CHAPTER 1

Introduction

Raindrops on the water.
WWF, Photo Library

Introduction

Though floods are the most common natural disaster and cause the greatest number of deaths and the most damage, the danger that they present is often underestimated. Serious floods occur at intervals of many years and thus lessons about flood precautions learned by one generation may have to be relearned by the next. The wide range of behaviour that rivers can also be deceptive. The gentle stream meandering through the pastures may with little warning become a raging, destructive torrent following a storm. One purpose of this book is to outline the dangers that floods present for people living and working alongside rivers.[1]

Flooding arises from a number of different causes. River flooding results from long periods of heavy rain or the melting of snow over large areas. The Great Flood of 1993 on the Mississippi[2] was a particularly severe example of a river flood lasting several months. On the other hand flash floods are caused by short intense storms (typically thunderstorms) over a small river basin, producing a flood that rises rapidly to a relatively high peak. Though a flash flood affects only a limited area the damage can be severe because of the high flow and sudden onset. Though flash floods can occur anywhere they are particularly common in arid areas and in the mountains where intense thunderstorms frequently occur.

A storm surge is a coastal or estuary flood produced by the passage of a low pressure centre accompanied by high winds, causing the sea to invade the land. Much of the damage from a tropical cyclone, hurricane or typhoon is due to the storm surge that it causes. Storm surges also happen outside the tropics, and any low-lying coastal area may be subject to a storm surge in times of severe weather. Often the weather system that causes the surge will also result in heavy rain inland-leading to river flooding which will combine with the storm surge in the lower reaches of the river.

There are many steps that can be taken and-perhaps more important-many actions that should be avoided to reduce the effects of flooding. Another purpose of this book is to introduce these measures with enough technical background to justify them. This book is addressed to all who are interested in floods who wish to know more about the factors affecting their frequency and severity, and how the damage caused by floods can be mitigated without having to become an expert in hydrology meteorology or river engineering. This book is written not only for the decision-maker or administrator who is responsible for disaster mitigation but also the interested citizen in the belief that a better-informed citizenry will build a constituency for the decision makers to implement more rational flood mitigation policies. A better understanding of the technical issues involved will make it possible for the public at large to communicate better with the technical experts who are called in to design and implement flood protection and alleviation measures.

Chapter 2 discusses some basic hydrological ideas as a background to the later chapters. Chapter 3, on flood plain management, introduces the concept of flood plain, the area subject to flooding and thus the focus of all efforts to reduce flood damage discusses in general terms how to reduce damage from floods. The next

1. Some statistical information on floods and flood damage is given from page 6 to page 8.
2. See page 9.

Flooded streets children in the rain, *Still Pictures. G. Noti*

two chapters describe the methods available. Chapter 4 deals with so-called structural measures including the use of dykes dams and diversion structures for protecting the flood plain from floods. Chapter 5 covers non-structural methods: regulation of the use of flood plains, to keep human activities out of the way of floods; floodproofing to render buildings safe against flooding; soil and water conservation measures to reduce flood runoff; and flood forecasting to warn against impending floods. Structural and non-structural methods are often set up in opposition to each other but in reality they must be considered complementary, both are needed in a comprehensive flood-protection scheme. Dams built for water supply, irrigation, hydropower and many other purposes, including flood control, represent a particular hazard and should one collapse the resulting flood can be catastrophic. Chapter 6 discusses how they can be designed safely against floods. Any flood- mitigation scheme can only be designed for a certain level of flood which will, sooner or later, be exceeded. When this happens it is important that the proper emergency response procedures are organized. These should of course be part of the particular society's normal emergency response procedures, and chapter 7 discusses their particular flood-related aspects. Chapter 8 draws some conclusions from the preceeding material and re-emphasizes the key points to be considered in flood alleviation and protection.