

for understanding geographic concepts and asking geographic questions. How does solar energy influence the distribution of climates, soils, and living organisms in particular places and across regions? How do natural systems affect human populations, and, in turn, what impact are humans having on natural systems?

Although geography is not limited to place names, maps and location are central to the discipline and are important tools for conveying geographic data. Evolving technologies such as geographic information systems and the Global Positioning System are widely used for scientific applications and in today's society as hundreds of millions of people access maps and locational information every day on computers and mobile devices.

In response to increasing globalization and environmental change, the geography education guidelines—updated by the National Council for Geographic Education (NCGE)—have now redefined the essential elements (or themes) of geography, expanding their number to six: *the spatial world, places and regions, physical systems, human systems, environment and society, and uses of geography in today's society*. These categories emphasize the spatial and environmental perspectives within the discipline and reflect the growing importance of human–environment interactions.

The Geographic Continuum

Because many subjects can be examined geographically, geography is an eclectic science that integrates subject matter from a wide range of disciplines. Even so, it splits broadly into two primary fields: *physical geography*, comprising specialty areas that draw largely on the physical and life sciences; and *human geography*, comprising specialty areas that draw largely on the social and cultural sciences (Figure 1.2). The growing complexity of the human–Earth relationship in the 21st century has shifted the study of geographic processes even farther toward the center of the continuum, resulting ultimately in a more balanced, more holistic perspective—such is the thrust of *Elemental Geosystems*.

Within physical geography, research now emphasizes human influences on natural systems in all specialty areas, effectively moving this end of the continuum closer to the middle. For example, physical geographers monitor air

pollution, examine the vulnerability of human populations to climate change, study impacts of human activities on forest health and the movement of invasive species, study changes in river systems caused by dams and dam removal, and examine the response of glacial ice to changing climate.

Geographic Analysis

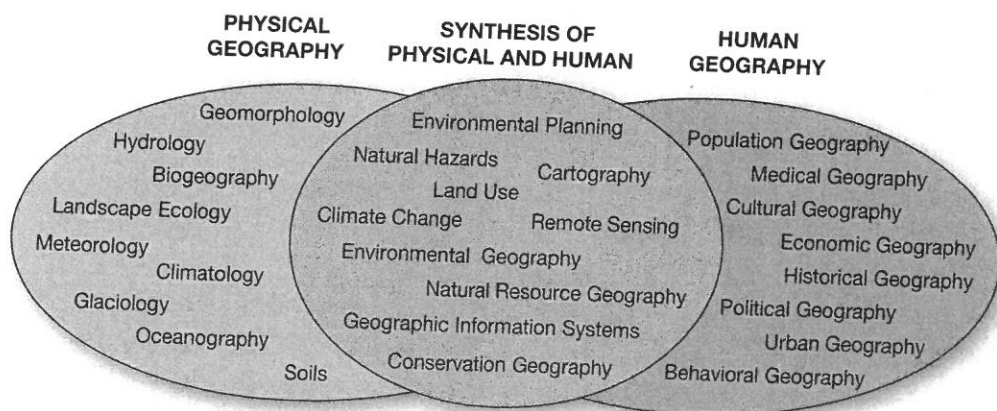
As mentioned earlier, the science of geography is unified more by its method than by a specific body of knowledge. The method is **spatial analysis**. Geographers view phenomena as occurring across spaces, areas, and locations. The language of geography—territory, zone, pattern, distribution, place, location, region, sphere, province, and distance—reflects this spatial view. Geographers analyze the differences and similarities between places.

Process, a set of actions or mechanisms that operate in some special order, is a central concept of geographic analysis. Among the examples you encounter in *Elemental Geosystems* are the numerous processes involved in Earth's vast water–atmosphere–weather system, in continental crust movements and earthquake occurrences, in ecosystem functions, and in river channel dynamics. Geographers use spatial analysis to examine how Earth's processes interact through space or over areas.

Therefore, **physical geography** is the spatial analysis of all the physical elements, processes, and systems that make up the environment: energy, air, water, weather, climate, landforms, soils, animals, plants, microorganisms, and Earth itself. Today, in addition to its place in the geographic continuum, physical geography encompasses the field of **Earth systems science**, the area of study that seeks to understand Earth as a complete entity, an interacting set of physical, chemical, and biological systems. With these definitions in mind, we now discuss the general process and methods used by scientists, including geographers.

The Scientific Process

The process of science consists of observing, questioning, testing, and understanding elements of the natural world. The **scientific method** is the traditional recipe of a scientific investigation; it can be thought of as simple, organized steps leading toward concrete, objective conclusions (Figure 1.3). There is no single, definitive method for scientific



◀Figure 1.2 The geographic continuum. Geography combines Earth topics and human topics, blending ideas from many different sciences. This book focuses on physical geography, but integrates pertinent human and cultural content for a whole-Earth perspective.