Text 1 EIGHT RISKY PLACES

By Mark Monmonier

Hazards of different types affecting areas of varying size are not easily compared. Even so, the research experience makes it easy to identify eight typical risky places.

1. Almost any place in California, for various reasons: In addition to earthquakes, wildfire, landslides, the state has volcanically active areas in the north, around Mt. Shasta and other major volcanoes, as well as in the east, where the Long Valley Caldera shows signs of renewed activity. Even beyond its infamous seismic zones, California's shoreline is vulnerable to tsunamis (seismic sea waves) from submarine earthquakes throughout the Pacific. More recent additions to this smorgasbord of hazards are smog, freeway snipers, urban riots, oil spills, and (looking ahead a few decades) severe water shortages.
2. Located only 70 miles from Mt. Rainier and Glacier Peak, which the U.S. Geological Survey considers active volcanoes, Seattle, Washington is also vulnerable to severe earthquakes. Unlike Californians, long aware of the risk, Washingtonians have only recently begun to plan for a seismic disaster.
3. Coastal Alaska and Hawaii are especially susceptible to tsunamis, huge waves whipped up by submarine earthquakes in the Ring of Fire encircling the Pacific Ocean. Alaska's Pacific coast is seismically active, and the Hawaiian Islands can generate their own tsunamis: deposits on Lanai suggest past run-ups as high as three thousand feet, and geophysicists fear a similar disaster were the southeast side of the Big Island (the island named Hawaii) to slide suddenly into the sea.
4. Tropical hurricanes pose a less catastrophic but more frequent danger to the Atlantic Coast, particularly to North Carolina's Outer Banks, a long, thin barrier island, from which evacuation is difficult. Since the seventeenth century, infrequent but fierce storms have carved new inlets, filled old channels, and move the shoreline westward at a rate of 3 to 5 feet per year. Moreover, if forecasts of a 250-foot rise in sea level because of global warming prove correct, current settlements on the Outer Banks could be wiped out in the next century or so.
5. Inadequate building codes, shoddy construction, low elevation, and level terrain make areas south of Miami especially vulnerable to high winds and flooding from storms like Hurricane Andrew, which caused over 20 billion dollars damage there in August 1992. Adding to the region's misery is metropolitan Miami's crime rate, one of the highest in the nation.
6. The Louisiana coast is also vulnerable to multiple hazards: winds and storm surge from tropical hurricanes, unnaturally high levels along the lower Mississippi River, and air and groundwater pollution from poorly regulated chemical industries concentrated along the state's Gulf Coast. Cancer mortality is extraordinarily high here as well.
7. The floodplains of the Mississippi and other mainstem rivers, which drain vast areas, are vulnerable to prolonged high water caused by persistent weather systems. The costly floods of summer 1993 demonstrated the shortsightedness of flood forecast models based on limited hydrologic data. Humans play a dangerous game of

hydrologic roulette by building homes, factories, and sewage-treatment plants in low-lying areas along rivers.

8. Any floodplain, large or small, is anywhere in the country. Although most victims evacuate in time, a picturesque parcel where "a river runs through it" carries the threat of undermined foundations. In arid areas, where thunderstorms are infrequent, flash floods kill around two hundred unsuspecting campers and hikers in a typical year. Along rivers large and small, the Federal Flood Insurance program uses maps to set rates, spread the risk, and encourage local governments to plan evacuations and control land use.

Our country has many more hazardous environments: some mapped well, others poorly or not at all. As Cartographies of Danger demonstrates, hazard-zone maps are a relatively new cartographic product as well as a good indication of how well we understand hazards and manage risk.

fierce – сильный, жестокий, суровый;
an inlet – бухта;
shoddy – некачественный, неустойчивый

Text 2 PRIME MERIDIAN

By Matt Rosenberg
Geography Expert

The prime meridian is the zero degree line of longitude that passes near London. The prime meridian was officially established as zero degrees longitude at an international conference in 1884. While latitude has its zero degree line along the equator, an actual physical feature, longitude is not based on any physical feature of the earth and is not impacted by the sun or the earth's orbit.

Prior to 1884, some countries utilized local "prime meridians" to establish their coordinate systems within their country and around the world.

In order to have any x,y system of coordinates, as latitude and longitude are, there must be a starting place for both the north-south and the east-west axes.

In the case of latitude, the choice is easy, zero degrees from the plane of the earth through its circumference is the equator and ninety degrees from the equator are the poles.

All other degrees of latitude are actual degrees between zero and ninety based on the arc from the plane along the equator (imagine a protractor with the equator at zero degrees and the north pole at ninety degrees).

However, for longitude there is no plane or place to start the counting of longitude so prior to 1884 some countries established their own local prime meridian. The United Kingdom and its former colonies established the Royal Observatory at Greenwich just outside of downtown London in 1675. This national observatory was established as the starting location for longitude or the y-axis for the British coordinate system.

Since the United Kingdom was a major colonial power and a major navigational power of the eighteenth and nineteenth centuries, their maps and navigational charts with the prime meridian passing through Greenwich were promulgated and many other countries adopted Greenwich as their prime meridians.

By 1884, international travel was commonplace and the need for a standardized prime meridian became readily apparent. Forty-one delegates from twenty-five "nations" met in Washington D.C. for a conference to establish zero degrees longitude and the prime meridian.

Greenwich was selected as the prime meridian by a vote of twenty-two in favor, one against (Haiti), and two abstentions (France and Brazil).

By the time of the conference, the United Kingdom and its colonies as well as the United States of America had already begun using Greenwich as the prime meridian; this weighed heavily on the selection process.

With the establishment of the prime meridian and zero degrees longitude at Greenwich, the conference also established time zones. By establishing the prime meridian and zero degrees longitude in Greenwich, the world was then divided into 24 time zones (since the earth takes 24 hours to revolve on its axis) and thus each time zone was established every fifteen degrees of longitude, for a total of 360 degrees in a circle.

The establishment of the prime meridian in Greenwich in 1884 permanently established the system of latitude and longitude and time zones that we use to this day. Latitude and longitude is used in GPS and is the primary coordinate system for navigation on the planet.

to promulgate – распространять

Text 3 THE EQUATOR, HEMISPHERES, TROPIC OF CANCER, AND TROPIC OF CAPRICORN

By Matt Rosenberg
Geography Expert

Three of the most significant imaginary lines running across the surface of the Earth are the equator, the Tropic of Cancer, and the Tropic of Capricorn. While the equator is the longest line of latitude on the Earth (the line where the Earth is widest in an east-west direction), the tropics are based on the sun's position in relation to the Earth at two points of the year. All three lines of latitude are significant in their relationship between the Earth and the sun.

The equator is located at zero degrees latitude. The equator runs through Indonesia, Ecuador, northern Brazil, the Democratic Republic of the Congo, and Kenya, among other countries. It is 24,901.55 miles (40,075.16 kilometers) long. On the equator, the sun is directly overhead at noon on the two equinoxes - near March and September 21.

The equator divides the planet into the Northern and Southern Hemispheres. On the equator, the length of day and night are equal every day of the year - day is always twelve hours long and night is always twelve hours long.

The Tropic of Cancer and the Tropic of Capricorn each lie at 23.5 degrees latitude. The Tropic of Cancer is located at 23.5° North of the equator and runs through Mexico, the Bahamas, Egypt, Saudi Arabia, India, and southern China. The Tropic of Capricorn lies at 23.5° South of the equator and runs through Australia, Chile, southern Brazil (Brazil is the only country that passes through both the equator and a tropic), and northern South Africa.

The tropics are the two lines where the sun is directly overhead at noon on the two solstices - near June and December 21.

The sun is directly overhead at noon on the Tropic of Cancer on June 21 (the beginning of summer in the Northern Hemisphere and the beginning of winter in the Southern Hemisphere) and the sun is directly overhead at noon on the Tropic of Capricorn on December 21 (the beginning of winter in the Northern Hemisphere and the beginning of summer in the Southern Hemisphere).

The reason for the location of the Tropic of Cancer and the Tropic of Capricorn at 23.5° north and south respectively is due to the axial tilt of the Earth. The Earth is titled 23.5 degrees from the plane of the Earth's revolution around the sun each year.

The area bounded by the Tropic of Cancer on the north and Tropic of Capricorn on the south is known as the "tropics." This area does not experience seasons because the sun is always high in the sky. Only higher latitudes, north of the Tropic of Cancer and south of the Tropic of Capricorn, experience significant seasonal variation in climate.

While the equator divides the Earth into Northern and Southern Hemispheres, it is the Prime Meridian at zero degrees longitude and the line of longitude opposite the Prime Meridian (near the International Date Line) at 180 degrees longitude that divides the Earth into the Eastern and Western Hemispheres. The Eastern Hemisphere consists of Europe, Africa, Asia, and Australia while the Western Hemisphere includes North and South America. Some geographers place the boundaries between the hemispheres at 20° West and 160° East so as to not run through Europe and Africa. The Prime Meridian and all lines of longitude are completely imaginary lines and have no significance with regard to the Earth or to its relationship with the sun.

a tilt – наклон; уклон

Text 4 GEOGRAPHY AND OVERVIEW OF TSUNAMIS

By Amanda Briney
Geography Expert

A tsunami is a series of ocean waves that are generated by large movements or other disturbances on the ocean's floor. Such disturbances include volcanic eruptions, landslides and underwater explosions, but earthquakes are the most common cause. Tsunamis can occur close to the shore or travel thousands of miles if the disturbance occurs in the deep ocean.

Tsunamis are important to study because they are natural hazard that can occur at any time in coastal areas around the world. In an effort to gain a more complete understanding of tsunamis and generate stronger warning systems, there are monitors throughout the world's oceans to measure wave height and potential underwater disturbances. The Tsunami Warning System in the Pacific Ocean is one of the largest monitoring systems in the world and it is made up of 26 different countries and a series of monitors placed throughout the Pacific. The Pacific Tsunami Warning Center (PTWC) in Honolulu, Hawaii collects and processes data gathered from these monitors and provides warnings throughout the Pacific Basin.

Tsunamis are also called a seismic sea waves because they are most commonly caused by earthquakes. Because tsunamis are caused mainly by earthquakes, they are most common in the Pacific Ocean's Ring of Fire - the margins of the Pacific with many plate tectonic boundaries and faults that are capable of producing large earthquakes and volcanic eruptions. In order for an earthquake to cause a tsunami, it must occur below the ocean's surface or near the ocean and be a magnitude large enough to cause disturbances on the sea floor.

Once the earthquake or other underwater disturbance occurs, the water surrounding the disturbance is displaced and radiates away from the initial source of the disturbance (i.e. the epicenter in an earthquake) in a series of fast moving waves. Not all earthquakes or underwater disturbances cause tsunamis - they must be large enough to move a significant amount of material. In addition, in the case of an earthquake, its magnitude, depth, water depth and the speed at which the material moves all factor into whether or not a tsunami is generated.

Once a tsunami is generated, it can travel thousands of miles at speeds of up to 500 miles per hour (805 km per hour). If a tsunami is generated in the deep ocean, the waves radiate out from the source of the disturbance and move toward land on all sides. These waves usually have a large wavelength and a short wave height so they are not easily recognized by the human eye in these regions. As the tsunami moves toward shore and the ocean's depth decreases, its speed slows quickly and the waves begin to grow in height as the wavelength decreases (diagram) This is called amplification and it is when the tsunami is the most visible. As the tsunami reaches the shore, the trough of the wave hits first which appears as a very low tide. This is a warning that a tsunami is imminent. Following the trough, the peak of the tsunami comes ashore. The waves hit the land like a strong, fast tide, instead of a giant wave. Giant waves only occur if the tsunami is very large. This is called run-up and it is when the most flooding and damage from the tsunami occurs as the waters often travel farther inland than normal waves would.

a trough – дно, основание;
a tide – волна, отлив, поток;
imminent – грядущий, неизбежный, скорый

Text 5 MASS WASTING AND LANDSLIDES

By Amanda Briney

Mass wasting, sometimes called mass movement, is the downward movement by gravity of rock, regolith (loose, weathered rock) and/or soil on the sloped top layers of the Earth's surface. It is a significant part of the process of erosion because it moves material from high elevations to lower elevations. It can be triggered by natural events like earthquakes, volcanic eruptions and flooding, but gravity is its driving force.

Although gravity is the driving force of mass wasting, it is impacted mainly by the slope material's strength and cohesiveness as well as the amount of friction acting on the material. If friction, cohesion and strength (collectively known as the resisting forces) are high in a given area, mass wasting is less likely to occur because the gravitational force does not exceed the resisting force.

The angle of repose also plays a role in whether a slope will fail or not. This is the maximum angle at which loose material becomes stable, usually 25°-40°, and is caused by a balance between gravity and the resisting force. If, for example, a slope is extremely steep and the gravitational force is greater than that of the resisting force, the angle of repose has not been met and the slope is likely to fail. The point at which mass movement does occur is called the shear-failure point.

Once the force of gravity on a mass of rock or soil reaches the shear-failure point, it can fall, slide, flow or creep down a slope. These are the four types of mass wasting and are determined by the speed of the material's movement downslope as well as the amount of moisture found in the material.

The first type of mass wasting is a rockfall or avalanche. A rockfall is a large amount of rock that falls independently from a slope or cliff and forms an irregular pile of rock, called a talus slope, at the base of the slope. Rockfalls are fast moving, dry types of mass movements. An avalanche, also called a debris avalanche, is a mass of falling rock, but also includes soil and other debris. Like a rockfall, an avalanche moves quickly but because of the presence of soil and debris, they are sometimes moister than a rockfall.

Landslides are another type of mass wasting. They are sudden, fast movements of a cohesive mass of soil, rock or regolith. Landslides occur in two types- the first of which is a translational slide. These involve movement along a flat surface parallel to the angle of the slope in a stepped-liked pattern, with no rotation. The second type of landslide is called a rotational slide and is the movement of surface material along a concave surface. Both types of landslides can be moist, but they are not normally saturated with water.

Flows, like rockfalls and landslides, are fast moving types of mass wasting. They are different however because the material within them is normally saturated with moisture. Mudflows for example are a type of flow that can occur quickly after heavy precipitation saturates a surface. Earthflows are another type of flow that occur in this category, but unlike mudflows, they are not usually saturated with moisture and move somewhat slower.

The final and slowest moving type of mass wasting is called soil creep. These are gradual but persistent movements of dry surface soil. In this type of movement, soil particles are lifted and moved by cycles of moistness and dryness, temperature variations and grazing livestock. Freeze and thaw cycles in soil moisture also contribute to creep through frost heaving. When soil moisture freezes, it causes soil particles to expand out. When it melts though, the soil particles move back down vertically, causing the slope to become unstable.

an angle – угол, наклон, сторона;
talus – осыпь, отвалочный материал;
an avalanche – лавина, обвал;
to saturate – наводнять, пропитывать

Text 6 MOUNT EVEREST

By Matt Rosenberg
Geography Expert

With a peak elevation of 29,035 feet (8850 meters), the top of Mount Everest is the world's highest point above sea level. As the world's highest mountain, climbing to the top of Mount Everest has been a goal of many mountain climbers for many decades.

Mount Everest is located on the border of Nepal and Tibet, China. Mount Everest is located in the Himalaya, the 1500 mile (2414 kilometer) long mountain system that was formed when the Indo-Australian plate crashed into the Eurasian plate.

The Himalaya rose in response to the subduction of the Indo-Australian plate under the Eurasian plate. The Himalaya continue to rise a few centimeters each year as the Indo-Australian plate continues moving northward into and under the Eurasian plate.

Indian surveyor Radhanath Sikdar, part of the the British-led Survey of India, determined in 1852 that Mount Everest was the tallest mountain in the world and established an initial elevation of 29,000 feet.

Mount Everest was known as Peak XV by the British until it was given its current English name of Mount Everest in 1865. The mountain was named after Sir George Everest, who served as the Surveyor General of India from 1830 to 1843.

Local names for Mount Everest include Chomolungma in Tibetan (which means "Goddess mother of the world") and Sagarmatha in Sanskrit (which means "Ocean mother.")

The peak of Mount Everest has three somewhat flat sides; it is said to be shaped like a three-sided pyramid. Glaciers and ice cover the sides of the mountain. In July, temperatures can get as high as nearly zero degrees Fahrenheit (about -18 Celsius). In January, temperatures drop to as low as -76°F (-60°C).

Despite the extreme cold, hurricane-force winds, and low oxygen levels (about one-third of the oxygen in the atmosphere as at sea level), climbers seek to successfuly climb Mount Everest every year. Since the first historic climb of New Zealander Edmund Hillary and Nepalese Tenzing Norgay in 1953, more than 2000 people have successfully climbed Mount Everest.

Unfortunately, due to the hazards and rigors of climbing such a dangerous mountain, over 200 have died attempting to climb - making the death rate for Mount Everest climbers about 1 in 10. Nonetheless, in the late spring or summer months, the climbing season, there can be tens of climbers attempting to reach the peak of Mount Everest each day.

The cost to climb Mount Everest is substantial. The permit from the government of Nepal can run from $10,000 to $25,000 per person, depending on the number in a group of climbers. Add to that equipment, Sherpa guides, additional permits, helicopters, and other essentials and the cost per person can be well over $65,000.

In 1999, climbers using GPS (Global Positioning System) equipment determined a new height for Mount Everest - 29,035 feet above sea level, seven feet (2.1 meters) above the previously accepted height of 29,028 feet. The climb to determine the accurate height was co-sponsored by the National Geographic Society and Boston's Museum of Science. This new height 0f 29,035 feet was immediately and widely accepted.

Regardless, Mount Everest will always be famous for its extreme height that reaches nearly five and a half miles (8.85 km) into the sky.

rigor – неприступность

Text 7 TYPES OF MAPS

By Amanda Briney

In geography, maps are one of the most important tools researchers, cartographers, students and others can use to examine the entire Earth or a specific part of it.

Simply defined, maps are pictures of the Earth's surface. They can be general reference and show landforms, political boundaries, water, the locations of cities, or in the case of thematic maps, show different but very specific topics such as the average rainfall distribution for an area or the distribution of a certain disease throughout a county.

Today with the increased use of GIS, also known as Geographic Information Systems, thematic maps are growing in importance.

The following is a list of each major map type used by geographers and a description of what they are and an example of each kind.

- **Political Map:** A political map does not show any topographic features. It instead focuses solely on the state and national boundaries of a place. They also include the locations of cities - both large and small, depending on the detail of the map. A common type of political map would be one showing the 50 U.S. states and their borders along with the United States' north and south international borders (map of the United States).
- **Physical Map:** A physical map is one that shows the physical landscape features of a place. They generally show things like mountains, rivers and lakes and water is always shown with blue. Mountains and elevation changes are usually shown with different colors and shades to show relief. Normally on physical maps green shows lower elevations while browns show high elevations. An example of a physical map is one showing the state of Hawaii (map of Hawaii). Low elevation coastal regions are shown in dark green, while the higher elevations transition from orange to dark brown. Rivers are shown in blue.
- **Topographic Map:** A topographic map is similar to a physical map in that it shows different physical landscape features. They are different however because they use contour lines instead of colors to show changes in the landscape. Contour lines on topographic maps are normally spaced at regular intervals to show elevation changes (e.g. each line represents a 100 foot (30 m) elevation change) and when lines are close together the terrain is steep. For example a topographic map showing the Big Island of Hawaii would have contour lines that are close together near the steep, high elevation mountains of Mauna Loa and Kilauea. By contrast, the low elevation, flat coastal areas show contour lines that are spread apart.
- **Climate Map:** A climate map shows information about the climate of an area. They can show things like the specific climatic zones of an area based on the temperature, the amount of snow an area receives or average number of cloudy days. These maps normally use colors to show different climatic areas. A climate map for Australia for example uses colors to show differences between the temperate area of Victoria and desert region in the center of the continent.

· **Economic or Resource Map:** An economic or resource map shows the specific type of economic activity or natural resources present in an area through the use of different symbols or colors depending on what is being shown on the map. For example an economic activity map for Brazil can use colors to show different agricultural products of given areas, letters for natural resources and symbols for different industries (image showing a map of Brazil).

· **Road Map:** A road map is one of the most widely used map types. These maps show major and minor highways and roads (depending on detail) as well as things like airports, city locations and points of interest like parks, campgrounds and monuments. Major highways on a road map are generally red and larger than other roads, while minor roads are a lighter color and a narrower line. A road map of San Francisco, California for example would show the major highways as a wide red line and other large roads as a lighter red with minor streets as gray (map of San Francisco).

· **Thematic Map:** A thematic map is a map that focuses on a particular theme or special topic and they are different from the six aforementioned general reference maps because they do not just show natural features like rivers, cities, political subdivisions, elevation and highways. If these items are on a thematic map, they are background information and are used as reference points to enhance the map's theme. An example of a thematic map would be one showing the population change of Canada in specific locations from 1996 to 2001. The map shows the theme it is attempting to get across to its audience and uses a political map (e.g. one showing the provincial and territorial borders of Canada) to give it more of a reference.

a terrain – рельеф местности;
steep - крутой

Text 8 MICRO HYDRO AS A RENEWABLE ENERGY

By Frederic Beaudry
Environmental Issues Expert

Micro hydropower, or more simply micro hydro, is a form of electricity production done at a very small scale, using power from a stream. The output of a micro hydro system is generally below 100 kilowatts, enough to provide power to a home, farm, or small community.

The elements of a micro hydro system include:

· **Water Intake**. A pipe collects stream water, sometimes in a natural pool or a very small reservoir. The intake pipe is located below the water surface to avoid collecting air and floating debris, and above the bottom to make sure it does not pull in sand or gravel.

· **Pipe**. The water then is carried downhill in a pipe, or sometimes in an open flume. The power output of the system depends greatly on the head (the vertical distance between the intake and the turbine) and the flow (in gallons per minute) permitted by the pipe. These considerations limit the availability of this type of energy to those close to a stream with a minimum of water volume and a steep enough slope.

· **Turbine**. The piped water then activates a turbine, which transforms the kinetic energy of the water into rotational energy transferred through a spinning shaft to a generator. Instead of a turbine, a simple electric pump with the flow reversed can be used.

Large, more complex systems can provide all the power needs of a modern home or business. Comparatively tiny systems of a few kilowatts (termed “pico hydro”) use a small turbine and generator (sometimes even a used car alternator), and are increasingly used in developing countries to power a few lights or a radio for several homes.

Micro hydro systems can be designed to have little impact on the environment compared to “big hydro”. They do not produce greenhouse gases. They often require no reservoir, but if they do, it usually holds no more than a few cubic yards of water. When installed on a larger stream where fish might live, only a fraction of the water is diverted into the pipe, having little effect on the natural water flow.

Whatever the size of the stream, the system needs to be designed with in mind the protection of aquatic life and ecological processes.

The advantages of micro hydro scale up with the size of a system. As head and flow increase, so does power output. However, environmental impacts worsen as well. Small public utilities-scale hydroelectric projects (a few megawatts in size) can have significant impacts on streams, and if the technology was used more extensively, the cumulative environmental damages would be large. When various-sized hydroelectric projects are compared, the per-kilowatt environmental costs might be in favor of one large project (hundreds or thousands of megawatts) compared to a series of smaller utilities-scale ones (1 to 20 megawatts).

Micro hydro is very different than utilities-scale hydro in its environmental impacts, but perhaps most importantly, it differs in how it makes users more mindful of the energy they use. Just like adopters of residential solar or wind energy, homeowners who install micro hydro projects become more aware of their energy consumption and they prioritize their energy use in a way those of us relying on public utilities do not.

Text 9 PROS AND CONS OF WIND POWER

By Larry West

Environmental Issues Expert

In the context of electricity generation, wind power is the use of air movement to rotate turbine elements in order to create electrical current.

But that is what wind has come to represent for millions of people, who see wind power as a better way to generate electricity than plants fueled by coal, hydro (water) or nuclear power.

Wind power is actually a form of solar power, because wind is caused by heat from the sun. Solar radiation heats every part of the Earth’s surface, but not evenly or at the same speed. Different surfaces—sand, water, stone and various types of soil—absorb, retain, reflect and release heat at different rates, and the Earth generally gets warmer during daylight hours and cooler at night.

As a result, the air above the Earth’s surface also warms and cools at different rates. Hot air rises, reducing the atmospheric pressure near the Earth’s surface, which draws in cooler air to replace it. That movement of air is what we call wind.

When air moves, causing wind, it has kinetic energy—the energy created whenever mass is in motion. With the right technology, the wind’s kinetic energy can be captured and converted to other forms of energy such as electricity or mechanical power. That’s wind power.

Just as the earliest windmills in Persia, China and Europe used wind power to pump water or grind grain, today’s utility-connected wind turbines and multi-turbine wind farms use wind power to generate clean, renewable energy to power homes and businesses.

Wind power should be considered an important component of any long-term energy strategy, because wind power generation uses a natural and virtually inexhaustible source of power—the wind—to produce electricity. That is a stark contrast to traditional power plants that rely on fossil fuels.

And wind power generation is clean; it doesn’t cause air, soil or water pollution. That’s an important difference between wind power and some other renewable energy sources, such as nuclear power, which produces a vast amount of hard-to-manage waste.

One obstacle to increasing worldwide use of wind power is that wind farms must be located on large tracts of land or along coastlines to capture the greatest wind movement.

Devoting those areas to wind power generation sometimes conflicts with other priorities, such as agriculture, urban development, or waterfront views from expensive homes in prime locations.

Of more concern from an environmental perspective is the effects of wind farms on wildlife, in particular on bird and bat populations. Most of the environmental problems associated with wind turbines are tied to where they are installed. Careful siting of these equipment is crucial, preferably away from migratory routes or established flight paths.

Wind speeds vary greatly between months, days, even hours, and they cannot always be predicted accurately. This variability presents numerous challenge for handling wind power, especially since wind energy is difficult to store.

As the need for clean, renewable energy increases, and the world more urgently seeks alternatives to finite supplies of oil, coal and natural gas, priorities will change.

And as the cost of wind power continues to decline, due to technology improvements and better generation techniques, wind power will become increasingly feasible as a major source of electricity and mechanical power.

Text 10 ACID RAIN

By Amanda Briney, Contributing Writer

Acid rain is rain consisting of water droplets that are unusually acidic because of atmospheric pollution - most notably the excessive amounts of sulfur and nitrogen released by cars and industrial processes. Acid rain is also called acid deposition because this term includes other forms of acidic precipitation such as snow.

Acidic deposition occurs in two ways: wet and dry. Wet deposition is any form of precipitation that removes acids from the atmosphere and deposits them on the Earth's surface. Dry deposition polluting particles and gases stick to the ground via dust and smoke in the absence of precipitation. This form of deposition is dangerous however because precipitation can eventually wash pollutants into streams, lakes, and rivers.

Acidity itself is determined based on the pH level of the water droplets.

Today, acid deposition is present in the northeastern United States, southeastern Canada, and much of Europe including portions of Sweden, Norway, and Germany. In addition, parts of South Asia, South Africa, Sri Lanka, and Southern India are all in danger of being impacted by acid deposition in the future.

Acid deposition can occur via natural sources like volcanoes but it is mainly caused by the release of sulfur dioxide and nitrogen oxide during fossil fuel combustion. When these gases are discharged into the atmosphere they react with the water, oxygen, and other gases already present there to form sulfuric acid, ammonium nitrate, and nitric acid. These acids then disperse over large areas because of wind patterns and fall back to the ground as acid rain or other forms of precipitation.

The gases responsible for acid deposition are normally a byproduct of electric power generation and the burning of coal. As such, it began entering the atmosphere in large amounts during the Industrial Revolution and was first discovered by a Scottish chemist, Robert Angus Smith, in 1852. In that year, he discovered the relationship between acid rain and atmospheric pollution in Manchester, England.

Although it was discovered in the 1800s, acid deposition did not gain significant public attention until the 1960s and the term acid rain was coined in 1972. Public attention further increased in the 1970s when the New York Times published reports about problems occurring in the Hubbard Brook Experimental Forest in New Hampshire.

After studying the Hubbard Brook Forest and other areas today, there are several important impacts of acid deposition on both natural and man-made environments. Aquatic settings are the most clearly impacted by acid deposition though because acidic precipitation falls directly into them. Both dry and wet deposition also runs off of forests, fields, and roads and flows into lakes, rivers, and streams.

Aside from aquatic bodies, acid deposition can significantly impact forests. As acid rain falls on trees, it can make them lose their leaves, damage their bark, and stunt their growth. By damaging these parts of the tree, it makes them vulnerable to disease, extreme weather, and insects. Acid falling on a forest's soil is also harmful because it disrupts soil nutrients, kills microorganisms in the soil, and can sometimes cause a calcium deficiency. Trees at high altitudes are also susceptible to problems induced by acidic cloud cover as the moisture in the clouds blankets them.

Because of these problems and the adverse effects air pollution has on human health, a number of steps are being taken to reduce sulfur and nitrogen emissions. Additionally, alternative energy sources are gaining more prominence today and funding is being given to the restoration of ecosystems damaged by acid rain worldwide.

deposition – осадок

Text 11 TOP SEVEN RENEWABLE ENERGY SOURCES

By Larry West
Environmental Issues Expert

Many nations count on coal, oil and natural gas to supply most of their energy needs, but reliance on fossil fuels presents a big problem. Fossil fuels are a finite resource. Eventually, the world will run out of fossil fuels, or it will become too expensive to retrieve those that remain. Fossil fuels also causes air, water and soil pollution, and produce greenhouse gases that contribute to global warming.

Renewable energy resources offer cleaner alternatives to fossil fuels. They produce much less pollution and fewer greenhouse gases, and by definition, will not run out. Here are our main sources of renewable energy:

1. Solar Energy

The sun is our most powerful source of energy. Sunlight, or solar energy, can be used for heating, lighting and cooling homes and other buildings, generating electricity, water heating, and a variety of industrial processes. The technology used to harvest the sun's energy is constantly evolving, including water-heating rooftop pipes, photo-voltaic cells, and mirror arrays.

2. Wind Energy

Wind is the movement of air that occurs when warm air rises and cooler air rushes in to replace it. The energy of the wind has been used for centuries to sail ships and drive windmills that grind grain. Today, wind energy is captured by wind turbines and used to generate electricity.

3. Hydroelectricity

Water flowing downstream is a powerful force. Water is a renewable resource, constantly recharged by the global cycle of evaporation and precipitation. The heat of the sun causes water in lakes and oceans to evaporate and form clouds. The water then falls back to Earth as rain or snow, and drains into rivers and streams that flow back to the ocean. Flowing water can be used to power water wheels that drive mechanical processes. And captured by turbines and generators, like those housed at many dams around the world, the energy of flowing water can be used to generate electricity. Tiny turbines can even be used to power single homes.

4. Biomass Energy

Biomass has been an important source of energy ever since people first began burning wood to cook food and warm themselves against the winter chill. Wood is still the most common source of biomass energy, but other sources of biomass energy include food crops, grasses and other plants, agricultural and forestry waste and residue, organic components from municipal and industrial wastes, even methane gas harvested from community landfills. Biomass can be used to produce electricity and as fuel for transportation, or to manufacture products that would otherwise require the use of non-renewable fossil fuels.

5. Hydrogen

Hydrogen has tremendous potential as a fuel and energy source. Hydrogen is the most common element on Earth—for example, water is two-thirds hydrogen—but in nature it is always found in combination with other elements. Once separated from other elements, hydrogen can be used to power vehicles, replace natural gas for heating and cooking, and to generate electricity. In 2015, the first production passenger car powered by hydrogen became available in Japan and the United States.

6. Geothermal Energy

The heat inside the Earth produces steam and hot water that can be used to power generators and produce electricity, or for other applications such as home heating and power generation for industry. Geothermal energy can be drawn from deep underground reservoirs by drilling, or from other geothermal reservoirs closer to the surface. This application is increasingly used to offset heating and cooling costs in residential and commercial buildings.

7. Ocean Energy

The ocean provides several forms of renewable energy, and each one is driven by different forces. Energy from ocean waves and tides can be harnessed to generate electricity, and ocean thermal energy—from the heat stored in sea water—can also be converted to electricity. Using current technologies, most ocean energy is not cost-effective compared to other renewable energy sources, but the ocean remains and important potential energy source for the future.

a dam – *плотина, дамба;*
to residue – *проживать, находиться, быть*

Text 12 GALAPAGOS IN DANGER

By Larry West
Environmental Issues Expert

UNESCO placed the Galapagos Marine Reserve on its list of "World Heritage in Danger." These 31 World Heritage Sites are in danger of losing their unique characteristics. The Galapagos Islands are threatened by growing tourism, invasive species, illegal fishing, and undocumented immigration leading to a human population the islands and marine area cannot support.

The Galapagos Marine Reserve is one of the largest and most biologically diverse marine protected areas (MPAs) in the world. The MPA covers 133,000 square kilometers, surrounding the Galapagos Islands in the eastern Pacific Ocean, about 1,000 kilometers off Ecuador's coast.

The marine reserve is home to a wide range of species: whales, dolphins, albatrosses, sharks, sea lions, penguins, fur seals, cormorants, marine iguanas, sea turtles, and tropical fishes. More than 2,900 marine species have been monitored, according to the Galapagos National Park Administration.

Several different habitats exist in the reserve. Underwater volcanoes or mountains, known as seamounts, rise to near the water's surface and provide feeding grounds for some fish, such as tuna and sharks, as well as birds, sea lions, and turtles. There are also reefs, underwater cliffs, wetlands, and lagoons.

The rich biodiversity is the result of the islands' location along the Equator. Warm and cold ocean currents mix with nutrient-rich cold water that rises from the ocean floor. Those nutrients create the food chain that sustains marine life, from tiny animals like the sea urchin to giant fish like the whale shark.

The MPA is designed to protect the biodiversity of the islands and the surrounding waters. The park was also created to ensure the sustainable use of natural resources by local residents.

Some agriculture and fishing are allowed in the MPA, and tourism is the area's most important economic activity. More than 100,000 people visit the Galapagos Islands every year. The sustainable use practices of the MPA seek to balance the demands of the tourist industry and the pristine habitats tourists seek.

In some areas of the reserve, researchers study the impact of human activity on the marine ecosystem. They study fishing methods, agricultural practices, and pollution left by tour boats. Underwater and coastal cleanup may also be a part of a scientific expedition.

Commercial fishing is allowed in some areas of the reserve. Some areas of the reserve allow sport fishing and other activities. In areas that allow recreational activities, removal of plants, animals, remains, or other natural objects is prohibited.

To ensure that tourists observe regulations, the reserve uses satellite-based geographic information system (GIS) technology to monitor activities in its waters.

a cormorant – баклан;
an urchin – еж;
pristine – нетронутый

Text 13 FLOODS

By Amanda Briney,
Contributing Writer

There are few places on Earth where people need not be concerned about flooding. Any place where rain falls is vulnerable, although rain is not the only impetus for flood.

A flood occurs when water overflows or inundates land that's normally dry. This can happen in a multitude of ways. Most common is when rivers or streams overflow their banks. Excessive rain, a ruptured dam or levee, rapid ice melting in the mountains, or even an unfortunately placed beaver dam can overwhelm a river and send it spreading over the adjacent land, called a floodplain. Coastal flooding occurs when a large storm or tsunami causes the sea to surge inland.

Most floods take hours or even days to develop, giving residents ample time to prepare or evacuate. Others generate quickly and with little warning. These flash floods can be extremely dangerous, instantly turning a babbling brook into a thundering wall of water and sweeping everything in its path downstream.

Disaster experts classify floods according to their likelihood of occurring in a given time period. A hundred-year flood, for example, is an extremely large, destructive event that would theoretically be expected to happen only once every century. But this is a theoretical number. In reality, this classification means there is a one-percent chance that such a flood could happen in *any* given year. Over recent decades, possibly due to global climate change, hundred-year floods have been occurring worldwide with frightening regularity.

Moving water has awesome destructive power. When a river overflows its banks or the sea drives inland, structures poorly equipped to withstand the water's strength are no match. Bridges, houses, trees, and cars can be picked up and carried off. The erosive force of moving water can drag dirt from under a building's foundation, causing it to crack and tumble.

In the United States, where flood mitigation and prediction is advanced, floods do about $6 billion worth of damage and kill about 140 people every year. A 2007 report by the Organization for Economic Cooperation and Development found that coastal flooding alone does some $3 trillion in damage worldwide. In China's Yellow River valley, where some of the world's worst floods have occurred, millions of people have perished in floods during the last century.

When floodwaters recede, affected areas are often blanketed in silt and mud. The water and landscape can be contaminated with hazardous materials, such as sharp debris, pesticides, fuel, and untreated sewage. Potentially dangerous mold blooms can quickly overwhelm water-soaked structures. Residents of flooded areas can be left without power and clean drinking water, leading to outbreaks of deadly waterborne diseases like typhoid, hepatitis A, and cholera.

But flooding, particularly in river floodplains, is as natural as rain and has been occurring for millions of years. Famously fertile floodplains like the Mississippi Valley in the American Midwest, the Nile River valley in Egypt, and the Tigris-

Euphrates in the Middle East have supported agriculture for millennia because annual flooding has left millions of tons of nutrient-rich silt deposits behind.

Most flood destruction is attributable to humans' desire to live near picturesque coastlines and in river valleys. Aggravating the problem is a tendency for developers to backfill and build on wetlands that would otherwise act as natural flood buffers.

Many governments mandate that residents of flood-prone areas purchase flood insurance and build flood-resistant structures. And highly advanced computer modeling now lets disaster authorities predict with amazing accuracy where floods will occur and how severe they're likely to be.

vulnerable – уязвимый;
an impetus – толчок;
a dam – плотина;
a levee – дамба;
adjacent – соседний;
silt – ил

Text 14 ANTARCTICA – RESOURSE OR REFUGE?

By Frederic Beaudry
Environmental Issues Expert

Few places on earth have not been exploited by humans. One such place is Antarctica. Antarctica is as close to an unpolluted environment as there is on earth, but it is not without its problems.

Seals and whales brought the earliest exploitation to Antarctica. There was no money to be made in Antarctica, and this "opportunity" resulted in the near extinction of the southern fur seal, the elephant seal, and the blue whale.

By the 1950s, aboveground nuclear testing had spread radioactive particles around the planet, including Antarctica. Pesticides like DDT were also turning up in the tissues and blood of certain Antarctic bird and marine mammal species. A growing hole the ozone layer above the Antarctic continent is caused by the use of chlorofluorocarbons. Fossil-fuel combustion contributes to the greenhouse effect, which, in turn, threatens to melt the ice in Antarctica's Western Peninsula.

During the past several decades, Antarctica has witnessed extensive scientific exploration. Much of this exploration has been economically motivated rather than scientific. For example, there are government scientists who, with the aid of satellites, are advising oil and mineral prospectors. In addition, much of the so-called scientific research is conducted with geopolitical or military objectives in mind.

Antarctica is also being proposed as a tourist attraction. Australia has suggested building a hotel, while Argentina is considering chartering a vessel to transport six hundred tourists from South America seven times a year. Several sites are also being viewed as potential ski resorts.

From an ecological perspective, Antarctica is fragile. The thin layer on the surface of the ocean, nourished by the sun, supports the tiny shrimplike krill, which, in turn, sustain fish, whales, seals, and penguins. These short, simple food chains are extremely sensitive to environmental insults.

In the mid-1970s, New Zealand proposed making the continent into an Antarctic World Park. This would run Antarctica into an international wilderness area, a region on earth where we recognize that humanity does not belong.

In 1991, an agreement was signed by 24 countries to ban mineral and oil exploration in Antarctica for 50 years. The agreement, which was hailed as historic by governments environmental groups, also includes new regulations for wildlife protection, waste disposal, marine pollution, and continued monitoring of the Antarctic, which covers nearly one-tenth of the world's land surface. The signing of the agreement in Madrid, Spain, was the result of two years of negotiations. The protocol protects Antarctica's delicate flora and fauna and sets procedures to assess environmental effects of all human activities on the continent.

to threaten – угрожать;
insult – оскорбление

Text 15 SEA – OR SEWER?

By Matt Rosenberg
Geography Expert

Forecast of what the sea will do are becoming all the more necessary depending on what we are doing to the sea; it has become mankind's great sewer.

Lakes, rivers and the very air itself have become clogged with our wastes. The sea, in its immensity, would appear to have an indefinite capacity to hide anything that might be thrown into it.

On the face of it, there does not seem to be much of a problem. The North Sea, for example, contains 54,000 cubic kilometers of water. Consequently, if 54,000 tons of any substance were dumped into this sea and perfectly dispersed, it would show up in a concentration of only one part per billion. This kind of reasoning has encouraged the use of the North Sea as a receptacle for everything from the raw sewage of the cities to the wastes of industry along the Rhine, one of the world's busiest areas of economic activity.

Such reasoning does not stand up because the sea is not a tub of water mixed every day by wind and tide. Currents not only disperse waste, they also concentrate it. That was what happened in spring 1965 when the beach near the Hague was suddenly covered with rows of dead fish. Analysis of the water just off the beach showed that its copper content was no less than 500 times higher than normal.

It has been estimated that one or two truckloads – twenty tons in all – of copper were enough to do the trick. Dumped stealthily on some beach at low tide, they were not diluted by the sea. Instead tides and currents concentrated the waste into a narrow lethal river about 200 yards wide and flowing north ever so slowly.

The problem of oil pollution grows more complex every day with new technological developments. The opening of the Northwest Passage from Alaska to the east coast of North America has drastic implications for the Arctic environment. If a giant tanker were to be wrecked in those waters, the effect would be even more lasting than in the temperate zone. In a cold climate, the volatile components of oil are no longer volatile and the breakdown of petroleum by bacteria in the sea occurs at much slower pace.

Another danger in the Arctic is that off-shore oilfields are vulnerable to icebergs. They are not only a formidable threat to a drilling platform but some icebergs, drawing more than 600 feet of water can wipe out pipelines laid along the bottom to link well-heads to the shore.

The sea is threatened on all sides. The worst of it that often we do not know we are polluting the environment until it is too late. All too often, we wake up to pollution too late and when there is too much of it already on our hands. To avert such a fate for the world ocean, the nations that have joined the Intergovernmental Oceanographic Commission have recommended the establishment of a world-wide system to monitor marine pollution.

Finally we must learn more about the ocean itself and the life it contains so that we will be able to recognize changes, whether harmful or beneficial, when and if they occur.

immensity – необъятность;
receptacle – вместилище;
drastic – радикальный;
implication – последствие;
vulnerable – уязвимый;
formidable - серьезный