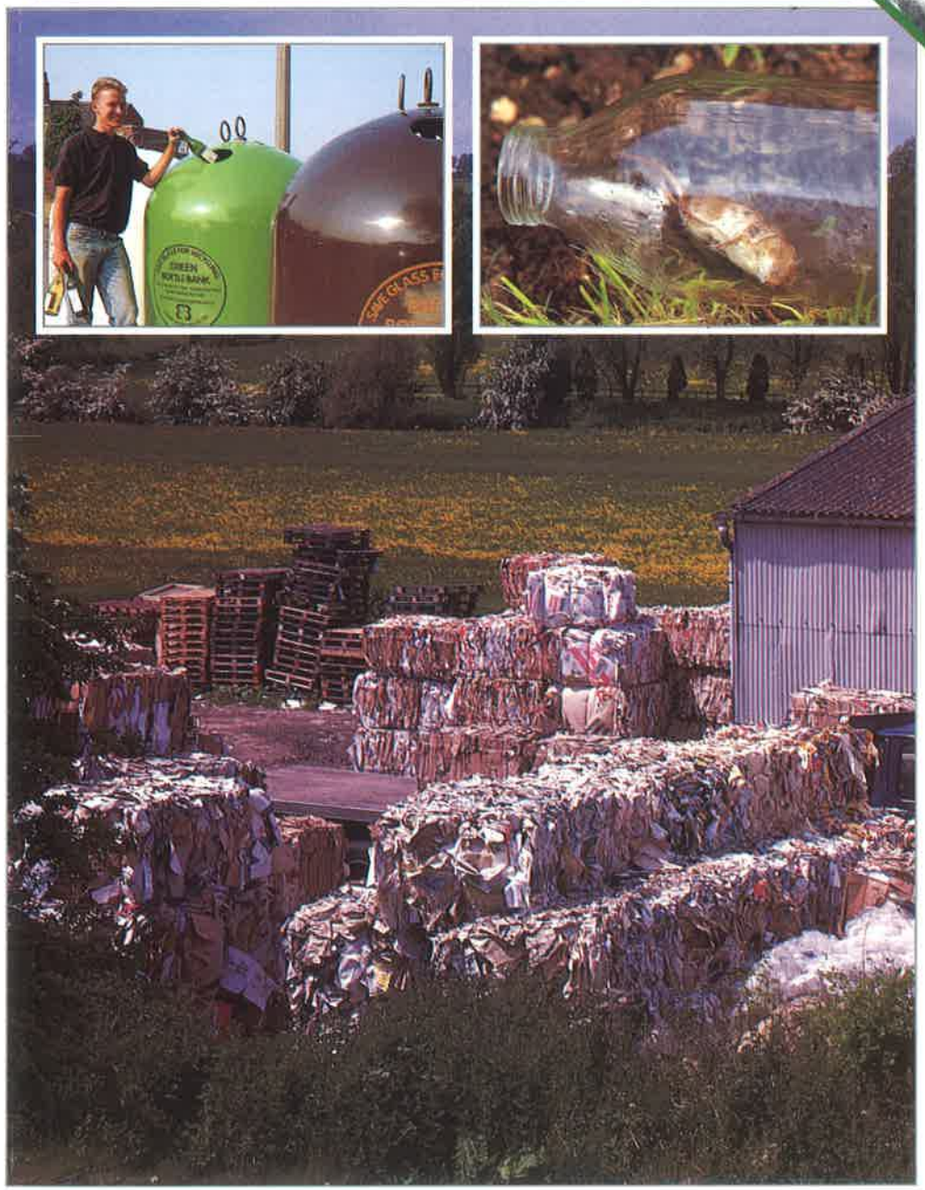
RECYCLING PAPER & GLASS

CARD 31

GROUP 11: CONSERVATION



Every day, throughout the world, we throw away massive amounts of garbage. But much of what goes into the trash could be recycled, saving energy, habitats, resources, and wildlife.

ACTION FILE

HOW PAPER AND GLASS ARE RECYCLED

Before anything can be recycled it must be collected. Many towns and cities have collection programs to remove waste to be recycled. Some programs are run by the city sanitation departments; others are run by charities or companies that sell the waste to recycling plants. In addition there are community recycling centers, where people can bring materials for recycling.

Left: *At recycling locations glass bottles may be sorted by color, such as green or brown, before they reach the recycling plant.*

Below: *Many communities have containers to make recycling paper as convenient as possible.*

RECYCLING PAPER

There are different recycling mills for different grades of paper. Newspaper is recycled into cardboard or more newspaper. High-quality paper, such as computer paper, is made into tissues or writing paper.

When the paper arrives at the mill, it is fed into a pulper. Water is added to make a souplike pulp, which is passed through screens to remove solid objects such as paper clips. The pulp may also be treated to remove ink either by washing it with chemicals or by bubbling air through it. The pulp is passed through heated rollers that squeeze the water out and dry the paper for use.

Recycled paper may be gray or speckled because ink always gets through the process. Although bleach may whiten paper, it is a dangerous pollutant.

Left: *Paper and cardboard used in industry are important resources for recycling.*

RECYCLING GLASS

Glass of the same color is fed into the plant on a conveyor belt. Caps and labels are removed by people, sometimes helped by magnets. The glass is crushed by a machine into small, smooth lumps and put into a furnace with other raw materials, including sand and limestone. The furnace melts them into molten glass, which is poured into molds for jars, bottles, or other glass items.

Millions of tourists visit the Mediterranean coast each summer, but few have any idea of the damage being done around and below the sparkling waters. Habitats and their resident wildlife are disturbed, polluted, and exploited while environmental protection programs struggle to cope with the destruction.

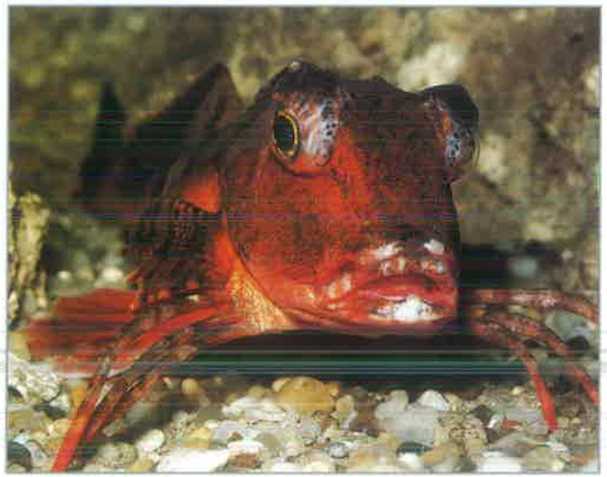
POLLUTION & EXPLOITATION

One hundred million people live around the Mediterranean. Many of them, plus a large number of tourists, produce sewage that is poured untreated into the sea. Because little water moves out of the sea, the sewage remains, killing the plants and decreasing the oxygen in the water. Algae proliferate and decrease the oxygen still further as they die and decompose.

Building sites for industry and tourist developments destroy sand dunes and wetlands. Silt washed down from sites covers underwater meadows of Neptune grass. This plant provides food and protection for small marine animals and is a rich producer of oxygen. Neptune grass is harvested illegally by trawlers and sold for animal bedding.

Oil tankers regularly cross the Mediterranean Sea, collecting oil at refineries in Libya and Tunisia. Major oil spills occur when the oil is being loaded. The oil tanks are also illegally washed out at sea. Oil kills marine birds and other animals and washes onto beaches.

Plastic waste thrown into the Mediterranean is also a serious problem as it chokes wildlife and does not decompose.



TOURISM

Red coral, together with its inhabitants, is gathered to sell to tourists. As a result, animals like the sea urchin are becoming rare.

The loggerhead turtle lays its eggs on Mediterranean beaches each year. As these beaches are developed for tourism, the eggs are in danger from vacationers who accidently trample on or drive over the turtles' nests. Bright hotel lights frighten the turtles away, leaving them nowhere to lay their eggs. The hatchlings that do emerge are confused by the human presence and cannot find their way to the sea.

Front inset left: *Even deepwater species like the trumpet fish are at risk from pollution.*

Front inset right: *Oil pollution in the Mediterranean kills sea species such as starfish.*

Left: *Like all Mediterranean fish, the striped gurnard suffers from pollution and overfishing.*

Right: *The loggerhead turtle population has slumped by 50 percent in the last decade.*

OVERFISHING

Fishing has provided a living for Mediterranean people for centuries, but modern fishing methods have put a strain on fish stocks.

Schools of tuna are netted and deliberately exhausted before they are landed to make them easier to handle. To pay for the maintenance of modern ships, huge catches are trawled. Less valuable fish are caught, then thrown back dead.

Inshore fisheries are almost depleted, and deeper water fisheries will probably have the same problem.

Left: *Red coral is taken from the seabed and then dried and sold to tourists.*

THE MONK SEAL

Except for a small number on Morocco's Atlantic coast, the monk seal is found only in the Mediterranean. As a result, it is particularly at risk.

Unlike other seals it lives in groups of two or three and does not gather in herds.

The monk seal was once very common, but its numbers decreased as the fishing industry expanded. Viewed as a competitor for fish, the seal was hunted more frequently as fish catches decreased.

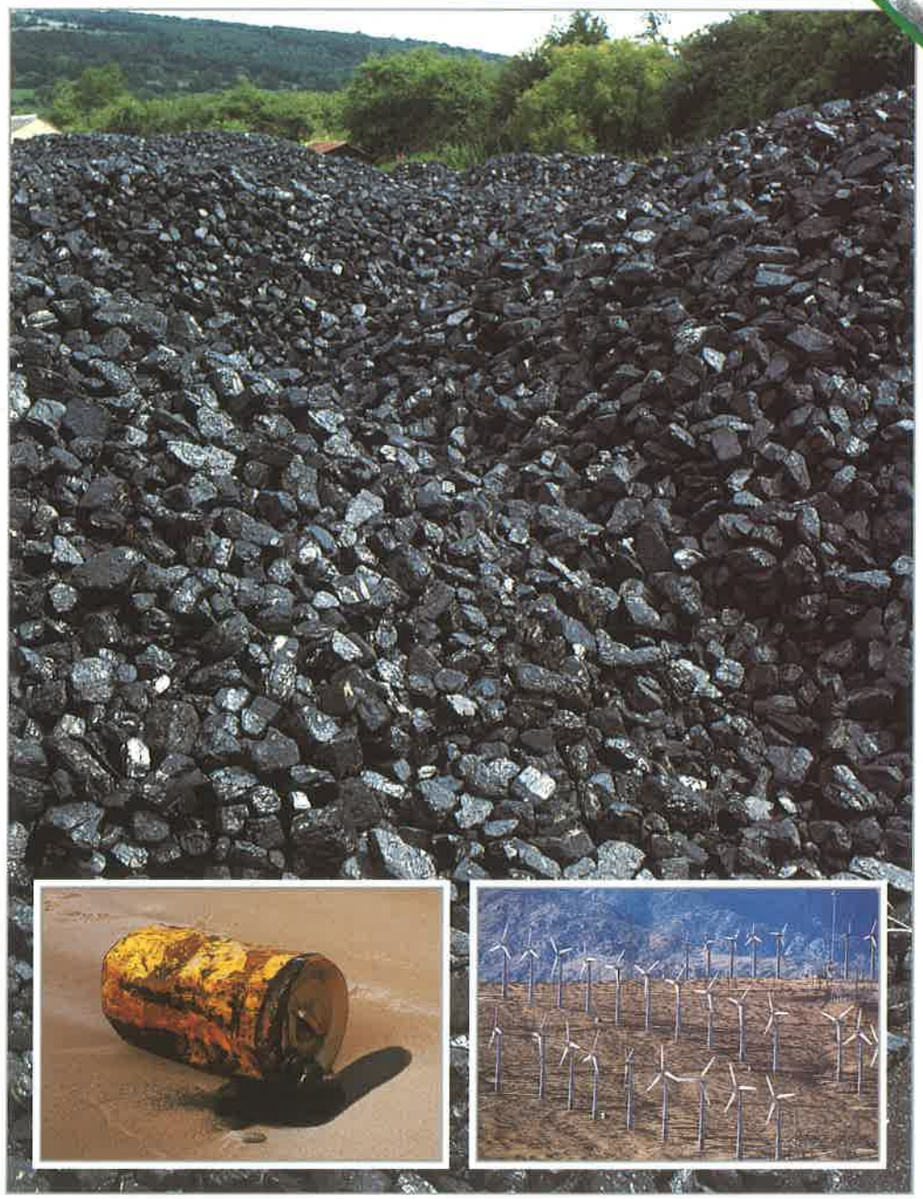
Tourism is also responsible for the monk seal's decline. Tourists now use the beaches where it likes to breed, and the seal has had to retreat to remote sea caves to give birth.

Although there is a special protected area for the seals near Crete, the monk seal is Europe's rarest mammal, with a population of less than 500.

CARD 28

CONSERVING FOSSIL FUELS

GROUP 11: CONSERVATION



Coal, oil, and gas provide power for many things in our lives. But we must reduce our use of them and look for other energy sources if we are to save our environment before it is too late.

ACTION FILE

WHAT CAN BE DONE?

No one source of energy can immediately replace fossil fuels. Most alternatives do not produce enough power. Some cause pollution, although none is as dirty as coal, oil, or gas. Nuclear power presents its own problems of leakage, waste disposal, and the dismantling of old reactors.

Alternative power sources can help. But to avoid a severe drop in our standard of living, we still need fossil fuels or nuclear energy.

EFFICIENCY IS VITAL

Rather than cut out all fossil fuels, we need to adopt a policy of energy efficiency. We need to use less fuel but make it work harder. For that we need equipment that is more energy-efficient. A gas stove uses less energy to heat water than a wood fire. Unfortunately, people in developing countries cannot afford to buy gas stoves.

If we are to save the environment, nations must invest in energy-efficient equipment that will reduce the demand for fossil fuels. They must also conduct research on renewable energy sources. Commitment to these issues may also narrow the gap between rich and poor nations.

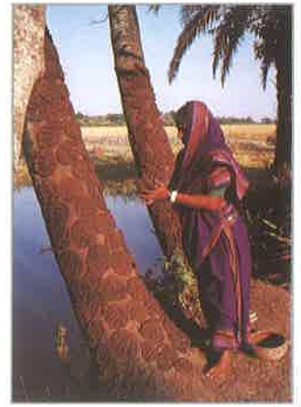
Above: *Nuclear power is efficient but carries high safety risks.*

Left: *Buried pipelines let nature reclaim the landscape.*

WHAT YOU CAN DO TO HELP

Everybody can help to conserve energy. To preserve heat, install insulation in your home. Use cars that are less fuel-hungry, drive them less often, and share rides. Oil is used to make plastic, so buy products with less packaging.

Left: *Using solar power for home energy needs helps to conserve fossil fuels.*



Right: *Manure, burned for fuel in many countries, is better used to fertilize the soil.*

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Four-fifths of the world's energy consumption relies on nonrenewable fossil fuels such as coal, oil, and natural gas. At the present rate of use, gas supplies should last for about 200 years and coal for 3,000 years. But even before these fuels run out, pollution from their use may destroy our environment—unless we change our ways.

THE FOSSIL FUELS

For thousands of years people have used fire to heat and to light their homes. Some burn coal; others burn wood, peat, and manure. While wood can be replaced by growing new trees, coal cannot.

Coal, oil, and gas are *fossil fuels,* which are formed in the earth from plant and animal remains. Coal is produced by the effects of pressure and heat on swamp trees over time. Oil comes from small plants and animals that died in the ancient seas. Pressure, heat, and time slowly turned their bodies into oil and gas.

Ten years ago people feared that our existing coal and oil supplies would run out. The world population was growing, and developing countries were demanding more fuel.

Today, the viewpoint has changed. Many scientists fear that pollution from coal, oil, and gas will increase acid rain, global warming, and the depletion of the ozone layer. If this pollution continues, it will cause irreparable damage to the planet long before we run out of energy.

Right: *If oil companies struck gas, they used to burn it as waste. Now it is used as a cheap and versatile fuel.*

Front inset left: *Oil may pollute even before it is burned.*

Front inset right: *Wind power is used in California.*

ALTERNATIVE SOURCES OF ENERGY

Nuclear power: Energy is released by splitting the nuclei of uranium atoms *(nuclear fission).* This method could meet energy needs for thousands of years, but it carries safety risks. The 1986 Chernobyl disaster in the Soviet Union sent radiation around the world.

The sea: One way to use tidal energy is to dam an *estuary,* where the end of a river meets the sea. The rising tide fills a reservoir, and then this water falls through turbines to produce electricity. This method could be used to satisfy one half of one percent of the world's energy needs.

Left: *Tidal waters flow past turbines in a dam to generate electric power. The sea's tides are a clean, renewable source of energy.*

Geothermal energy: Heat energy in the earth's core is released by volcanoes, geysers, and hot springs. Reykjavik, the capital of Iceland, gets its heating from hot springs.

To harness geothermal energy, it is necessary to dig deep. One experimental power station located in Cornwall in England has two wells, each four miles deep. Cold water is pumped in, heated by the hot rocks at that depth, and then pumped out again. The heat from the water is used to generate electricity.

Above: *A geothermal plant in Svartsengi, Iceland, generates power from heat that escapes from deep in the earth.*

Solar power: The sun has an almost endless supply of energy. In *photosynthesis,* plants use this energy to make carbohydrates, which we eat for energy. But we can also use solar energy directly. In California's Mojave Desert, solar panels produce power for 2,000 homes, reducing the need for fossil fuels. Solar power works best on a large scale in very sunny areas.

Biomass: Wood, certain crops, manure, and garbage are another potential energy source, collectively referred to as *biomass.* In Coventry, England, the Peugeot factory uses heat from household garbage that is burned in incinerators, but most cities fail to use this heat source. Heat could also be harvested from the cooling towers of power stations.

Brazil grows sugarcane and other crops to produce alcohol (ethanol) to fuel cars. In China waste and sewage are converted into a gas that is used to light and heat homes.

Wood: Wood is burned to produce heat or light, and it is the main energy source for 70 percent of people in developing countries.

In many areas of the world, wood is being burned faster than it can be replanted. At current rates of consumption, by the year 2000 some 2.4 billion people may endure substantial hardships due to a shortage of wood. Local governments may have to establish forested "green belts" around wood-hungry cities to prevent a shortage and meet both domestic and industrial demands for fuel.

Wind power: Wind energy is endlessly renewable and does not cause pollution. However, groups of modern energy-producing windmills do take up a lot of space and are noisy.

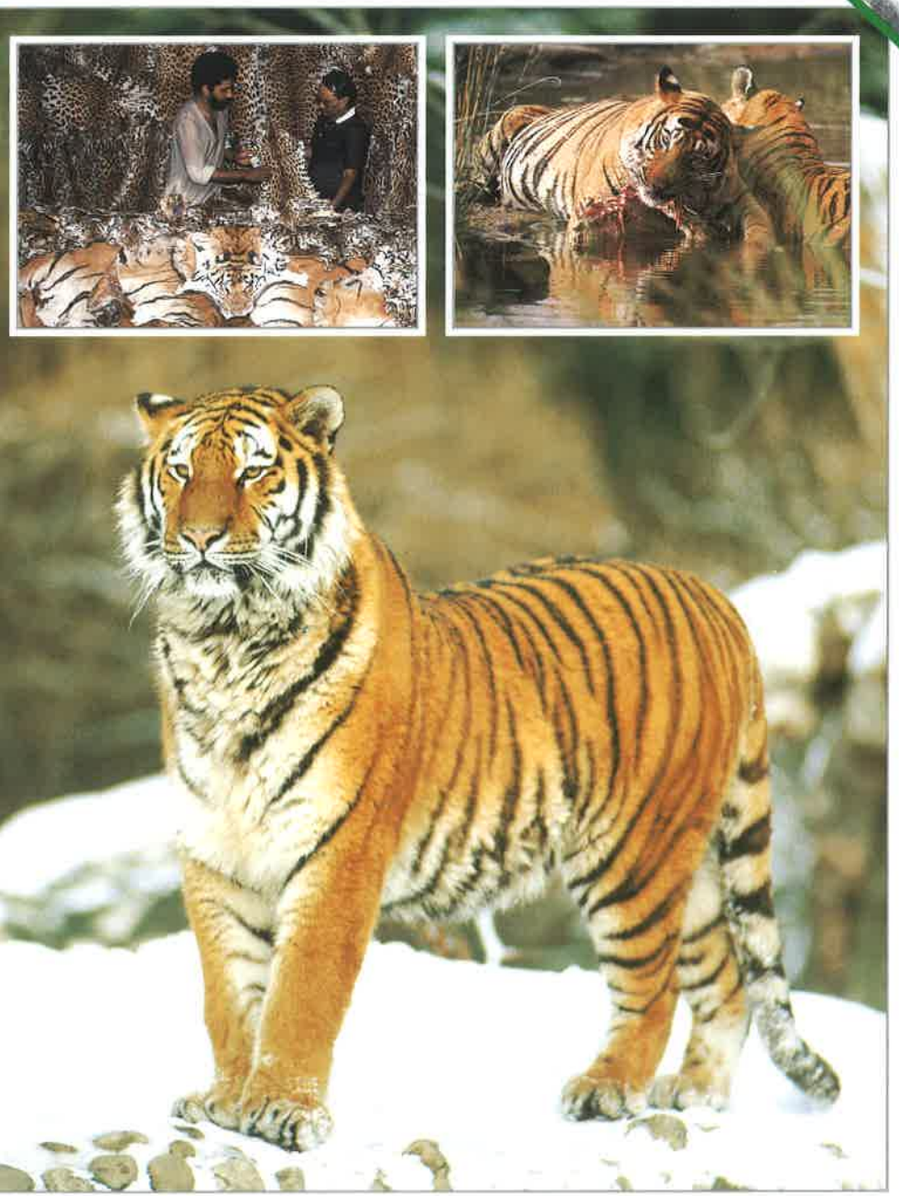
On small islands, such as the Orkneys off the coast of Scotland, windmills already provide an important source of power. California is creating extensive windmill "farms" in the desert. Each windmill has sails about 65 feet in diameter. By the year 2000 California should obtain 20 percent of its energy from the wind.

Hydroelectric power: The power of water flowing down through a river or dam can be harnessed to generate electricity. Scotland, Scandinavia, and many African countries already produce much of their power in this way. But there are drawbacks to hydroelectric power. It is expensive to dam a river, and farmland and homes must be flooded. In addition, soil washes into the dammed lake and makes it increasingly shallow, so that the dam has at most 40 years of effective use.

CARD 26

SAVE THE TIGER

GROUP 11: CONSERVATION



Eight kinds of tiger once ranged freely in forests over large portions of Asia. Today only five subspecies are known to survive, and all of these are classified as endangered.

ACTION FILE

TIGER RESERVES

Like other large predators, tigers face certain problems in a reserve. Inbreeding between small groups of tigers within a single reserve may eventually cause the species to decline. A group of about 500 tigers is needed to ensure that the species does not suffer genetically.

FOREST CORRIDORS

The ideal arrangement is to link several reserves with "forest corridors" and allow animals to travel freely between them. Some of these corridors already exist, but they are threatened by the need for more agricultural land and by poor security.

Another solution is to move individual tigers between the smaller reserves for breeding and in this way increase the gene pool.

Captive breeding programs are used to minimize inbreeding. In the case of the Siberian tiger, these programs seem to be succeeding, and the numbers in captivity are approximately twice those in the wild.

Below: *Posters border the Anamalai Wildlife Preserve, where tigers are protected.*

Right: *Bullet holes in a skin prove that the illegal fur trade continues to thrive.*

THE TIGER TRADE

In spite of a ban on international commercial trade, there is still a thriving illegal trade in tiger skins, with the demand mainly from the Arab nations, China, and Japan. Tiger bones are also in demand in China as a medicinal ingredient.

Below: *Conditions in a reserve are not ideal, but tigers are safer there than in the wild.*

LOCAL POPULATION PRESSURES

Many tiger reserves are opposed by the local population because they have displaced people from land where they once grazed their animals.

In the Ranthambhore Tiger Reserve in India, for example, villagers were resettled on good agricultural land near the reserve. But droughts and overgrazing have made the newly settled area useless. The government's provision of fertile land for tigers over people has led to fights between villagers and reserve guards. A private foundation has been set up to teach the villagers about the need to conserve wildlife and to help them revitalize the land.

At the Chitwan National Park in Nepal, villagers may enter the park for two weeks every year to collect the tall grass they use for thatching their homes and feeding their livestock. This plan seems to have defused a difficult situation. Studies of the tiger's needs have been made at Chitwan, and they have provided vital data for improving the management of tiger reserves.

In spite of international protection measures and public awareness of the problem, the tiger is threatened with extinction. Poachers are active throughout its range because there are still large profits to be made from the illegal trading of tiger skins. But, like many other endangered animals, the tiger is primarily threatened by the reduction of its habitat.

LIFESTYLE

There are five surviving subspecies of tiger, of which the largest and most heavily built is the Siberian tiger. All five subspecies are protected internationally and are classified as endangered.

The tiger does not seem to have developed a complex society. The family group usually consists of a female with young, but breeding pairs have been seen feeding from the same kill.

For centuries the fearsome reputation of the tiger has inspired legends, but in reality tigers normally avoid contact with humans. Only rarely do they eat people.

Unlike the lion and cheetah, the tiger prefers the cover of a wooded habitat. It usually hunts alone, stalking and ambushing its prey, then killing it with a bite to the throat. It averages one kill in 10 to 20 attempts.

Front inset left: ***Big cats are still hunted despite a ban on commercial trade worldwide.***

Front inset right: ***Reserves must protect a healthy stock of the tiger's prey.***

Right: ***The majestic Bengal tiger, like the other tiger subspecies, is endangered.***

Below: ***The tiger is a solitary hunter and needs a large range with dense undergrowth.***

THE TIGER'S DECLINE

For thousands of years the tiger lived in forests that were heavily populated with prey and had only isolated groups of people. Today the situation is almost reversed.

About 6,000 to 9,000 tigers live in the wild throughout Asia, and another 1,000 are in zoos around the world. This population is just a tiny fraction of the numbers that once roamed the Asian continent.

The drastic decrease in the tiger population in this century is a result of the destruction of the tiger's natural habitat to meet human needs for housing, food, and fuel.

Each year a single tiger needs to catch and eat about 100 large prey from a variety of species. These prey must have healthy food plants to eat, unpolluted water to drink, and sufficient space to live undisturbed by humans. As the wild areas of Asia shrink, few plant and animal species can adapt to the changing habitat. They are vanishing at an alarming rate, resulting in fewer available prey for the tiger.

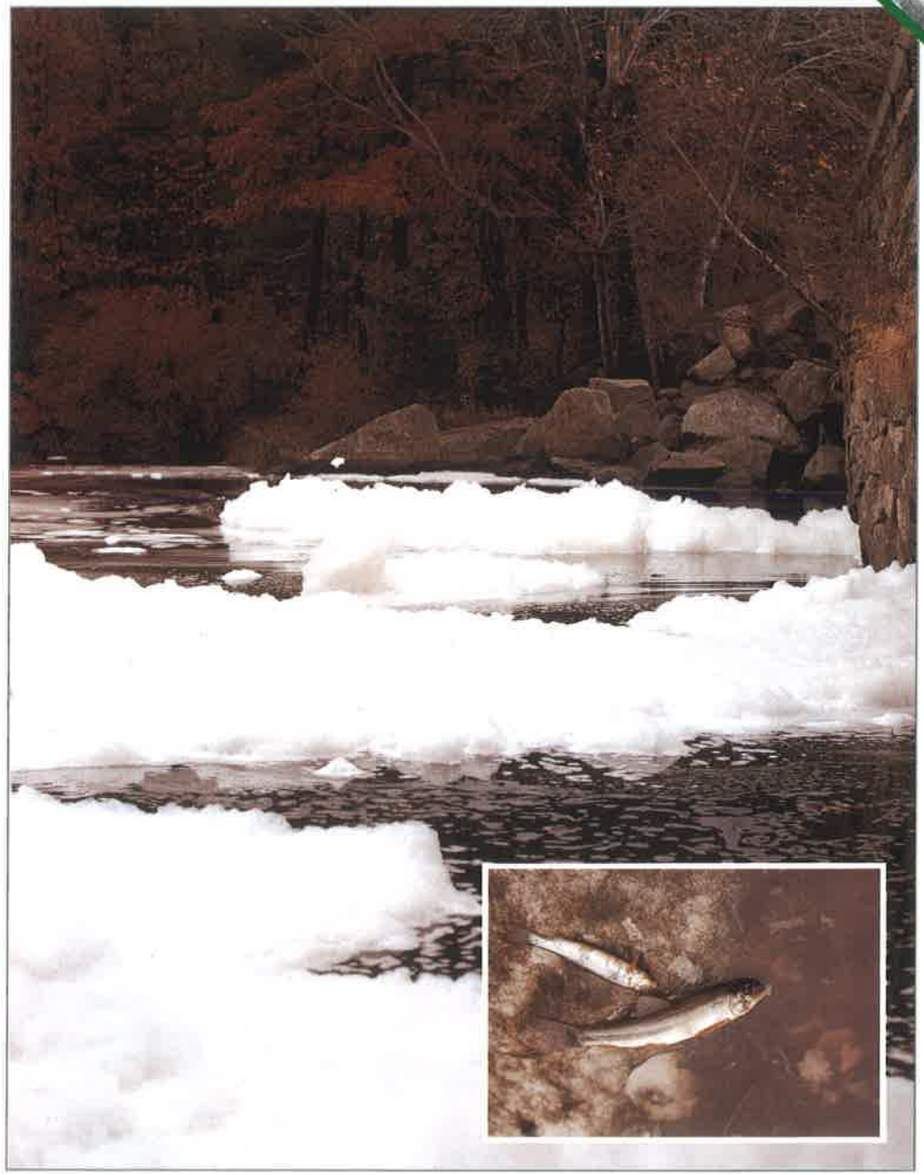
Above: ***Clean drinking water is needed by both villagers and tigers. The tiger often loses.***

Below: ***The tiger reproduces well in captivity, but inbreeding can cause problems.***

CARD 25

SAVE THE RIVERS

GROUP 11: CONSERVATION



Our freshwater waterways have been heavily polluted over the past 50 years. As a result, a serious threat now exists to the wildlife unique to rivers and freshwater habitats.

ACTION FILE

RIVER POLLUTION — A GLOBAL CONCERN

Western Europe
The Rhine River releases more than 100 tons of toxic heavy metals into the North Sea daily, after flowing through five major industrial nations.

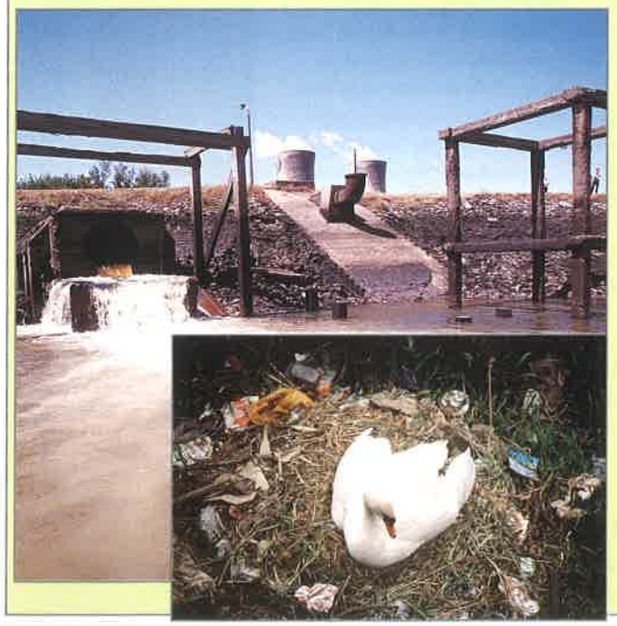
In 1986, a chemical plant in Switzerland accidentally released almost 35 tons of toxic waste into the Rhine. The waste flowed through France, Germany, and Holland, killing almost everything in its path, including wildlife.

India
The Ganges is India's most sacred river. Hindus have traditionally been buried in its waters when they died. Recently, the river has lost its natural ability to purify itself, as riverside populations have grown to 200 million.

The Indian government is cleaning up the Ganges. The bodies put into the river each year at Varanasi are now cremated first.

Great Britain
For many years the River Thames supported little wildlife. Today, with waste control and sewage plant upgrades, salmon are returning to the river. The Thames is now considered one of the cleanest metropolitan rivers in the world.

But the Thames is still vulnerable to loss of oxygen. In July 1986 almost a million fish died when London's sewage system broke down after a major rainfall.



Above: ***Acidity tests detect pollutants in a river.***

Left: ***Industrial waste is released into a river.***

Inset: ***Litter pollutes and hampers the life of river species.***

THE FUTURE — WHAT WE CAN DO?

- Avoid pouring hair dyes, bleaches, medicines, or engine oil down drains.
- Buy organic vegetables and meats to discourage the use of agricultural chemicals.
- Use non-phosphate cleaning products. Avoid buying the products of companies known to pollute waterways.
- Support local and national conservation groups dedicated to protecting waterways.
- Lobby for the modernization of sewage systems and for tougher legislation on waste control and pollution management.

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Many rivers today are choked with domestic, industrial, and agricultural waste, and threatened by poisons from the atmosphere. These waterways carry pollution across continents, robbing wildlife of their habitats and ultimately polluting the oceans.

CAUSES OF POLLUTION

The quality of the world's freshwater waterways has declined dramatically since the late 1970s. They are becoming polluted with more complex and powerful poisons every day.

Surveys made in Great Britain in the 1980s revealed that more than 500 miles of the rivers studied had worsened significantly, with over 2,500 miles of river classified as "biologically dead."

Human waste: Hundreds of millions of gallons of sewage are being released daily into the world's rivers. Much of this sewage enters the sea through streams and river systems.

The *toxins* (poisons) released by the sewage allow the growth of *sewage fungus*—bacteria that feed on organic waste. The fungus spreads over green plants and uses up the oxygen in the water, suffocating wildlife species.

Industry: Industrial waste causes millions of tons of metallic toxins to be released into rivers every year. And fossil-fuel stations and gasoline engines release millions of tons of sulfur dioxide and nitrogen oxide into the air. Sunlight changes these elements into sulfuric and nitric acid, and the pollutants return to earth and its waters as *acid rain.*

Agriculture: Pesticides, fertilizers, and herbicides enter waterways through rainfall and seepage. Ironically, fish farming—an attempt to restock trout and salmon destroyed by pollution—is undermining the survival of other aquatic creatures. The use of pesticides to control fish lice is dangerous to freshwater lobsters, crabs, and mollusks.

INCREASE IN ALGAE

The introduction of large deposits of nitrogen and phosphorus from sewage, industry, and farming into waterways causes a process called *eutrophication.* This means that a waterway can support more plant life—especially algae.

When plants like algae flourish in the mineral-enriched water, they blanket the water and cut off sunlight for underwater plants, which then die. The dead plants decompose, using up the remaining oxygen in the water. Fish and other river species then suffocate and die. Nitrogen deposits in British waterways, for example, are estimated at almost 400,000 tons a year.

Front cover inset: *The price of pollution from a textile mill.*

KEY TO THE SPECIES

1	Reed mace	18	Limpet
2	Grey heron	19	Blackfly larva
3	Flowering rush	20	Mayfly larva
4	Alderfly	21	Stonefly larvae
5	Kingfisher	22	Jenkins spire shell
6	Damselfly	23	Reeds
7	Dragonfly	24	Branched bur weed
8	Pondweed	25	Blanket weed
9	Otter	26	Sludgeworm
10	Water milfoil	27	Bloodworm
11	Diving beetle	28	Rat-tailed maggot
12	Carp	29	Shrimp
13	Crayfish	30	Water hog-louse
14	Leech		
15	Flatworm		
16	Pea cockle		
17	Caddis larva		

EFFECTS ON WILDLIFE

Game fish varieties are the first to suffer from pollution. Trout and salmon need cool waters with plenty of oxygen, and their numbers have declined severely in many North American and European rivers. Even sturdy fish species such as carp and perch, which have adapted to the warmer, less-oxygenated lowland rivers, are now vulnerable to water *toxins* (poisons).

Studies of slow-flowing lowland river systems in eastern England reveal that the mixed fisheries of the 1950s are now almost dominated by the roach—a sturdy fish that can survive in low-oxygen water.

Eel populations are dying in European rivers. And large numbers of lifeless *spawn* (fertilized eggs) on river surfaces suggest that frogs and toads are also dying out.

The decline in fish and insect varieties also affects freshwater birds like the gray heron, kingfisher, coot, swift, martin, dipper, and moorhen. The pollution also affects the otter, which is already rare.