations involved in mitigation actions	Percentage
04	Yes	7%
42	No	70%
14	Not sure	23%

Table F.6: Stage-I Data Analysis-Current Climate Change Actions: Mitigation

c) Organization's current policies, strategies and plans include provision for climate change adaptation?

Number of respondents	Organisations plans include adaptation	Percentage
03	Yes	5%
13	No	22%
44	Not sure	73%

Table F.7: Stage-I Data Analysis-Current Climate Change Actions: Adaptation

Appendix G: Data Analysis – Barriers to Climate Change Adaptation

Thinking about actions/strategies that could be taken to adapt to climate change, on a scale of one to four where one is “strongly disagree” and four is “strongly agree”, please express your views

Barrier: It may cost money to do these things	Number of respondents	Percentage
Strongly disagree	03	5%
Disagree	05	8%
Slightly disagree	12	20%
Strongly agree	40	67%

Table G.1: Stage-I Data Analysis-Barriers: Cost Money

Barrier: It may be inconvenient	Number of respondents	Percentage
Strongly disagree	04	07%
Disagree	14	23%
Slightly disagree	12	20%
Strongly agree	30	50%

Table G.2: Stage-I Data Analysis-Barriers: Inconvenient

Barrier: Needs more information about how and why to do it	Number of respondents	Percentage
Strongly disagree	01	2%
Disagree	03	5%
Slightly disagree	08	13%
Strongly agree	48	80%

Table G.3: Stage-I Data Analysis-Barriers: Information

Barrier: It is wastage of money	Number of respondents	Percentage
Strongly disagree	32	53%
Disagree	20	33%
Slightly disagree	05	08%
Strongly agree	03	05%

Table G.4: Stage-I Data Analysis-Barriers: Wastage of Money

Barrier: No regulatory requirement	Number of respondents	Percentage
Strongly disagree	04	7%
Disagree	07	12%
Slightly disagree	11	18%
Strongly agree	38	63%

Table G.5: Stage-I Data Analysis-Barriers: Regulations

Barrier: The benefits will be gained by others, not our organisation	Number of respondents	Percentage
Strongly disagree	18	30%
Disagree	03	05%
Slightly disagree	20	33%
Strongly agree	19	32%

Table G.6: Stage-I Data Analysis-Barriers: Benefits

Barrier: It involves technological expertise	Number of respondents	Percentage
Strongly disagree	07	12%
Disagree	08	13%
Slightly disagree	10	17%
Strongly agree	35	58%

Table G.7: Stage-I Data Analysis-Barriers: Technology

c) Would you like to be involved in the future stages of this research?

Yes	46
No	14

Table G.8: Stage-I Data Analysis-Future Involvement

Appendix H: Data Analysis – List of Participants in Stage-II

Local Government	Senior / Technical Executives Case-1	General Staff Case-2
Local Government (City District Government, Lahore)	Zila Nazim (Distt. Nazim)-LHR (A)	Distt. Officer (HRM)-LHR (A)
	Distt. Coordination Officer (DCO) - LHR (B)	Deputy Distt. Officer (HRM) –LHR (B)
	Executive Distt. Officer (Municipal Services) -LHR (C)	Distt. Officer (Planning) -LHR (C)
	Distt. Officer (Environment) -LHR (D)	Deputy Distt. Officer (Planning) - LHR (D)
	Deputy Distt. Officer (Environment) -LHR (E)	Environment Inspector-A (E)
	Prof. Dr. A. R. Saleemi, UET-LHR (F)	Environment Inspector-B (F)
	Dr. J. R. Rabbani, UET-LHR (G)	Environment Field Assistant-A (G)
	Ahmed Saeed, Principal Expert-CC, IUCN (H)	Environment Field Assistant-B (H)

Table H.1: Stage-II: Details of Participants

Appendix I: Ethical Committee Approval Letter



Human Research Ethics Sub-Committee
Office of the Pro Vice-Chancellor
Phone: 9925-2974
Fax: 9963-2891
Email: cheryl.deleon@rmit.edu.au

10 November 2008

Muhammad Saleem Janjua
5/1310 Sydney Road
FAWKNER 3060

Dear Muhammad,

Re: Human Research Ethics Application – Register Number HRESC-A-129-08/08

The Design and Social Context Portfolio Human Research Ethics Sub-Committee, at its meeting on 17 October 2008 assessed your ethics application entitled “*Opportunities for Climate Change Adaptation in developing Countries- A Case of Local Government in Pakistan*”

I write to advise that your application **will** receive approval as **Risk Level 2** classification **subject** to the following minor amendments being sighted to the satisfaction of the Chair:

Section B: Project Particulars

B2 - Please clarify if/how permission will be forthcoming to conduct interviews. Participants in small discussions must agree to confidentiality. How are participants recruited?

Section C: Details of Subject

C1- The role of staff and academics is important and needs to be stated.

Section D: Project Classification and Estimation of Potential Risk

D1- Reclassify as Level 2, as individuals will be speaking on behalf of their employer.

Section E: Informed Consent

E1- Remove ‘under 18’ section from consent form. Also add RMIT letterhead and contact details

Further issues:

- Many of the questions read like they are statements, and could be viewed as prompts to the participants to confirm your ideas.

If you have any questions about this letter, please contact the Acting Chair of the Ethics sub-committee
Dr Suellen Murray

Please note that if the committee does not receive a response to this letter **within 2 months** from the date of the letter, it will be assumed that you are no longer seeking approval for your project and your application will be withdrawn.

I wish you well in your research.

Yours sincerely,
Andrew Hyde for (CHERYL C. DE LEON)
Secretary, DSC Ethics Sub-Committee

cc: A/P Ian Thomas, GSS&P

**Design and Social Context
Portfolio Office**

Building 8, Level 8
360 Swanston Street
Melbourne VIC 3000
Australia

GPO Box 2476V
Melbourne VIC 3001
Australia

Tel. +61 3 9925 2226
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• www.rmit.edu.au

Appendix J: Plain-English Description for Interviews (Stage-II)



Design and Social Context Portfolio
School of Global Studies, Social Science and Planning
GPO Box 2476V
Melbourne VIC 3000
Australia

Dear
.....
.....

My name is Saleem. I am undertaking a PhD at RMIT University. The title of my research is *Opportunities for Climate Change Adaptation in Developing Countries – A Case Study of Local Governments in Pakistan*. Associate Professor Ian Thomas (Program Director Environment and Planning) and Dr. Martin Mulligan (Senior Research Fellow) are supervising this research. Please read this sheet carefully and be confident that you understand the contents before deciding whether to participate.

Climate change is an issue that is being addressed at every level of government and society along two primary tracks: *mitigation* and *adaptation*. *Mitigation* of climate change refers to activities which reduce the greenhouse gases (GHGs) that result in global warming while *adaptation* refers to adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. *Mitigation* and *adaptation* are two alternative but important and complementary policy responses to climate change. The principal difference between the two response strategies is that *mitigation* attempts to prevent the climate change problem from occurring in the first place, while *adaptation* aims to cope with the problems of climate impacts which have not or are not going to be prevented either before, during or after they occur. Therefore, *mitigation* tries to reduce the source of the problem of climate change and hence the impact, while *adaptation* tries to reduce the consequences of those impacts.


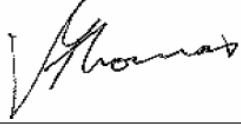
The overall goal of this research is to explore opportunities for climate change adaptation at the local government level in Pakistan, and develop an action plan (strategies / policies / tools) for building capacity to adapt to climate change impacts. For achieving the goal, six objectives have been formulated: find out threats and opportunities due to climate change at the local government level in developing countries and Pakistan; find out the best practice climate change adaptation models from current international practice; identify current adaptation activities in other countries, especially Asian / developing countries; identify barriers to climate change adaptation at the local government level internationally and in Pakistan; address key barriers and explore opportunities / develop an action plan (strategies / policies / tools) for building capacity to adapt to climate change impacts; formulate proposals necessary to maintain a long-term action plan for the inevitable climate change that will occur in Pakistan.

As part of my research I am conducting few semi-structured interviews. The interviews should take approximately 30 minutes to complete. The purpose of the interviews is to; collect initial primary data for the current levels of understanding and awareness of climate change adaptation at the organisational level. The interview discussions will be saved on my laptop and any identifying features will be removed. Identification of participants will not be made known.

There are no perceived risks outside your day-to-day activities. If you have any concerns that information provided during the interviews might entail some special risk, please do not hesitate to let me know. We can ensure that the information is not recorded or used in a manner that might entail risk to you or to others. Participation in these interviews is voluntary and you can withdraw at any stage. If you decide to withdraw, any information you have provided will not be used. No personal identifiable information will be sought and your anonymity is fully guaranteed.

Information obtained will only be used for academic research purpose. Results may be presented in research papers, conferences, and forums. If you are willing to participate in this survey, please sign this form below. If you have any questions about the research, you may contact the senior research supervisor, Associate Professor Ian Thomas, on ian.thomas@rmit.edu.au

Yours Sincerely

 <p>Saleem (Muhammad Saleem Janjua) PhD Candidate, RMIT University Melbourne, Australia</p>	 <hr/> <p>Supervisor: Associate Professor Ian Thomas Program Director Environment and Planning RMIT University Melbourne, Australia</p> <p>Supervisor: Dr. Martin Mulligan Senior Research Fellow RMIT University Melbourne, Australia</p>
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Appendix K: Details about AdaptNet

AdaptNet is a decentralized network that creates common knowledge and reference points for participants; it offers information, analysis, and methodology to undertake climate change adaptive policy research. AdaptNet highlights best practice and demonstration projects. It focuses on cities and regions in Australia. AdaptNet produces a free fortnightly e-bulletin that includes 5 recent reports related to climate change adaptation. It publishes analytic papers, critiques and explanations of climate change adaptation practice. It supports the development of creative thinking in relation to climate change adaptation challenges and facilitates an open exchange of views and ideas. AdaptNet has been running since 5 December 2006.

In the last three and half years since AdaptNet was created, the field of climate adaptation has changed significantly. The need for Australian areas to adapt to climate change is now recognised as imperative; and many Australian regions and cities are grappling with the complex issues of planning for and dealing with the unavoidable impacts of an already changing climate. The debate around what to do and how to do it has become more sophisticated as we learn from each other – from our shortcomings as well as our successes. Therefore, in the start of 2010, it was

time for us too, to consolidate some of the learning of the past years. Hence, we made some significant changes in AdaptNet: we refined the content parameters, revisited the publishing schedule and invited a number of experts to provide us with additional support in order to continue to improve the quality of the reports and research that we list in AdaptNet. These changes were made under the guidance of the new leader of the climate change adaptation programme at RMIT – Associate Professor Darryn McEvoy, who is also acting as the Deputy Director of the newly established Victorian Centre for Climate Change Adaptation Research (VCCAR). Professor Peter Hayes continues as the foundation project advisor of AdaptNet. We retained and strengthened our focus on climate adaptation in Australia and the Asia-Pacific region, as well as taking into account the most salient research and reports coming from the wider international arena.

AdaptNet has built up its subscriber base of **1435** e-mail addresses so far. These subscribers are from at least 50 different countries. Australia is our strongest country, but we have subscriptions from as far away as Djibouti, Tajikistan and the Federated States of Micronesia. Of the 923 addresses (English edition) where we can identify the type of organisation, we have 285 educational organisations (generally universities), 274 non-profit organisations, 226 government organisations, and 138 international organisations. The largest single subscriber group is RMIT University (at least 65 subscribers) and then the Victorian government (at least 55 subscribers). The Web archives are well indexed by the major search engines. “AdaptNet” is the top result for that term in both Yahoo and Google, where it is competing against two technology companies and a college in the US. It also appears on the first page of results for “Climate Change Adaptation” in Yahoo. Many websites house a link to AdaptNet, including: NCCARF; UN Framework Convention on Climate Change (UNFCCC); UNDP; World Bank; ALM; Danish Development Research Network (DDRN); UKCIP; International Institute for Sustainable Development (IISD); Tiempo Climate Portal; Linking Climate Adaptation Network, and many others.

AdaptNet currently produces its e-bulletin in 3 languages: English, Bahasa Indonesia, and Vietnamese. AdaptNet has a repository of information related to urban climate change adaptive policy research and analysis that goes back to 2006.

Adaptnet can be found at: <http://www.nautilus.org/mailling-lists/adaptnet/english/2010>

Appendix L: Final Questionnaire (Stage-III)



Design and Social Context Portfolio
School of Global Studies, Social Science and Planning
Melbourne, VIC 3000
Australia

Dear

My name is Saleem. I am undertaking a PhD at RMIT University. The title of my research is *Opportunities for Climate Change Adaptation in Developing Countries-A Case Study of Local Governments in Pakistan*. Associate Professor Ian Thomas (Program Director Environment and Planning) and Dr. Martin Mulligan (Senior Research Fellow) are supervising this research. I am also working as editor of AdaptNet (ISSN: 1836-2478) which is a free weekly publication focused on urban climate change adaptation prepared by the Global Cities Research Institute at RMIT University, Melbourne, Australia. It focuses on cities in Australia and the Asia-Pacific region, but acknowledges the global network of cities.

<http://www.globalcollab.org/gci/adaptnet> (I have included more details below).

The overall goal of my PhD research is to explore opportunities for climate change adaptation at the urban local government level in Pakistan, and to develop an action plan for building capacity to adapt to climate change impacts. For achieving the goal, 5 objectives have been formulated: find out threats and opportunities due to climate change at the urban local government level in developing countries and Pakistan; identify current urban adaptation activities in other countries, especially Asian / developing countries; find out the best practice urban climate change adaptation models from current international practice; and explore opportunities / develop an action plan (strategies / policies / tools) for building capacity to adapt to climate change impacts; formulate proposals necessary to maintain a long-term action plan for the inevitable climate change that will occur in Pakistan.

As part of my PhD research I am conducting a survey (see below). The survey should take approximately 30-45 minutes to complete.

The purpose of this survey is to derive lessons from the current local level adaptation practices being carried out in different parts of the world. Specifically, I will consider three focal questions for seeking responses in this questionnaire. First, what is the background of the local area for which climate adaptation plan has been prepared? Second, what factors are important in guiding the development of a local adaptation plan /what were the drivers of adaptation planning in the local area? Third, what mechanism/tools were prescribed and used in the local adaptation plan?

Information obtained will only be used for academic research purpose. Results may be presented in research papers, conferences, and forums.

If you have any questions about the research, please don't hesitate to ask. I would be happy to explain you further.

Yours Sincerely

Saleem

Questionnaire

Section-I: Background Information

Q 1: What is the name given to the climate adaptation plan?

Q 2: What is the name and population of the local area for which climate adaptation plan has been prepared?

Name: -----

Population: -----

Q 3: What is the type of area?

- 1 2 3 4
Urban Coastal Rural Other, please explain below

Q 4: On a scale of 1 to 4 where 1 is “not at all concerned” and 4 is “very concerned”, how concerned is your local government/city/municipality about the following issues in relation to adapting to climate change?

Water (supply scarcity, contamination, demand, other)

- 1 2 3 4
not at all concerned slightly concerned concerned very concerned

Please explain the particular concern you have: -----

Public Health (due to pollution, increasing heat, other)

- 1 2 3 4
not at all concerned slightly concerned concerned very concerned

Please explain the particular concern you have: -----

Energy (high energy demand/increased energy consumption, other)

- 1 2 3 4
not at all concerned slightly concerned concerned very concerned

Please explain the particular concern you have: -----

Ecosystem (degradation, fire, food shortage, other)

1 2 3 4
not at all concerned slightly concerned concerned very concerned

Please explain the particular concern you have: -----

Human settlement (inland floods, coastal floods, other)

1 2 3 4
not at all concerned slightly concerned concerned very concerned

Please explain the particular concern you have: -----

Other, if any: please explain: -----

Q 5: Does any adaptation plan exist at the level of your national government? Yes / No

If yes, what is its name & when was it approved? Can you please supply any information that would assist in obtaining a copy?

Name: -----

Approval date (month/year): -----

How to obtain a copy? -----

Q 6: Is the local level adaptation plan approved and being implemented? Yes / No

If yes, when was it approved? Who is the main agency(s) responsible for its implementation?

Approval date (month/year): -----

Implementing agency: -----

Section-II: Drivers of Adaptation Planning

Q 7: I am interested in understanding what factors have been important in guiding the development of the local adaptation plan in your area?

To help me understand, please indicate if you agree with the following statements;

(a) To initiate/implement any adaptation plan, local governments/city governments/municipalities need an appropriate and effective leadership, one that facilitates and/or empowers stakeholders and enables them to learn, develop and implement various climate adaptation actions.

Yes / No

If yes, can you please tell me how leadership manifested in your local government/city government/municipality that guided the development of local adaptation plan. Also, explain who were those leader(s) / champion(s), what did they do; how they initiated the local adaptation plan/adaptation process etc.

Note: If you need more space for your response, please add more lines.

(b) To initiate/implement any adaptation plan, local governments/city governments/municipalities need a vision (for direction and guidance), based on some principles, that is both commonly held and defined by all staff members.

Yes / No

If yes, can you please tell me how your local government/city government/municipality's vision helped bringing change in the context of climate adaptation learning and action. Also, please explain the vision; guiding principles etc.

Note: If you need more space for your response, please add more lines.

(c) To initiate/implement any adaptation plan, local governments/city governments/municipalities need an organizational culture that not only supports but, values and encourages learning and action for climate adaptation.

Yes / No

If yes, can you please tell me what type of culture your local government / city government / municipality demonstrated that helped bringing change in the context of climate adaptation learning and action.

Note: If you need more space for your response, please add more lines.

(d) To initiate/implement any adaptation plan, local governments/city governments/municipalities need characteristics of good governance (devolution and independence; answerability and transparency; responsiveness and flexibility; participation and inclusion; and experience and support) that support effective climate adaptation learning and action.

Yes / No

If yes, can you please tell me how each of the above mentioned good governance components relates to, and helped, implementing climate adaptation learning and action in your local government/city government/municipality.

Note: If you need more space for your response, please add more lines.

(e) To initiate/implement any adaptation plan, local governments/city governments/municipalities need to establish enabling conditions and then identify local area specific climatic impacts, risk/vulnerability assessment, and develop adaptation strategies to maximize the use of their staff's innate *innovation and creativity*.

Yes / No

If yes, can you please tell me how your local government/city government/municipality is making the best use of the staff's innate innovation and creativity for climate adaptation learning and action.

Note: If you need more space for your response, please add more lines.

(f) To initiate/implement any adaptation plan, local governments/city governments/municipalities need to be *funded sufficiently* by the internal (federal and/or provincial governments) and external (international donors) bodies.

Yes / No

If yes, can you please tell me what impact, if any, have funding constraints had on your local government/city government/municipality's ability to carry out its adaptation activities.

Note: If you need more space for your response, please add more lines.

Please suggest any other dimension(s) that relate to your local government/city government/municipality or outside your local government/city government/municipality (e.g. national, international, business, community, extreme event) that you feel have been important in guiding the development of your local adaptation plan.

Note: If you need more space for your response, please add more lines.

Section-III: Adaptation Plan: Steps Involved & Mechanism Used

Q 8: Who is the primary/main agency responsible for adaptation plan? (e.g. environment office; planning office; mayor's office; etc.)

Q 9: What are the main stages/steps involved in your local climate adaptation plan?

Q 10: Please identify main stakeholders/participants in your local government / city government / municipality who have been moving the adaptation plan forward.

Q 11: Please explain how participation of various stakeholders is being organized for implementing adaptation plan in your local area. (What is the coordination mechanism?)

Q 12: If you have additional thoughts, issues, or suggestions related to adaptation planning in developing-country cities/Pakistan, please write below.

Appendix M: Data Analysis – Background Information

Criterion	Albay	Cape Town	Durban
Name given to the local adaptation framework/strategy/plan	Albay in Action on Climate Change (A2C2)	Framework for Adaptation to Climate Change/ CAPA is in progress	Headline Adaptation Strategy (general guidelines) / sector specific municipal adaptation plans are in progress
Population	Province of Albay, Philippines; 1,190,823 (Based on August 2007 Census)	City of Cape Town; 3.5 million	City of Durban; 3.5 million
Climate Zone	tropical climate	Mediterranean climate	subtropical climate
Type of area	mainly non-coastal areas	coastal	coastal
How concerned is your local government/city/municipality about the following issues in relation to adapting to CC	<u>Water</u> (supply scarcity, contamination, demand, other) R-1: very concerned R-2: very concerned R-3: very concerned	<u>Water</u> (supply scarcity, contamination, demand, other) R-1: slightly concerned R-2: concerned R-3: very concerned	<u>Water</u> (supply scarcity, contamination, demand, other) R-1: concerned
	<u>Public Health</u> (due to pollution, increasing heat, other) R-1: very concerned R-2: very concerned R-3: very concerned	<u>Public Health</u> (due to pollution, increasing heat, other) R-1: slightly concerned R-2: concerned R-3: concerned	<u>Public Health</u> (due to pollution, increasing heat, other) R-1: concerned
	<u>Energy</u> (high energy demand/increased energy consumption, other) R-1: slightly concerned R-2: slightly concerned R-3: slightly concerned	<u>Energy</u> (high energy demand/increased energy consumption, other) R-1: very concerned R-2: concerned R-3: very concerned	<u>Energy</u> (high energy demand/increased energy consumption, other) R-1: very concerned
	<u>Ecosystem</u> (degradation, fire, food shortage, other) R-1: concerned R-2: concerned R-3: concerned	<u>Ecosystem</u> (degradation, fire, food shortage, other) R-1: concerned R-2: very concerned R-3: very concerned	<u>Ecosystem</u> (degradation, fire, food shortage, other) R-1: concerned
	<u>Human settlement</u> (inland floods, coastal floods, other) R-1: very concerned R-2: very concerned R-3: very concerned	<u>Human settlement</u> (inland floods, coastal floods, other) R-1: concerned R-2: very concerned R-3: concerned	<u>Human settlement</u> (inland floods, coastal floods, other) R-1: very concerned
	<u>Other, if any:</u> please Explain NIL	<u>Other, if any:</u> please Explain R-1: NIL R-2: agricultural failure,	<u>Other, if any:</u> please Explain NIL

		increased immigration from surrounding regions and southern Africa, loss of tourism potential, increased social and political unrest R-3: NIL	
National Strategy/Plan for Climate Adaptation?	NO	No plan exists, however A draft strategy exists	No plan exists
Is local adaptation plan approved? Being implemented? Implementing agency?	Yes; August 8, 2007; Center for Initiatives and Research on Climate Change Adaptation (CIRCA)	Not yet, however a draft has been approved & undergoing external review at this time / City of Cape Town Dept of Env Resource Management will implement it	Not yet / sector specific municipal adaptation plans are in progress at this time

Table M.1: Stage-III Data Analysis-Background Information

Appendix N: Data Analysis – Drivers of Adaptation Planning

Criterion	Albay	Cape Town	Durban
<p>What factors have been important in guiding the development of the local adaptation plan in your area?</p> <p><i>To help me understand, please indicate if you agree with the following statements</i></p>	<p>To initiate/implement any adaptation plan, local governments/city governments/municipalities need an appropriate and effective <i>leadership</i>, one that facilitates and/or empowers staff and enables them to learn, develop and implement various climate adaptation actions.</p> <p>R-1: Yes R-2: Yes R-3: Yes</p>	<p>To initiate/implement any adaptation plan, local governments/city governments/municipalities need an appropriate and effective <i>leadership</i>, one that facilitates and/or empowers stakeholders and enables them to learn, develop and implement various climate adaptation actions.</p> <p>R-1: Yes R-2: Yes R-3: Yes</p>	<p>To initiate/implement any adaptation plan, local governments/city governments/municipalities need an appropriate and effective <i>leadership</i>, one that facilitates and/or empowers stakeholders and enables them to learn, develop and implement various climate adaptation actions.</p> <p>R-1: Yes</p>
	<p>To initiate/implement any adaptation plan, local governments/city governments/municipalities need a <i>vision</i> (for direction and guidance), based on some principles, that is both commonly held and defined by all staff members.</p> <p>R-1: Yes R-2: Yes R-3: Yes</p>	<p>To initiate/implement any adaptation plan, local governments/city governments/municipalities need a <i>vision</i> (for direction and guidance), based on some principles, that is both commonly held and defined by all staff members.</p> <p>R-1: No R-2: No R-3: Yes</p>	<p>To initiate/implement any adaptation plan, local governments/city governments/municipalities need a <i>vision</i> (for direction and guidance), based on some principles, that is both commonly held and defined by all staff members.</p> <p>R-1: Yes</p>
	To initiate/implement any adaptation plan, local governments/city governments	To initiate/implement any adaptation plan, local governments/city	To initiate/implement any adaptation plan, local governments/city governments / municip

<p>municipalities need an <u>organizational culture</u> that not only supports but, values and encourages learning and action for climate adaptation.</p> <p>R-1: Yes R-2: Yes R-3: Yes</p>	<p>governments / municipalities need an <u>organizational culture</u> that not only supports but, values and encourages learning and action for climate adaptation.</p> <p>R-1: No R-2: Yes R-3: Yes</p>	<p>need an <u>organizational culture</u> that not only supports but, values and encourages and action for climate adaptation.</p> <p>R-1: Yes</p>
<p>To initiate/implement any adaptation plan, local governments/city governments/municipalities need characteristics of <u>good governance</u> (devolution and independence; answerability and transparency; responsiveness and flexibility; participation and inclusion; and experience and support) that support effective climate adaptation learning and action.</p> <p>R-1: Yes R-2: Yes R-3: Yes</p>	<p>To initiate/implement any adaptation plan, local governments/city governments/municipalities need characteristics of <u>good governance</u> (devolution independence; answerability and transparency; responsiveness and flexibility; participation and experience and support) support effective climate adaptation learning and action.</p> <p>R-1: No R-2: Yes R-3: Yes</p>	<p>To initiate/implement any adaptation plan, local governments/city governments/municipal need characteristics of <u>good governance</u> (devolution and independence answerability and transparency; responsiveness and flexibility; participati inclusion; and experience and support) that support effective climate adaptation learning and action.</p> <p>R-1: Yes</p>
<p>To initiate/implement any adaptation plan, local governments/city governments/municipalities need to establish enabling conditions and then identify local area specific climatic impacts, risk/vulnerability assessment, and develop adaptation strategies to maximize the use of their staff's innate <u>innovation and creativity</u>.</p> <p>R-1: Yes R-2: Yes R-3: Yes</p>	<p>To initiate/implement any adaptation plan, local governments/city governments/municipalities need to establish enabling conditions and then identify local area specific climatic impacts, risk/vulnerability assessment, and develop adaptation strategies to maximize the use of their staff's innate <u>innovation and creativity</u>.</p> <p>R-1: No R-2: Yes R-3: Yes</p>	<p>To initiate/implement any adaptation plan, local governments/city governments/municipal need to establish enabling conditions and then identify local area specific climatic impacts, risk/vulnerability assessment, and develop adaptation strategies to maximize the use of their staff's innate <u>innovation and creativity</u>.</p> <p>R-1: Yes</p>
<p>To initiate/implement any adaptation plan, local governments/city governments/municipalities need to be <u>funded sufficiently</u> by the internal (federal and/or provincial governments) and external (international donors) bodies.</p>	<p>To initiate/implement any adaptation plan, local governments/city governments/municipalities need to be <u>funded sufficiently</u> by the internal (federal and/or provincial governments) and external (international donors) bodies.</p>	<p>To initiate/implement any adaptation plan, local governments/city governments/municipal need to be <u>funded sufficiently</u> by the internal (federal and/or provincial governments) and external (international donors) bodies.</p>

	<p>R-1: Yes R-2: Yes R-3: Yes</p> <p><u>Any other characteristics?</u> One of the important aspect in Albay was our commitment to Integrate CC adaptation and DRR into its comprehensive land use plan (LUP).</p>	<p>R-1: Yes R-2: Yes R-3: Yes</p> <p><u>Any other characteristics?</u> * The fact that there are many international scientists working on CC has increased the profile of CC in CT * need a greater emphasis on public private partnerships, a shared responsibility and a re that CC is a problem we all share * Public pressure</p>	<p>R-1: Yes</p> <p><u>Any other characteristics?</u> The primary driving force for adaptation planning in Durban was due to an Individual (Dr. Roberts) with experience in environmental issues who was also aware of adaptation issues and commissioned a strategy for cc adaptation in Durban</p>
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Table N.1: Stage-III Data Analysis-Drivers of Adaptation Planning

Appendix O: Data Analysis – Adaptation Plans: Steps Involved

Criterion	Albay	Cape Town	Durban
Primary/main agency responsible for implementing adaptation plan?	Office of the Governor and Center for Initiatives and Research on Climate Change Adaptation (CIRCA)	Environmental Resource Management Department	Environmental Management Department in eThekweni Municipality (an expansion of what was previously Durban Municipality)
Main stages/steps involved in the local climate adaptation plan?	Government of Albay (PGA) follows a five-step-principle in its adaptation initiatives: 1. Make it a goal 2. Ordain policies 3. Build institutions 4. Execute programs and projects 5. Nurture Partnerships and mobilize resources.	1. Draft plan, 2. Workshops and consultation within the organizations, 3. Revised draft for public comment, 4. External review 5. final draft for approval	Study our strategy
Main stakeholders/participants who have been moving the adaptation plan forward?	Partnerships are evident with CIRCA's public and private partnerships with United Nations Development Programme, World Bank, Asian Development Bank, European Commission, World AgroForestry Centre, University of the Philippines Los Banos, Bicol University, Department of Education,	* Gregg Oloefse in Environment R & M Dept. * NGO's, CBO's Provincial Government and communities * Employees, NGOs	* lead responsibility for adaptation is attached to governments

	<p>Commission on Higher Education, Civil Service Commission, Department of Interior and Local Government, National Economic and Development Authority, Department of Tourism, Department of Science and Technology, Department of Health, Department of Environment and Natural Resources, Philippine National Police, PNOG-EDC, LCC Malls, Pacific Mall Legazpi, Christian Aid, Plan Philippines, Diocese of Legazpi in the different projects implemented for the past years. It is therefore apparent that participation started already from project conceptualization and planning.</p>		
<p>How participation is being organized? / coordination mechanism</p>	<ul style="list-style-type: none"> * CIRCA is empowering Albayanos for CC adaptation * With the participation of the Albayanos from all walks of life * CIRCA initiated the integration of CC and environmental knowledge into the academic curricula *an executive forum was conducted; participation and support of local leaders and chief executives * CIRCA involved the residents of the coastal communities in planting mangrove propagules in its coastal reforestation program * CIRCA also entered the threshold of the religious sector to hear their perspectives on climate change through an Inter-Faith Forum 	<ul style="list-style-type: none"> * Still under development * technical working groups most probably * engaging the private sector, civil society and local communities 	<p>primary mechanism for coordination is the strategy itself, however, it is under development phase through sector specific municipal adaptation plans (in-progress)</p>

Table O.1: Stage-III Data Analysis-Adaptation Plans: Steps Involved

Appendix P: Background Information about Albay

Albay is located between the provinces of Camarines Sur on the north and Sorsogon on the south. It is bounded on the east by the Pacific Ocean, on the northeast by Lagonoy Gulf, west and southwest by Buriás Pass. Albay has a land area of 2,552.6 square kilometres. About 50% of its total land area is mainly devoted to agriculture – with coconut and coco-based products as its major commodities, followed by corn and rice. As of May 2000, Albay has a total population of about 1.2 million, which makes it the 22nd most populous province in the country. The eastern half of Albay is founded by volcanic mountain ranges; it has no dry season but there is very pronounce maximum rainfall from November to January. While in the western half, rainfall is evenly distributed throughout the year. Average monthly rainfall is 233 millimetres with the lowest at 130 millimetres. In Albay, average monthly temperature ranges from 28.1 C to a low 25 C in January.

Albay with its geographical location is highly vulnerable to natural disasters. Located at the eastern Pacific seaboard, Albay is especially vulnerable to tropical storms and cyclones, which bring destructive winds, heavy rainfall and storm surges several times a year. Typhoons affecting the province and the Philippines as a whole, form in the Pacific Ocean, and move in a west-northwest direction, many times the wind intensifying to speeds of 200 kph.

Table 1 shows the affected population and damages caused by tropical cyclones from 1994 to 2006 in Albay Province. Although there is no clear temporal trend on the number of people affected and cost of damages, it is important to recognize the high vulnerability of the province to typhoons. Human settlements in the province along the coastlines are vulnerable to storm surges. Similarly, houses located at mountainsides with steep and unstable slopes are prone to landslides and mudslides.

	Typhoon Occurrences	Year	Affected Population				Total Damages (US\$)
			Persons	Dead	Injured	Missing	
1	Typhoon Akang	1994	18,036	47	112	1	2,211,904
2	Typhoon Gading	1994	6,799	1	2	1	1,546,644
3	Typhoon Mameng	1995	10,126	0	0	0	1,588,884
4	Typhoon Rosing	1995	440,372	44	20	2	11,991,106
5	Typhoon Pining	1997	1,800	0	0	0	836,956
6	Typhoon Loleng	1998	201,834	1	7	1	6,754,448
7	Typhoon Sendang	1999	1,122	0	0	0	2,444
8	Typhoon Reming	2000	27,547	12	1	2	7,188,989
9	Typhoon Senyang	2000	22,882	0	0	0	91,111
10	Typhoon Dindo	2004	33,892	0	6	1	5,038,046
11	Typhoon Unding	2004	1,744	0	0	0	942,094
12	Typhoon Yoyong	2004	18,372	0	10	1	1,124,229
13	Active Low Pressure – ITCZ	2005	19,062	4	0	0	3,099,983
14	Tropical Storm Caloy	2006	47,065	0	5	0	2,207,708
15	Typhoon Milenyo	2006	698,460	14	176		37,007,025
16	Typhoon Reming	2006	1,060,875	604	1465	419	71,787,460
	TOTAL						153,419,031

Source: PSWD/APSEMO (Daep 2007)

Table P.1: Disaster Occurrences in Albay (1994 – 2006)

Appendix Q: Background Information about Cape Town

Cape Town is the second most populous city in South Africa, forming part of the metropolitan municipality of the City of Cape Town. It is the provincial capital of the Western Cape, as well as the legislative capital of South Africa, where the National Parliament and many government offices are situated. Cape Town is famous for its harbour as well as its natural setting in the Cape floral kingdom, including such well-known landmarks as Table Mountain and Cape Point. Cape Town is Africa's most popular destination for tourism. Please see map of Cape Town below;

As of 2007 census, the city had an estimated population of 3.5 million. Cape Town's land area of 2,455 square kilometres (948 sq miles) is larger than other South African cities, resulting in a comparatively lower population density of 1,425 inhabitants per square kilometre (3,690 /sq mile).

The Cape Peninsula has a Mediterranean climate, as does most of California, South Western Australia and much of the Mediterranean. The city has well-defined seasons. In winter, which lasts from May to September, large cold fronts come across from the Atlantic Ocean with heavy precipitation and strong north-westerly winds. The winter months are cool, with an average minimum temperature of 7 °C (45 °F) and an average maximum of around 17 °C (63 °F). Most of the city's annual rainfall occurs in wintertime, but due to the mountainous topography of the city, rainfall amounts for specific areas can vary dramatically. Newlands, to the south of the city, is the wettest suburb in South Africa. The valleys and coastal plains average 515 millimetres (20 in) of rain per annum, while mountain areas can average as much as 1,500 millimetres (60 in) per annum. The summer, which lasts from November to March, is warm and dry. The Peninsula gets frequent strong winds from the south-east, known locally as the Cape Doctor, because it blows away pollution and cleans the air. The south-easterly wind is caused by a high-pressure system which sits in the South Atlantic to the west of Cape Town, known as the South-Atlantic High. Summer temperatures are mild, with an average maximum of 26 °C (79 °F). Cape Town can be uncomfortably hot when the Berg Wind, meaning "mountain wind" blows from the Karoo interior for a couple weeks in February or early March.

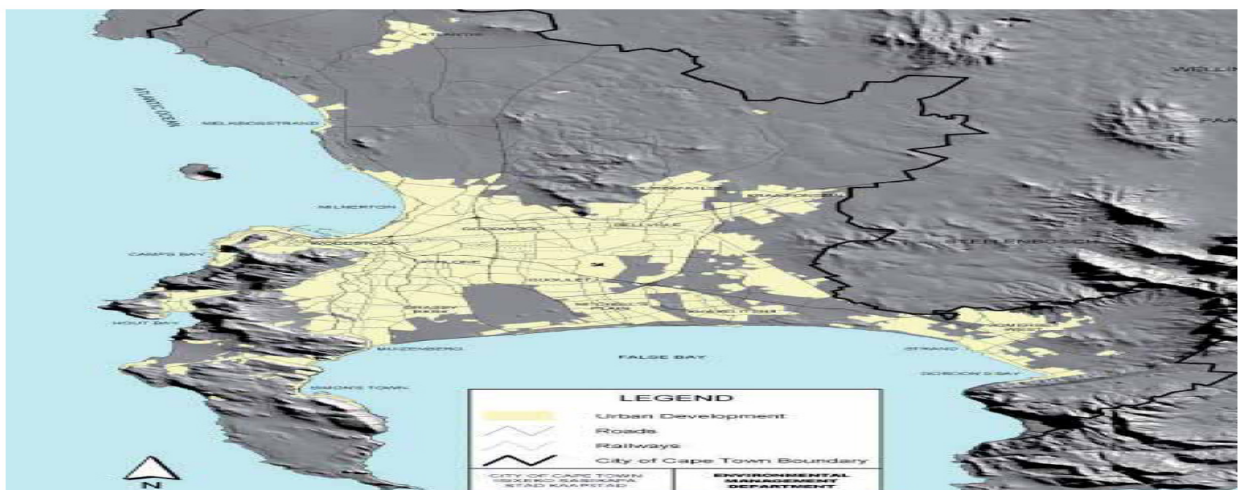


Figure Q.1: Map of City of Cape Town

Appendix R: Background Information about Durban

Durban is the third most populous city in South Africa, forming part of the eThekweni metropolitan municipality. It is famous as the busiest port in Africa. It is also a major centre of tourism due to the city's warm subtropical climate and beaches. According to the 2007 survey, the city has a population of almost 3.5 million. Durban's land area of 2,292 square kilometres (884.9 sq miles) is comparatively larger than other South African cities, resulting in a somewhat lower population density of 1,513 inhabitants per square kilometre (3,918.7/sq mile). See map of Durban below.

Durban is characterized by a mild subtropical climate with warm wet summers and mild moist to dry winters, which are frost-free. However, due to large altitude variations, some western suburbs get very cold in the winter. Durban has an annual rainfall of 1,009 millimetres (39.7 in). The average annual temperature is 21°C, with daytime maxima peaking from January to March at 28 °C (82 °F) and the minimum is 21 °C (70 °F), dropping to daytime highs from June to August of 23 °C (73 °F) and the minimum is 11 °C (52 °F). The metropolitan area is topographically hilly, with very few flat areas, except in the immediate vicinity of the central business district and the harbour. The western suburbs off Hillcrest and Kloof are significantly higher above sea-level, reaching up to 850 meters (2,789 ft) in the community of Botha's Hill. Many gorges and ravines are found within the metropolitan area. There is almost no true coastal plain.

The local government structure responsible for managing the city is known as eThekweni Municipality, and this municipality is one of the leaders in the field of local level environmental management in the region.

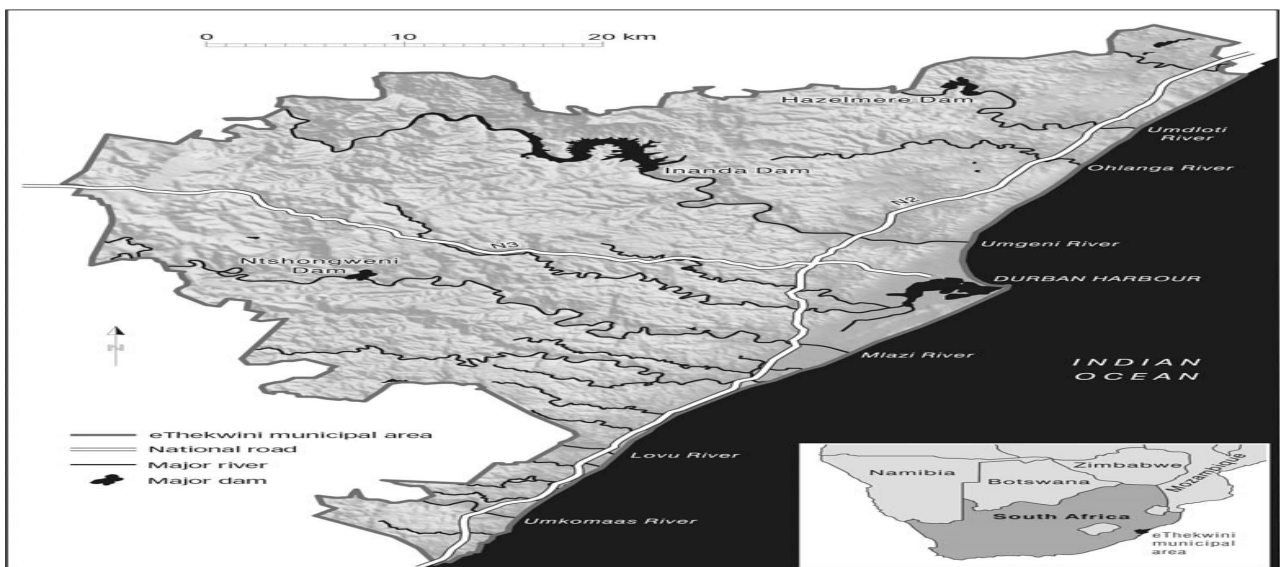


Figure R.1: Map of Durban