

## 4.1 INTRODUCTION

Our current understanding of human interference with the climate system indicates the possibility of rapid global-scale warming accompanied by changes in planetary-scale flow patterns and significant continental and regional-scale effects. However, the climate's evolution is substantially uncertain. Because of the complexity and nonlinear nature of the climate system itself, the error bars associated with the uncertainties of the future level of climate-modifying GHGs and aerosols are considerable, and the limitations in our scientific understanding severe. The inadequacy of the observational data base for the climate system and the computer resources required to effect a single prediction or an ensemble of predictions compound these difficulties. Nevertheless, a significant anthropogenically induced climate change is sufficiently likely to warrant an assessment of its possible nature, amplitude, and global and regional character.

In this context the term "scenario" has entered the discussion on climate change. Climate change scenarios are viewed as formal prescriptions of a plausible space-time evolution of the system. They are usually either physically or statistically based descriptions of future climatic conditions designed for a variety of purposes. For example they can be geared to providing insight on the climate system's sensitivity to pre-specified changes in the future climate forcing, to assessing climate change's relative importance compared to other aspects of global and regional change, and to exploring possible interactions of climate change with other anticipated environmental and socioeconomic trends.

This chapter focuses on regional scenarios for the future Alpine climate. Chapter 2 presented an overview of Alpine climate itself, and chapter 3 discussed aspects of its history. The next two sections outline the need for, and the framework of, scenario construction. Thereafter, section 4.4 provides a critical overview of the available techniques, followed in section 4.5 by a presentation and intercomparison of a series of Alpine scenarios associated with increased atmospheric GHG concentrations.