

Natural Environments of Europe**The Rhine River**

Physically and culturally, the Rhine River has played a major role in European history. From its source high in the Swiss Alps, it flows through widely varying terrain from east-central Switzerland northward and westward to its North Sea outlet in the Netherlands.

Being Europe's most important river, more than 35,000 vessels regularly travel along the Rhine, especially between the two main industrial centers, the Ruhr and Rijnmond. Apart from navigation, the river is also used for fishing, tourism, and recreation. Rhine water is used for domestic, industrial, and agricultural purposes, and for generating energy. Last, but not least, the Rhine is used as a sewer.

As long as people have lived near the Rhine, they have thrown their refuse into the water. In the past the river was usually able to clean itself and break down pollutants. However, since the Industrial Revolution the volume of waste has risen greatly and the type of waste has changed. Today, industrial effluents mix with domestic waste, sewage, phosphates, and heavy metals like lead and mercury. Not all these pollutants are biodegradable, and some are highly toxic.

There are three major sources of pollution in the Rhine. First, many types of industries have established themselves along the banks of the river. The chemical industry disposes of waste containing heavy metals such as cadmium, lead, and mercury. The paper-making, brewing, and detergents industries also dump their waste into the river. Although most of these emissions are properly authorized, some emissions are not, and there is always the risk of accidental spills or leaks.

Second, households dispose of a variety of waste products: soap, detergents, leftovers, and sewage. People often throw things directly into the river, from pieces of paper to rusting bed frames and old bicycles.

Third, many agricultural practices lead to organic waste, chemical fertilizers and other waste products reaching the river. Fertilizers contain various chemicals from phosphates and nitrates to poisonous hydrocarbons.

The Rhine is crucial to the economy of many areas in Europe. For example, the port of Rotterdam in the Netherlands is vital for the Dutch economy. As silt transported by the river settles near the riverbanks and at the harbor, it has to be constantly dredged to allow large ships to berth there. Metals such as lead and cadmium pollute the river. These metals attach themselves to silt particles, and hence the polluted silt cannot be dumped in the North Sea.

The pollution of the Rhine causes many other problems. For example, public health would be seriously affected if the water is not purified. Phosphates, which are in high concentration, stimulate the growth of algae, eventually clogging the pipelines and filters. Silt poses a similar problem. The high salinity of the water not only gives the water an unpleasant taste,

Chapter 13, Critical Thinking Activity, continued

but also helps to corrode the pipelines. Saline discharges from mines in Germany make the water in the Rhine unsuitable for market gardening in the Netherlands—a huge part of the economy. Hence, Dutch market gardeners have to desalinate water before using it to water their crops—an expensive undertaking.

International cooperation over the Rhine goes back to 1887 with a treaty prohibiting the discharge of wastes dangerous to fish. More recently, after a serious accident in 1986, the Rhine Action Programme (RAP) was developed and adopted by all the countries bordering the Rhine. There are three specific aims of RAP. One, RAP aims to accelerate the reduction of permanent pollution from all sources. Two, RAP wants to reduce the risk of accidents and spillages. Three, RAP seeks to improve hydrological and other conditions of the river.

These aims must be met at both the national and international levels. At the national level, each country involved must pass legislation detailing how much waste material can be discharged. Industrial plants will be obliged to have a permit for their emissions. Pollution taxes will be imposed on both individuals and industrial plants. Purification and measuring stations will be built.

At the international level there is to be more cooperation between countries that share the Rhine. There will an alarm system for every time the concentration of a certain material exceeds its permitted value. Plans are to be made for the conservation and restoration of natural landscapes in and around the Rhine.

- 1.** List five reasons why the Rhine is considered Europe's most important river.

- 2.** Why is it now more difficult for the Rhine to clean itself of pollutants?

- 3.** List three current sources of pollution to the Rhine. Describe three effects this pollution has had on the natural environment of Europe.

- 4.** What are three possible solutions to the Rhine's pollution problems?
