INQUIRY 1: WHAT KIND OF FORESTS GROW ON EARTH AND HOW DO THEY DIFFER?

THE SITUATION: Across the planet, different types of forests are found. One reason different forest types exist is because they grow under different *climates* (Figure 5). Another reason is that human activities have changed some of the forests, for example through planting or felling of trees. To better understand the different types of forests found across Earth, the scientists had to decide what was most important about those forest differences to study. In other words, to study the differences between forests across the planet, FAO had to determine how they would *classify* forests.

Before we learn how FAO classified the world's forests, let's think about the place on which these forests grow. What is this place called?

If you guessed Earth, you are right! We know that Earth spins on its *axis* and revolves

GLOSSARY:

climate: The average condition of the weather over large areas, over a long time, or both.

classify: To arrange by putting into groups according to some system.

axis: A straight line about which a body or geometric figure rotates.

equator: An imaginary circle around the middle of Earth at an equal distance from the North Pole and the South Pole.

conserve: To avoid wasteful or destructive use of something.

latitude: Distance north or south of the equator.

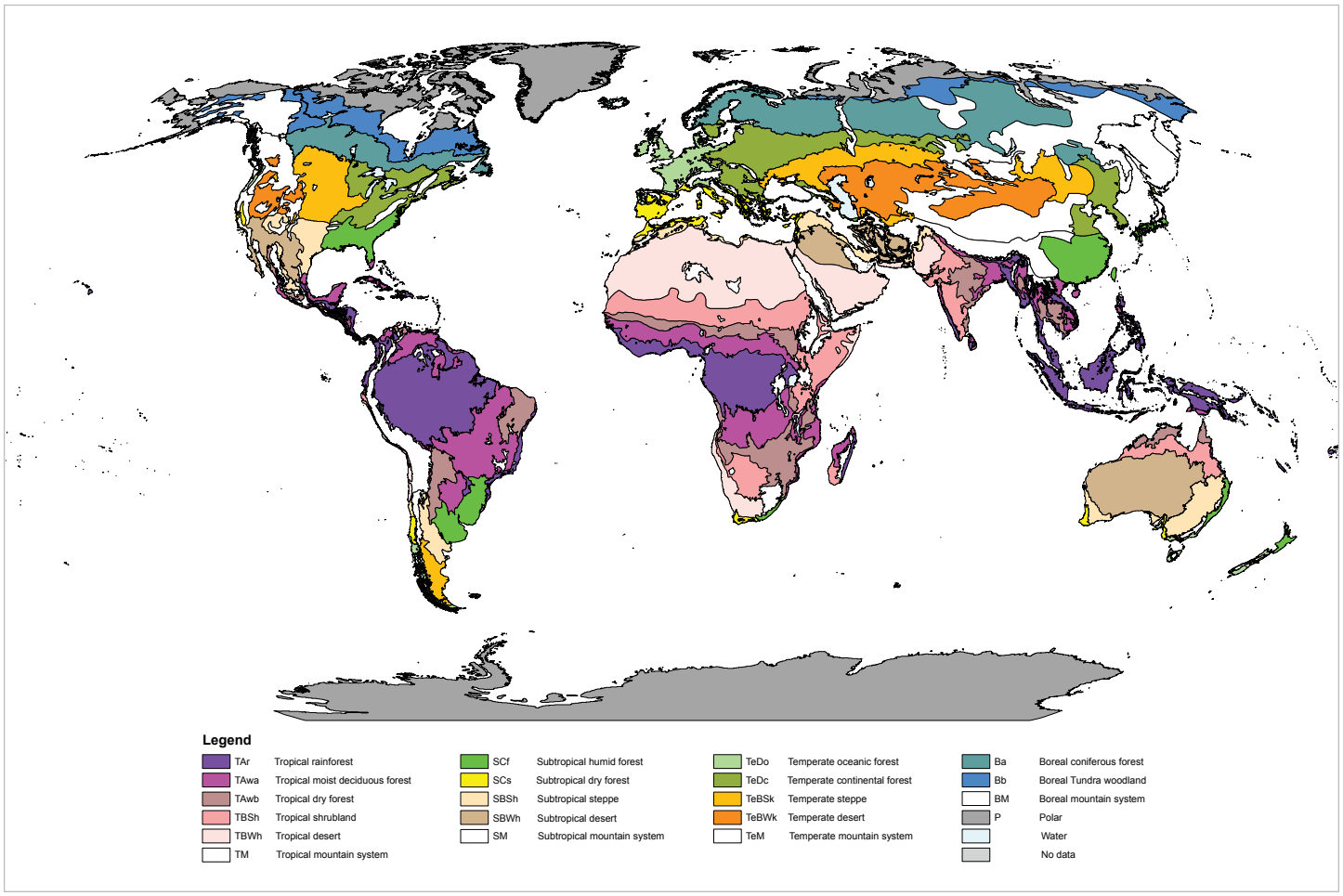

Figure 5. World ecozone map. An ecozone is a region with similar type of land cover. Notice that similar ecozones can occur on different continents

around the sun (Figure 6). The area near the equator is closest to the sun. Because of this, Earth is warmest near the *equator*, and coolest near the poles (Figure 7).

About 71 percent of Earth is covered with water, and most of this is ocean. The top level of any ocean is called sea level. The height of the land compared with sea level is called elevation. At higher elevations, the climate is cooler (Figure 8).

Across Earth, different areas receive different amounts of rainfall.

Plants need water to survive and have adapted over time to live with varying amounts of rainfall. Some plants, such as those in tropical rain forests, must have a lot of water to survive. Other plants, like those in deserts, do not need much water to survive. Desert plants have adapted to *conserve* the amount of water they receive. Drier areas have fewer plants and trees. Some areas have no plants or trees at all. The 3 things that we have just explored are *latitude*, elevation, and rainfall (Figures 7-10). They affect what kind of forest grows naturally in a particular area on Earth (Figures 9-10 and 12).

In addition to latitude, elevation, and rainfall, there is another influence on Earth's forests. This influence is changing Earth's forests, no matter where on Earth the forests are located. It was this influence FAO was most interested in understanding. What influence did the scientists want to understand?

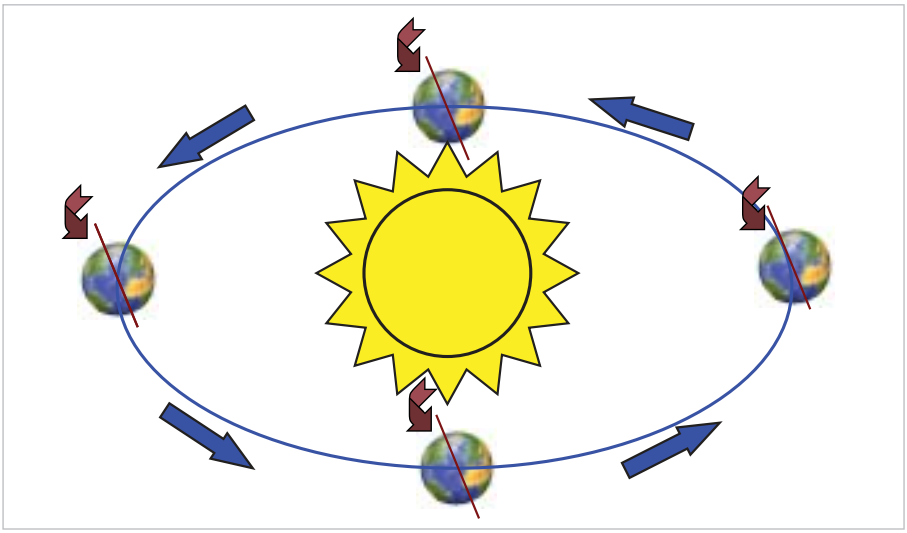

Figure 6. Earth spins on its axis and revolves around the sun

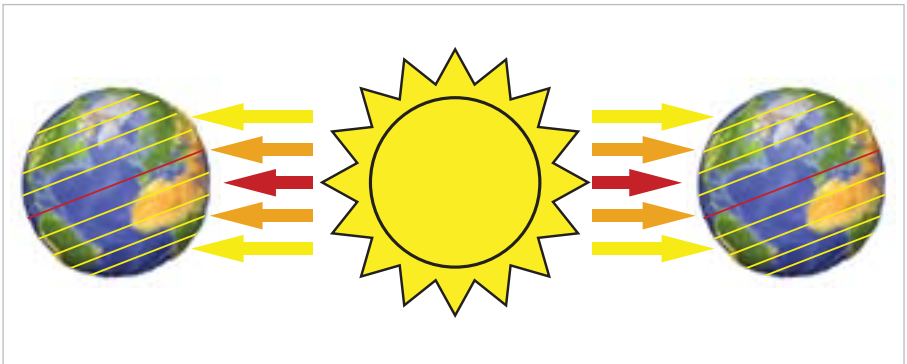

Figure 7. Earth is warmer near the equator, cooler near the poles

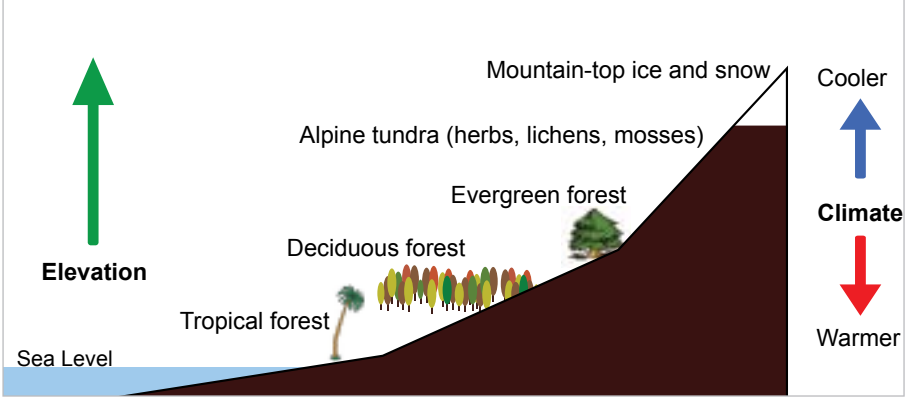

Figure 8. The higher the land's elevation, the cooler its climate

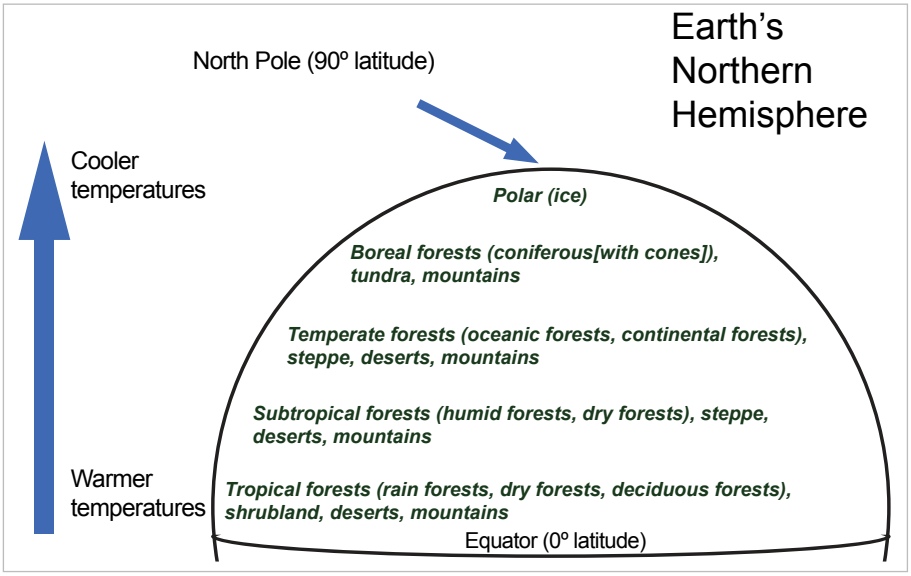

Figure 9. Vegetation types, temperature, and latitude

If you guessed humans, you are right! FAO wanted to understand how forests are changing as a result of human activity. To study the influence of humans on forests, the scientists classified forests into five categories (Table 1, page 11). These categories were based on how much humans have changed the forest.

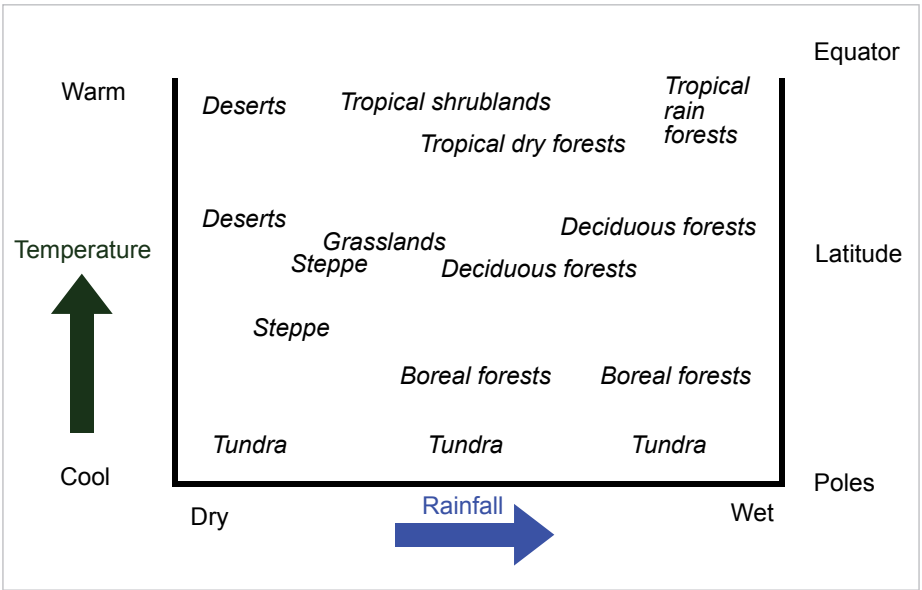

Figure 10. Vegetation types, temperature, and rainfall

If humans have not changed a forest much at all, that forest is made up of *native* plant and tree species. Native species are those that are found in the area naturally (Table 1, page 11 and Figure 12 , page 12).

Not all forests are made up of native species, and not all forests get their start naturally. Trees are planted by people for many reasons. People plant trees to harvest timber in the future and for other wood products such as pulp for making paper. When people plant trees for these kinds of products, the resulting forests are called productive plantations.

Of course, trees are also planted for food products such as fruits and nuts, but the result of these plantings are mostly fruit orchards. Fruit orchards were not included among the forest categories by FAO.

People also plant trees to achieve environmental benefits. Trees may be planted to protect streams and rivers and to keep soil from eroding, a practice called soil and water *conservation*. When people plant trees to conserve water quality and soil, the resulting forests are called protective plantations.

After FAO had classified forests according to human activity, they were ready to discover how humans were influencing the world's forests. They asked each country correspondent to provide information about the characteristics of their country's forests according to the categories in Table 1 for the years 1990, 2000, and 2005.

GLOSSARY:

native: Naturally occurring in an area.

species: Groups of organisms that resemble one another in appearance, behavior, chemical processes, and genetic structure.

ecological: Having to do with ecology, the study of organisms and their relationship with their environment.

environmental services: The collection of environmental processes that provide benefit to life on Earth.

conservation: The care and protection of natural resources such as forests and water.

ecosystem: A community of organisms living in an environment as an interdependent system.

WHAT THEY DISCOVERED: In 2005, slightly more than half of all forest area worldwide was classified as modified natural forest (Figure 11). Remember that modified natural forests contain native tree species that have grown naturally but show some signs of human activity.

In 2005, more than one-third of the world's total forest area was classified as primary forest showing no signs of human activity.

The largest area of primary forest was in the Amazon region of South America. Seven percent of the world's forests were semi-natural. Productive and protective plantations only made up 3.8 percent of total forests worldwide. Of this 3.8 percent, 3 percent was in productive plantations.

Between 1990 and 2005, the areas of primary forest and modified natural forest were decreasing worldwide. The areas of semi-natural forest and forest plantations increased over the same period. Each year since 1990, about 6 million hectares of primary forest have been lost or modified. About 2.8 million

Table 1. Categories of forests identified by FAO

CATEGORY OF FOREST CHARACTERISTICS	DESCRIPTION OF FOREST WITHIN EACH CATEGORY
Primary forest	Forests with native tree *species*. Evidence of human activities is not visible and the forest's *ecological* processes are not widely disturbed.
Modified natural forest	Forests with native tree species that have grown naturally. There is evidence of human activities in a modified natural forest. An example is an area where some trees were cut in the past.
Semi-natural forest	Forests with native tree species that have grown because humans have either sown seeds or planted small trees, or have otherwise assisted the growth of native tree species.
Productive forest plantation	Man-made forests with mostly non-native (and in some cases native) tree species. These forests have been purposely planted by humans for the production of wood products or non-wood forest products. People create a productive plantation by sowing seeds or planting small trees.
Protective forest plantation	Man-made forests with mostly non-native (and in some cases native) tree species that have been purposely planted by humans for *environmental services*.

You Do the Math:
What percentage of forest land worldwide was classified as either modified natural forest or primary forest?

You Do the Math:
How many hectares of productive plantations are added every year? How many hectares of protective plantations are added every year?

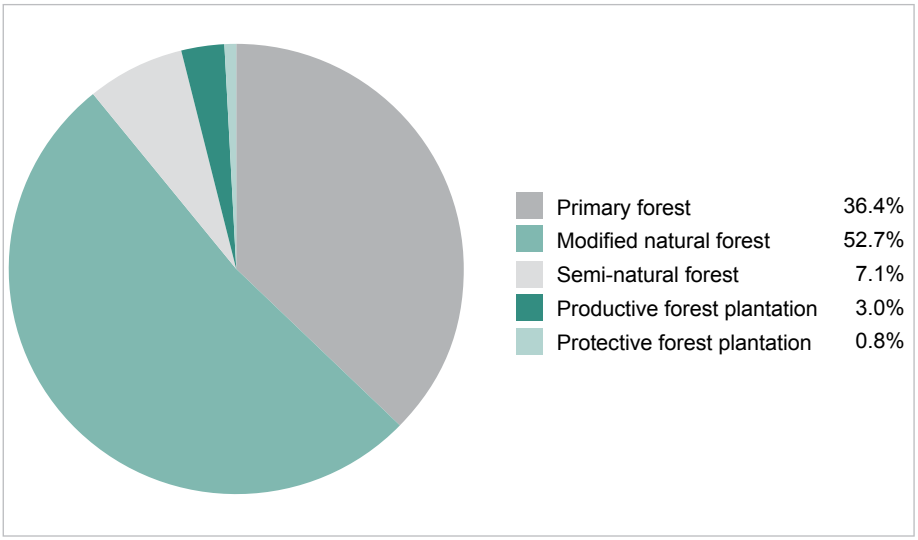

Figure 11. Forest characteristics: percent worldwide in each category

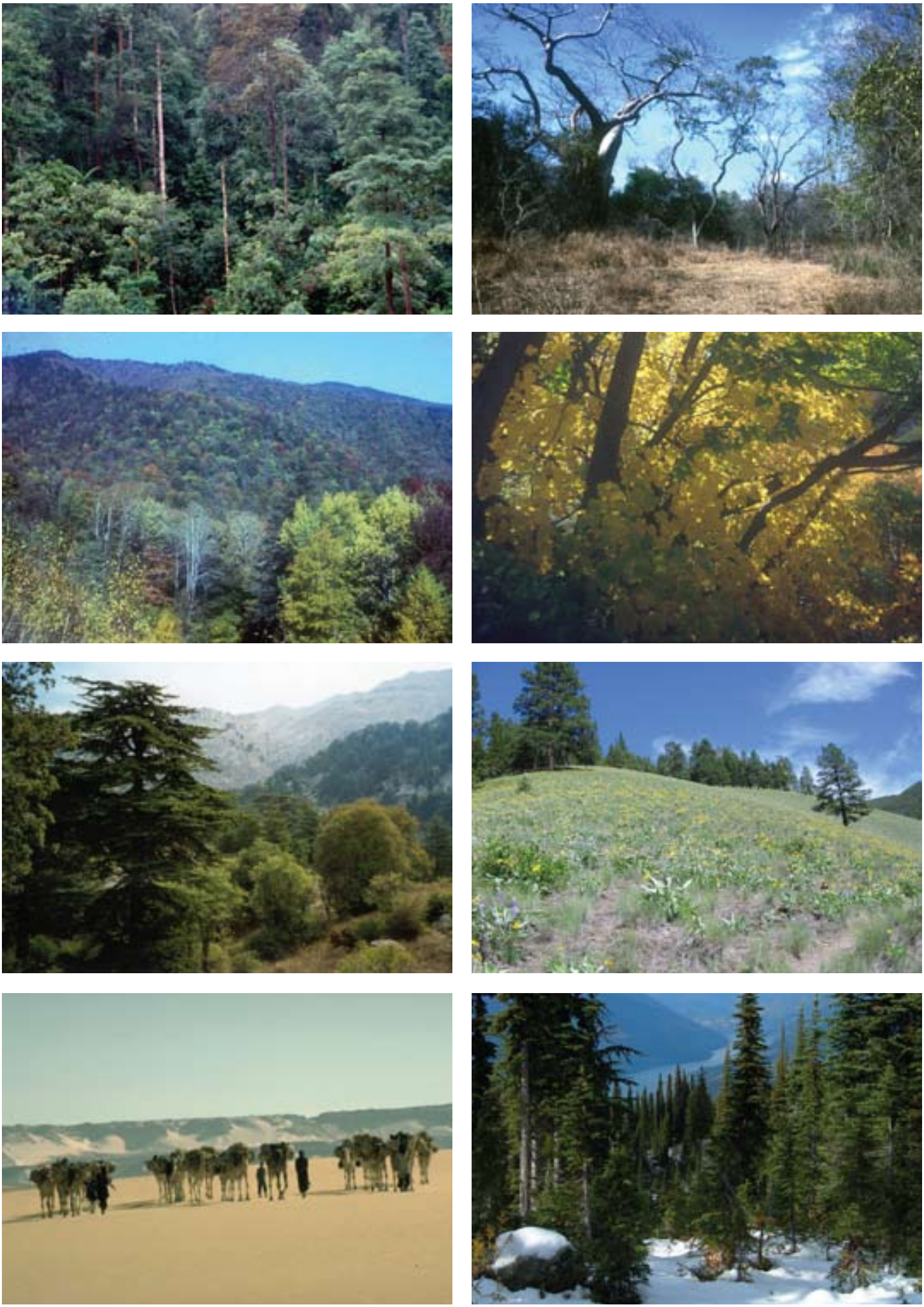

Figure 12. Some native ecosystems

hectares of forest plantations are added every year. Of these, 87 percent are productive plantations (Figure 13).

REFLECTION SECTION

Describe the majority of forests worldwide. You can either use one or two categories to do this.

What are two major trends in the categories of forests?

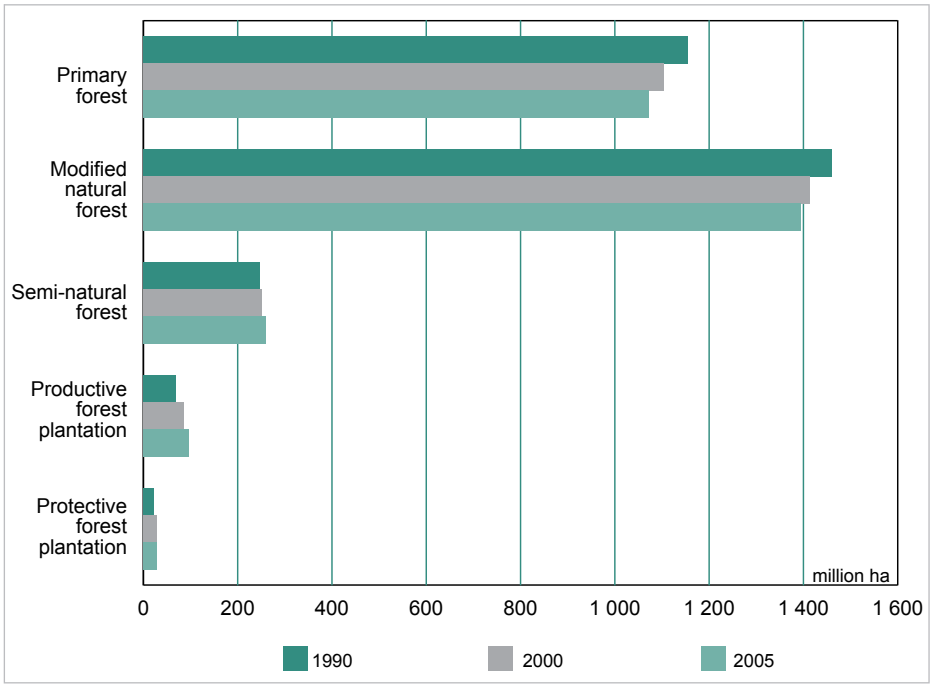

Figure 13. Changes in different categories of forests from 1990 to 2005 (million hectares)