Preface

Society is at a turning point in how it copes with the environmental problems and security threats that often play out in the transport arena. The ideas for this book combine the science of networks and the fundamental importance of connectivity that transport provides in the context of the environment and security. These areas are usually explored as separate concepts and this book provides a convergence. Combining these areas creates new ideas and directions that would be overlooked by focusing on any one of these areas separately.

The book is not meant to be an exhaustive treatment of these three areas but rather selects those parts of each area that provide meaningful interconnections with the others. Environment is broadly construed to encompass ecology, the urban environment, and social justice related to transport. Security primarily pertains to effects of terrorism and can also pertain to effects of other extreme events. Transport focuses on surface transport and primarily rail and road based transport rather than air and marine travel.

The book offers new insights in a number of areas that address very current problems, for example, how to reduce the sensitivity of ecological systems to transport activity through the use of wildlife corridors and use transport density as an advantage in reducing vulnerabilities posed by environmental hazards and security breaches.

Chapter 1 presents the concept of networks as a framework for integrating the three themes of transport, environment, and security. This is applied to the forces that connect, then disconnect and reconnect people to urban settlements. Chapter 2 then provides the context for road and rail transportation networks primarily in the US. This is followed by an in-depth analysis of transit systems nationwide that illustrates how they are networked and the attributes of those networks, primarily as they affect concentration of services and the environmental and security issues this may create. Chapter 3 begins the environmental component with an analysis of how transportation and climate change are interrelated. The dual relationship of how transport affects climate and climate affects transport is underscored along with how development continues to shape both of them. Some of the newer technologies for adapting to climate change
are presented in light of heat and flooding. Chapter 4 provides solutions primarily in the form of reconfiguring transport networks and how institutional processes are organized to manage these changes. Chapter 5 extends the environment discussion in Chapter 3 from global climate change to some of the more traditional environmental areas that potentially influence transport networks, and also provides some unique network-based solutions to ecological problems. Chapter 6 introduces natural hazards and accidents that disrupt transport, and the role that transport in turn can play in alleviating some of the effects of these conditions. Chapter 7 brings in the third component, that of security, how transport has been a target, and what methods the US federal government has been implementing primarily in the form of funding to address these threats. Chapter 8 concludes with insights about future directions by taking advantage of network strategies to integrate the three areas.

The book provides some unique aspects of the transport, environment, and security nexus. It combines data on the environment and transport in order to obtain new insights into the relative ways energy is used. It also provides analyses of transit networks as a way of understanding their environmental and security dimensions. It provides unique analyses of new transport networks emerging in the form of fueling stations needed for new renewable fuels as well as environmental networks being created as ecological corridors to be compatible with transport networks.

The idea for this book came about over many years through separate research investigations in the environment, security and infrastructure, and a continuing interest in and fascination with network theory that dates back to my early studies in the natural and physical sciences. Since that time, the urban infrastructure domain through teaching, research and professional activities has provided an umbrella for continuing my work in the environmental field. That experience started with the first Earth Day and has evolved to encompass environmental justice, climate change, and the continuing catastrophes that overwhelm our lives. This book represents a beginning not an end.