the related traditional fields of knowledge, illustrating the interdisciplinary nature of the subject.

Table 1.1 *Interdisciplinary Nature of the Subject—Air Pollution*

Environmental issue/Topic	*Major subject/Topic knowledge required*
Nature and reactions of air pollutants	Chemistry and Chemical Engineering
Effects of air pollutants on human beings, animals, plants and materials	Zoology and Botany and various branches of life science, Physics, and Chemistry
Effect of climate on air pollution	Meteorology, Thermodynamics, Geography, Mathematical modelling, etc.
Air pollution control devices	Physics, Chemistry and various branches of Engineering
History of air pollution and air pollution episodes	History
Economic impacts of air pollution	Economics, Demography
Sociological impacts of air pollution	Sociology
Alternative fuels	Various branches of physical sciences
Conservation of resources and pollution control	Various branches of physical and political sciences
Ozone hole and global warming	Almost every branch of study has got something to contribute to the understanding of this phenomenon.

1.6 COMPONENTS OF THE ENVIRONMENT AND THEIR INTERACTIONS

Chemicals on earth are distributed among four major environmental components or conceptual spheres—atmosphere, hydrosphere, lithosphere and biosphere. While such a classification of nature is arbitrary, it helps in organizing and extending our knowledge of distribution and flow of chemicals. A schematic representation of the four environmental components and their interrelationships is shown in Fig. 1.7. The circles represent the spheres and the curved arrows the flow pathways of the matter. In the diagram, circles and curved arrows are used instead of boxes and straight line connections to emphasize the close, dynamic, inseparable, organic coupling among the environmental components. If one component or linkage changes, all other components respond. In this conceptual frame, every sphere has a two-way linkage to every other sphere, including itself. The two-way linkage signifies that the matter may flow from one component to another in both

directions. Some arrows show the transfer within a given component from one location to another indicating movement of the substance from one physical location to another without leaving the sphere. Since matter cannot be created or destroyed, the major objective is to find the location and chemical form of the substance at any given time.

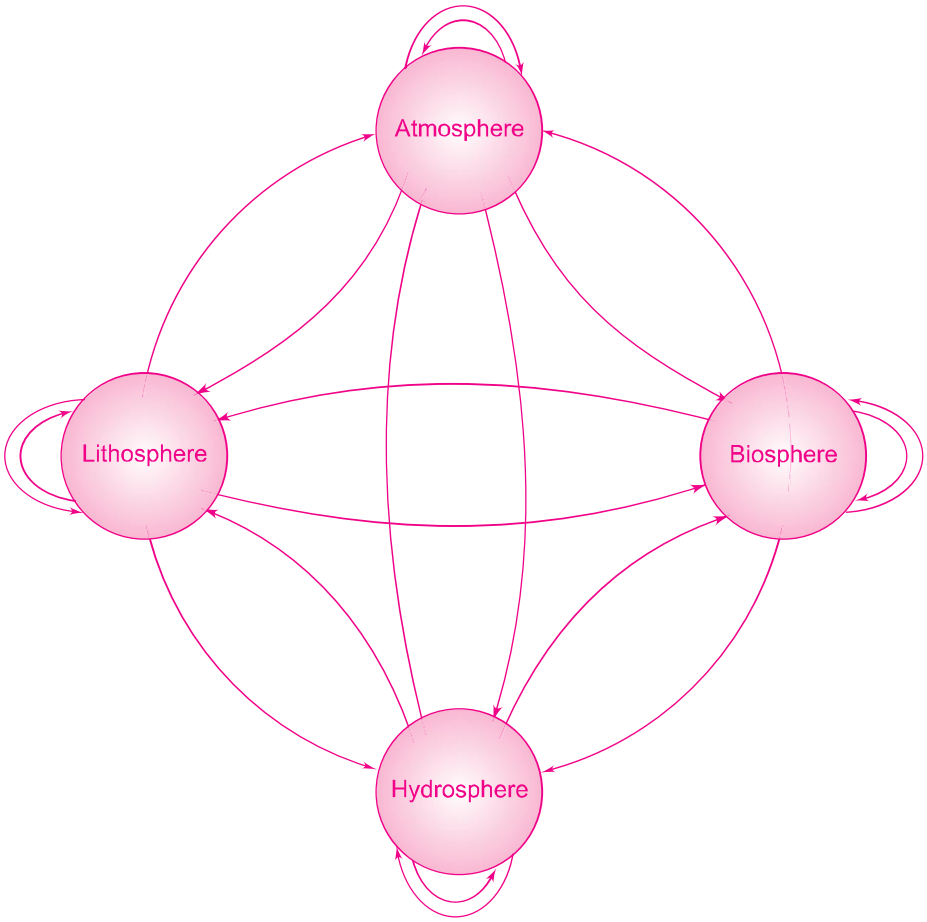

Fig. 1.7 *Components of the Environment*

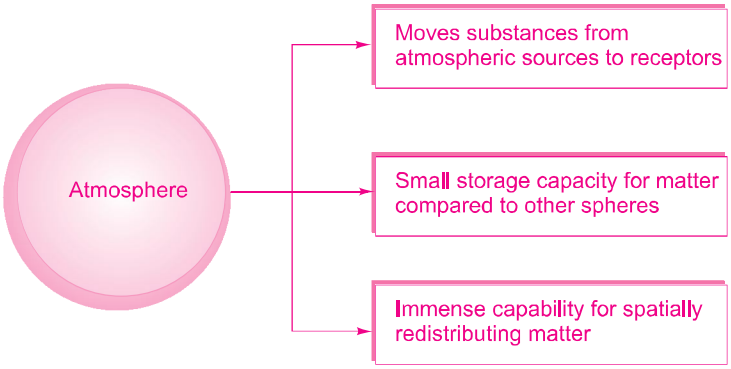

Fig. 1.7(a) *Atmosphere*

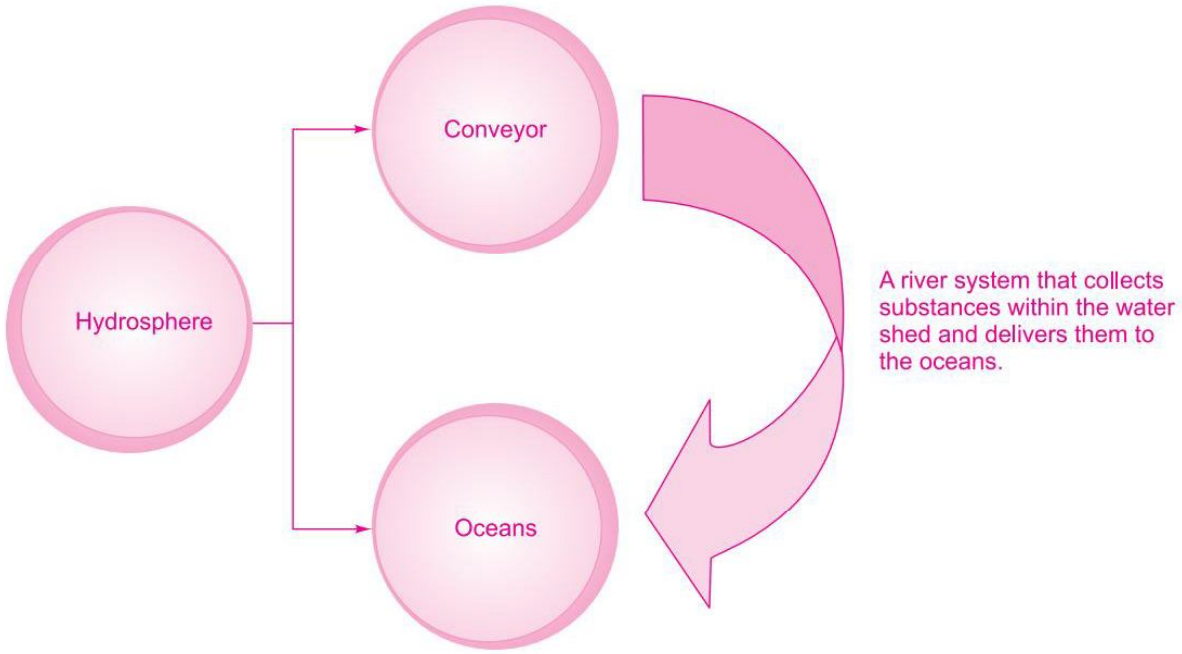

Fig. 1.7(b) *Hydrosphere*

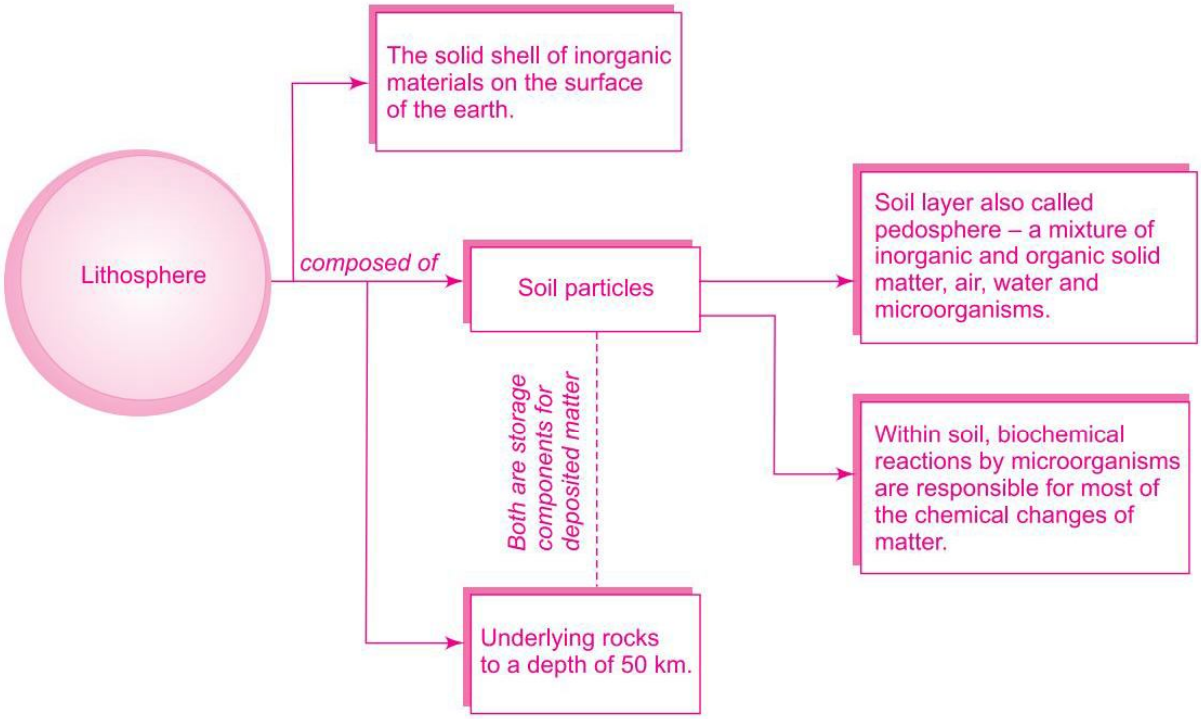

Fig. 1.7(c) *Lithosphere*

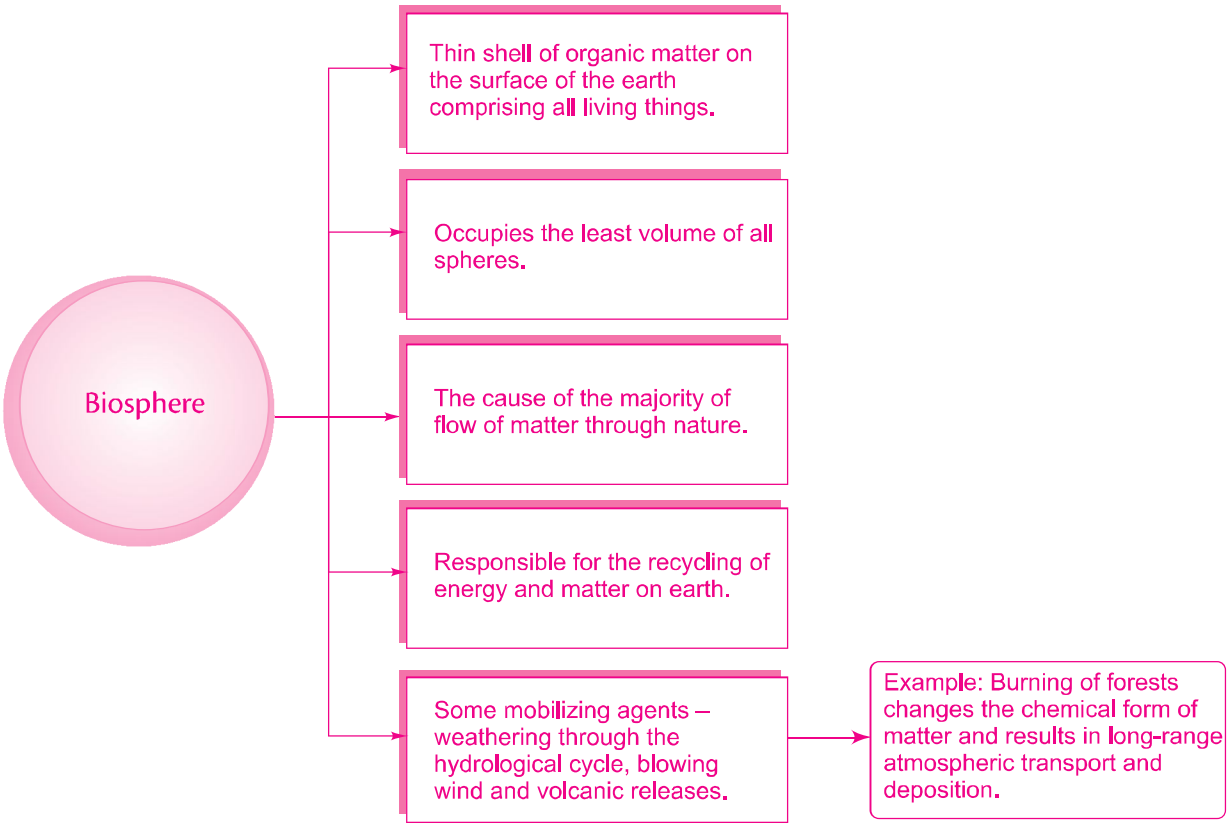

Fig. 1.7(d) *Biosphere*

1.7 HUMANS AND THE BIOSPHERE

Humans are part of the biosphere, and human activities most closely resemble the functions of the biosphere. Humans are responsible for the largescale redistribution of chemicals on earth. Population explosion, coupled with increased per capita consumption of natural resources, is the root cause of all the adverse human impacts on the biosphere.

The atmosphere and the hydrosphere are effective transporters of matter; and, as a result, many of the anthropogenic chemicals are transferred to the land or the oceans where they are subsequently incorporated in these long-term geochemical reservoirs. Much of the environmental damage is done in the atmosphere, hydrosphere, lithosphere and biosphere during the transit from one long-term geochemical reservoir to another.