1944, 1946, 1953 and 1964, reported Dr. Robert Wallace of the U.S. Geological Survey's National Center for Earthquake Research.

Other disasters have struck within the past five years on the same earthquake belt as the Turkish disaster. On Sept. 1, 1962, an earthquake killed 10,000 persons in northwest Iran; and a series of earthquakes shook Skopje, Yugoslavia, on July 26, 1963, killing more than a thousand persons.

The worst earthquake catastrophe in world history occurred in Shensi Province of northern China in January 1556, when a tremor killed 830,000 people. China was inflicted with another great tragedy in December 1920, when 180,000 persons were reported killed in the earthquake near Kansu.

Throughout the centuries, appalling death tolls have made earthquakes and their resultant fires and floods the greatest natural destroyer of life and property—killing on an average some 15,000 persons each year.

More than a million earthquakes occur annually, with an average of two every minute. Most of these are very slight tremors and produce little damage. There are about 20 earthquakes yearly large enough to cause serious damage. Fortunately, most of these occur in sparsely populated areas of the world.

Tremendous Energy Released

A tremendous amount of energy is released by an earthquake. For instance, the energy of a very large quake may be equal to that of a 100-megaton fusion bomb—hundreds of times greater than the nuclear explosion over Bikini.

Scientists classify earthquakes on a magnitude scale according to the total amount of energy released. The magnitude scale most often used was devised by Dr. Charles F. Richter of the California Institute of Technology in Pasadena, Calif. The scale starts at 0 and goes up to 8.9, the highest magnitude recorded.

Each increase of a whole number on the scale represents a tenfold increase in the energy of the earthquake. Thus, an earthquake of magnitude 2 is 10 times greater than that of magnitude 1. One of the greatest earthquakes ever recorded, the Assam earthquake of Aug. 15, 1950, had a magnitude of 8.6. The Good Friday earthquake in Alaska, March 27, 1964, was recorded as 8.5 on the Richter scale.

Earthquakes are also described by their intensity, which is the amount of shaking and destruction observed above ground at a particular place and time. Intensity varies with distance from the epicenter. The two types of scales are often confused by the layman, but they are quite different.

There is only one magnitude of an earthquake, but there can be many differing reports of the damage inflicted on towns and cities above ground.

Scientists "listen in" on the earth with instruments so delicate that they can "hear" a mouse walk across the basement floor—or an earthquake hundreds of miles away. These are seismographs, working on the principle of inertia in the following manner:

A heavy weight is suspended from a frame anchored in bedrock. A "pen" or beam of light from the weight draws a line on a continuously running band of sensitized paper. When an earthquake or tremor shakes the rock, it also shakes the frame and the recording device—but the free-hanging pendulum remains inert. The movement of the earth is thus recorded as a series of agitated lines on the sensitized paper.

Constant Earthquake Check

Hundreds of seismograph stations throughout the world constantly are recording shocks and vibrations that crisscross through planet earth. By checking with other stations, seismologists keep track of earthquakes and also accumulate knowledge about the interior of the earth.

Earthquake waves travel at different speeds through different kinds of materials. Some do not pass through liquid or molten rock; others speed up in denser material such as granite and slow down in sand. By clocking the various times of arrival and the directions from which the waves arrive, then analyzing their behavior, scientists have been able to draw a detailed chart of the earth's structure.

Earthquake research is underway in many parts of the world. A National Center for Earthquake Research, part of the U.S. Geological Survey, is set up at Menlo Park, Calif., to be an open exchange research laboratory. The President's Office of Science and Technology, after an in-depth study of earthquake research, recommended extensive field surveys of earthquake areas, more research in earthquake-resistant buildings and installation of batteries of sophisticated instruments to monitor restless faults, such as the San Andreas Fault in California.

A newly established National Earthquake Information Center, part of the Environmental Science Services Administration, will inform the public of sizable earthquakes, magnitude 6.5 or larger, occurring anywhere in the world.

As the world population continues to increase, and men continue to build more cities and towns across the changing face of earth, the disasters from these natural forces cannot help but become more catastrophic unless great caution is taken.

Scientists may not be able to control or prevent the suddenly released energies of nature. However, catastrophies to human and animal life can be reduced by better understanding of the causes and behavior of the forces that shake the earth and by recognizing the warning signals predicting their arrival.

Nature Note

Coriolis Force

➤ A COMPLEX force, set up by the rotation of the earth, has been blamed for helping generate the great twisting windstorms—hurricanes, cyclones and tornadoes. Because of this force, rivers in the Northern Hemisphere scour their right banks more severely than the left. This force is partly responsible for the major wind systems of the earth—the trade winds, westerlies and easterlies.

Known as the Coriolis force, this deflecting influence of the earth's rotation gives the winds their spin.

Essentially it can be explained this way: as the earth rotates on its axis from west to east, all trees, mountains and other things attached to it move with it. But the air, unattached and free moving, continues in a certain direction while the earth slips under it.

For instance, suppose a mass of cold air starts to move southward from the North Pole toward a point on a meridian. In the time necessary for it to reach that point, the point will have moved to the east with the rotating earth, and the air body will reach another point that has moved in from the west. Hence, to an observer on earth, the air seemed to have blown from the north toward the west in a curved path. To an observer in space, the air body actually followed a straight line; it was only the earth that slipped beneath it to give an appearance of a path curved to the right.

Masses of air from the South Pole are affected the same way, and they undergo deflection to the left. The earth's spin does not affect the moving air at the equator, however. The deflecting force starts to take effect from about six to 15 degrees north and south from the equator.

CONSERVATION

Bubble Wall to Reduce Silt Deposits

➤ A BUBBLE barrier may be created across the entrance to Newcastle Harbor, New South Wales, to stop the build-up of silt.

The State Government is investigating a novel scheme that, if successful, would save about one million dollars yearly. At present the Public Works Department dredges up to four million tons of silt each year from the bed of the harbor to keep the channels open for free movement of shipping.

At the department's hydraulic laboratory, a full scale model of the Lower Hunter Valley has been constructed. Silt flows into the harbor from the upper sections of the Hunter. The model also simulates actual flood conditions to test the effectiveness of a major flood mitigation program.