Chapter 6
Climate Change in the Built Environment:
Addressing Future Climates in Buildings

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ABSTRACT

Despite a growing awareness of climate change, there is little evidence that this is being addressed in cities and built environments. Events such as flooding in Houston, USA; landslides in Free Town, Sierra Leone; and water shortages in La Paz, Bolivia and Cape Town in South Africa demonstrate that it is increasingly important that climate change is understood and addressed in built environments to ensure that they become more resilient. This chapter introduces climate change and outlines the implications of this for built environments. It describes measures that can be incorporated into built environments to enable them to adapt to projected climate changes. Understanding climate change and preparing for this by developing built environments that are more resilient will be an increasingly valuable and important skill. Reading this chapter will support the development and refinement of skills and knowledge in this area and it is an essential reference for built environment students and practitioners.

INTRODUCTION

Climate change is now considered as one of the most important issues facing the world today (Hamin & Gurran, 2009). Climate change science has also developed

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to such as extent that climate change projections can be made within an increasing level of accuracy and detail (Hamin & Gurran, 2009; Guan, 2009).

Simulations now provide climate projections with some degree of certainty 20, 50 and 100 years into the future. Projections describe aspects of climate that will change such as temperatures, the occurrence of very hot days, annual rainfall, heavy rainfall, wind speeds and extreme weather conditions. Current weather data already indicates that climate change is occurring and is confirming the accuracy of climate change projections.

As built environments usually have a lifespan of at least 50 years it is important to understand how climates may change over this period and how this can be addressed in new buildings and urban development proposals (Guan, 2009). Existing built environments must also be assessed in terms of projected climate changes and required adaptations carried out.

This chapter has been developed to support a better understanding of climate change and how it can be addressed in the built environment. It aims to answer the following questions:

- What is climate change?
- What are climate change projections?
- What are the implications of these projections for the built environment?
- How can the built environment be adapted for projected changes?

WHAT IS CLIMATE CHANGE?

Climate change describes a change in the state of the climate that persists for an extended period. This is identified by changes to the mean, for instance, mean temperatures over a long period. Climate change, such as the occurrence of the Ice Ages, can be attributed to natural causes or to human activity. The climate change that is currently being experienced has been directly attributed to human activity (IPCC, 2014).

Current climate change, which is also referred to as global warming, is a result of the greenhouse effect. The greenhouse effect is caused by greenhouse gases, such as carbon dioxide, methane, nitrous oxide and chlorofluorocarbons in the atmosphere trapping heat from the sun and limiting the extent to which this heat is reradiated into space. Increases in these gases in the atmosphere result in a stronger 'greenhouse effect' and leads to higher temperatures and climate change.

Of the greenhouses gases, increases in carbon dioxide have had the most significant impact. Rising carbon dioxide levels are attributed to reduced capacity by vegetation