5 Non-renewable resources are non-living, or abiotic, such as minerals and fossil fuels. Non-renewable implies that there is a fixed or finite amount. In practical terms, it is not a simple matter to determine the fixed amount of a non-renewable resource such as oil or natural gas, much less gold or copper. More frequently we view these re- sources within a more specific, regional context and make projections about how long a particular mine or oil well will produce until it is exhausted. Even then, these estimates are often good only for a particular time and a particular technology. The concept of a finite amount of any resource is important to the management process.

6 Figure 7.1 is an ecosystem model of resource use, illustrating that our use of resources affects the environment and the use of other resources. The term fundamental resources refer to air (atmosphere), water (hydrosphere), and land (lithosphere). The mix of these three essential spheres, along with energy from the sun, produces photosynthesis. They are thus fundamental to life and are therefore known as life-giving resources.

7 The dynamics of the ecosystem model are revealed by looking at the example of how people rely on and use more and more fossil fuels for energy and materials. Using these non-living resources results in ever greater amounts of waste (pollution) such as sulphur dioxide, which is given off to the atmosphere, one of the fundamental resources. In the atmosphere, sulphur dioxide (S02) combines with water vapour (H2O) and falls as acid. Resource Management in a Changing Global Economy 111 precipitation (H2SO4), which affects the land (lithosphere) and the resources of the land, including living resources. Increased acidity from acid rain can have a serious impact on drinking water, forests, agriculture, and fish living in the streams and lakes (hydrosphere). Similarly, the increased production of carbon dioxide (CO 2) globally is responsible for climate change, and it will potentially have catastrophic effects on this province and the rest of the world (see Chapter 2 for more detail). The ecosystem model demonstrates the cyclical nature of resource use, thereby recognizing environmental impact as a "cost" in the production of any given commodity. This assessment incorporates the real cost of commodities and raises the concept of sustainability of resources.

8 In the field of resource management, it is essential to view the whole process of how resources are developed into products. A struggle in the past that continues to this day is recognizing and assessing the impact and costs associated with resource development: the packaging that increases the costs for solid wastes, the effluents from industries discharged into our water and land, and the potential environmental effects, including human health, of using products such as herbicides and pesticides. What level of effluent or discharge is "safe," and who pays the costs of cleanup? Considering that many of the consequences to human health and the environment take a great deal of time to assess, it is not surprising that these negative factors have been labelled as externalities to the production process. Corporations have therefore not had to include environmental repercussions among the costs of production.

9 The term sustainability, or sustainable development, is a relatively new concept, dating since the 1980s. Fundamentally, sustainable development means that resources should not be exploited to a level where they will not be available for future generations. This concept rests on a knowledge base and recognition that the destruction or extinction of species brings ruin to an economy and a way of life and that, in some cases, this destruction occurs through government policy. Sustainability recognizes ecological relationships; thus, it is not an easy concept to put into practice, particularly when increasing populations create a corresponding increase in demand for resources and products. Phil McManus (2000, 813) suggests that a debate continues as to where the emphasis on sustainability is placed: on development (i.e., continuing a standard of living), or on ecological processes. The message of this geography of British Columbia is the need to gauge resource use and its impacts for each region of the province. Sustainability, however, must also be viewed globally.

10 Subsequent chapters examine individual resources that have been and continue to be important to British Columbia. A common theme is to see how resource use has developed and changed. As conditions of society change, so do its need for and use of resources. Technologies have changed, ways of making a living have changed, understanding of and attitudes toward the environment have changed, and British Columbia has become much more urban. Change provokes new conflicts over resource use. Traditional forestry practices, for example, run headlong into other, non-timber values such as old-growth preservation, wildlife, water quality, and tourism. More and more, all resources require management.

**RESOURCES, DEVELOPMENT, AND THE BC ECONOMY**

**Staples Theory**

1 The Canadian economic historian Harold Innis used staples theory to describe the development of Canada (Watkins 1963; Barnes and Hayter 1997). His theory is based on the exploitation of resources, or staples, in Canada. Its main assumption is the existence of an external demand for these resources. Innis identified five resources in the development of Canada: fish, furs, timber, wheat, and minerals. These five represent both a historical and an east-to-west pattern of development. Minerals, the last resource on the list, are the exception to the directional trend. The first resource was cod, taken off the coast of Newfoundland beginning in the late 1400s. Next, the continental resources were developed from east to west with the fur trade, followed by timber and agriculture. Minerals tended to be discovered sporadically from region to region. Through these resources and the economic activities tied to them, the Canadian economy developed.

2 The terms backward, forward, and final demand linkages are used in staples theory to describe the types of economic activity, including implications for employment, associated with each staple. Backward linkage refers to all the conditions necessary to export a resource. The most important backward linkage for any resource is the collection of transportation systems because it can influence so many other economic activities. When the country was first developed, this meant building and running port facilities with warehouses, boat repairs, and all the employment related to loading resources onto ships for export. Over time, ports were connected to canals, railways, and road systems. Backward linkages also include the employment created from building these facilities as well as the construction and manufacturing of rails, boats, trains, trucks, or any of the inputs to export a resource.

3 Forward linkage is the process of adding value to any resource through further processing or manufacturing prior to export. In British Columbia, there has always been concern about the export of raw logs versus the forward linkage of milling the logs into dimension lumber. Obviously, if the sawmilling activity occurs here, then more jobs are created in British Columbia. Much higher value added to wood can be gained by manufacturing furniture, doors, or even musical instruments, with consequent greater benefits to employment and to government revenues. Once a resource is tagged for export, a community is usually involved, whether at the port or at the location of resource extraction. Over time, and with the accumulation of backward and forward linkages, some of these communities have become major centers.

4 Final demand linkages are defined as the demand for production of goods and services for the local or domestic market. In smaller communities, consumer goods may have to be imported. Nevertheless, as the population increases, the ability to reach thresholds for local production also increases.

5 The accumulation of all these linkages is referred to as the multiplier effect. A pulp mill or mine, for example, locates in a community, adding 500 workers (forward linkage). These workers in turn need housing, food, and many other necessities and luxuries, and so the local economy grows to fulfill this increased demand (final demand linkages). One more pulp mill or mine in the province may be all it takes to stimulate the manufacture of pulp or mine machine components (backward linkages). All this economic activity can mean considerably more than 500 people working. To be kept in mind as well, though, is the main assumption of this theory, that there is an external demand for the resource. Periods of recession and depression show that external demand has not always been sustained. When the mill or mine shuts down, the multiplier effect works in reverse and many more people, apart from those in the mill or mine, face unemployment. When a mill or mine is the only industry, its closure may jeopardize an entire community.

6 British Columbia's history of dependence on external demand for its resources continues today. The data in Figure 7 .2 show that overall imports of goods and services exceed exports for the years shown. British Columbia continues to rely on the export of resource-based goods (energy, metals, and forest products in particular) and the import of higher value-added products (Table 7 .1). Staples theory is therefore a useful framework to assess the effects of various forward, backward, and final demand linkages in terms of employment and social benefits. These effects are not necessarily easy to determine, however, because the technologies of resource processing change along with accessibility, competition, markets, and so forth.