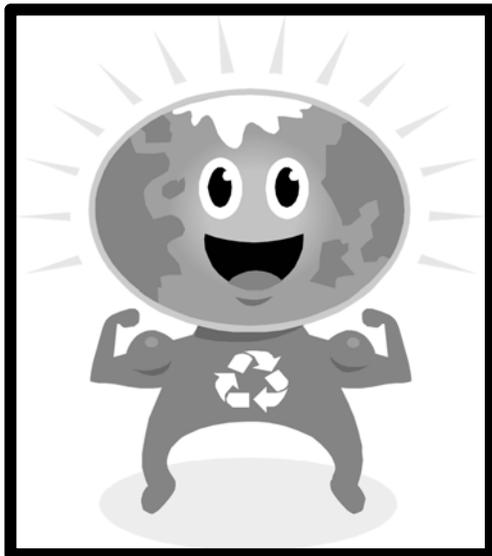




 **ecology**

WARRIORS

An Educational Publication of
National Garden Clubs, Inc.



Ecology Warriors

Helping to Save the Environment

Conservation Pledge

I pledge to protect and conserve the natural resources of the planet earth and promise to promote education so we may become caretakers of our air, water, forest, land and wildlife.

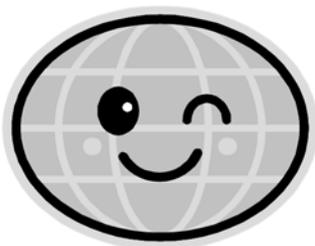
MAKING A WORLD OF DIFFERENCE – Choices Matter

"**Making A World of Difference - Choices Matter**" can open new doors for in-depth creative learning and educational opportunities centered on the natural resources of planet earth - our air, water, forest land and wildlife. Education is the key in making responsible decisions for today and tomorrow. Educated citizens are responsible stewards, who then are able to make wise choices for conserving and protecting our planet earth and its natural resources.

The Environmental Concerns and Conservation Committee of National Garden Clubs, Inc. invites you to become an **Ecology Warrior** as you investigate and study the contents of this booklet. **You can make a world of difference by the choices you make for the conservation and preservation of our natural resources.**

My name is _____

I am an Ecology Warrior!



The question is not 'can you make a difference?' You already make a difference. It's just a matter of what kind of difference you want to make. Choices matter!



Air

Air envelops the earth and makes life possible.

- Humans breathe in about 35 pounds of air every day!
- Air pressure around our earth is called **atmosphere**. It takes many air molecules to build up that air pressure.
- The earth's atmosphere shields us from harmful cosmic radiation.
- The air layer closest to the earth is the **troposphere** where invisible chemical cycling of essential elements takes place, as well as the uneven heating of earth's surfaces that creates our weather.
- The air of the troposphere is made up of gases such as nitrogen, oxygen, argon and sulfur oxides.
- All of these bits of matter play an important role in our weather by providing surfaces for condensation and eventually precipitation - allowing water that evaporates from the ocean and land to rejoin us on the earth's surface.
- Additionally, rain and other forms of precipitation wash some of these particles down to the earth's surface.
- Green plants, in addition to respiring, photosynthesize when exposed to sunlight.
- Photosynthesis involves taking carbon dioxide out of the air and converting it to a carbon-based sugar, releasing oxygen in the process.

Air is more than just the atmosphere – most all living beings need it.

- **Air pollution** is the introduction into the atmosphere of chemicals, particulates or biological materials that cause discomfort, disease or death to humans, damage other living organisms, such as food crops, or damage the natural or built environment.
- **Indoor air pollution** and **urban air quality** are known to be two of the **world's worst toxic pollution problems**.

Air pollution questions to consider:

- What varieties of plants or trees would cost less to grow, would grow faster and would reduce toxic emissions into the environment?
- Are there inexpensive, robust and plentiful plant species that would offer an economical alternative for people who currently depend upon burning wood for heat and cooking?
- Is it possible to improve or enhance indoor air quality with certain plants?
- What plants increase oxygen output?
- Can air quality within a building or house be improved with a specific or greater number of plants?
- Could exterior gardens in cities, such as rooftop gardens and wall gardens, improve air quality?

When planning gardens – both inside and outside – consider applications and possible solutions for **Making a World of Difference** because **Choices Matter**.



Bees

By the numbers:

- 25,000 bee species in the world
- 4,000 native bees in North America
- 2,000 native bees in Mexico
- The majority of native bees in Central and South America are stingless bees.

- Bees worldwide are declining in numbers due to several issues collectively called “Colony Collapse Disorder” (CCD). Issues that contribute to CCD include insecticides, viruses, pests, such as parasitic wasps and mites, and the widespread farming practice of monoculture.
- Monoculture is the agricultural practice of producing and growing a single crop or plant species over a wide area for a number of consecutive years. Monocultures are more susceptible to the spread of pests and diseases. Also, monocultures do not provide bees with a variety of food, therefore, bees can easily starve. In the case of commercial honeybee pollination, hives have to be moved to new crops regularly.
- How can you help?
 - Plant a variety of flowers in your garden. Bees prefer purple, violet, yellow and white flowers.
 - Limit the use of hybrid and double blossom flowers because more pollen can be found on single blossom flowers.
 - Plant native plants.
 - Cluster several specimens of the same plant in a grouping to fill a four-foot square area for easier bee pollination.
 - Plant vegetables, herbs, fruits and nut trees.
 - Avoid the use of insecticides.
 - Provide habitats for native bees. Leave bare ground exposed for ground dwelling bees. Provide bee-houses for mason bees. Leave a small brush pile for native bees to nest in.
- Many bees, many homes.
 - 30% nest in hives...honeybees, hornets, wasps. These are social insects.
 - 40% nest in cavities...mason bees, leafcutter bees, mud daubers. These are solitary insects.
 - 30% nest in hives and holes in the ground...bumblebees, alkaline bees. These can be social and solitary.
- European honeybees are not native to North America, yet they are the number one pollinator of North American commercial food crops.
- Honeybees travel up to two miles in search of pollen; mason bees forage within 300 feet of their nest.
- Mason bees are 60 times more efficient at pollination than honeybees. This leads to greater produce yields.
- Bees pollinate 1/3 of our food supply.

Birds



Birds are an indication of the health of our environment.

- The Americas are home to a tremendous diversity of native birds.
- One in three people living in the United States is a bird-watcher.
- Natural habitat areas are dwindling in size and many have been eliminated. As a result, migratory birds are losing their resting stopovers and are forced to travel huge distances to find food.
- A simple and effective solution is to create a wildlife habitat. Habitat gardening provides immediate benefits, but long-term effects are even better.
- When we make certain that our environment remains a healthy place for wildlife, we are keeping it healthy for humans as well.
- **The best way to supply birds with the food they need is by planting a wide variety of native plants and trees.** Supplemental bird feeders can also add nutrition to their diets.
- **Always feed natural fresh seeds, feed small amounts daily and clean feeders once a week with 10% bleach solution.**
- You can also feed birds by using peanut butter in pinecones, suet feeders, seed feeders, hummingbird feeders, nectar feeders, and fruit and nut holders.
- Be sure to include a clean water source. A birdbath, small pond or shallow container with about ½ inch to 1 inch of water can fulfill the need for bathing and drinking.
- Birds also need dust to have a dust bath, which helps birds absorb excess oils in their feathers and also discourage mites and other parasites.
- Cover is as important as food and water to the survival of birds. Protective cover is needed for nesting sites, sleeping and feeding areas.
- Different species have different cover requirements, so consider as many types of cover as possible: rock piles, brush piles, hollow logs, trees, shrubs, tangles of vines, meadow grasses, and even water.

Interactive bird song poster created by Minnesota Conservation magazine.

Click on the bird you want to hear at: www.dnr.state.mn.us/volunteer/julaug10/bird_songs_interactive.html

Become a birdwatcher and learn all you can about different birds, help the birds survive, and commit to protecting them for the health of the world.



Butterflies

Butterflies are losing their natural habitat due to urbanization, excess use of chemicals and genetically altered plants.

MONARCH BUTTERFLIES

- Monarch butterflies can lay as many as 500 eggs in their short life.
- The eggs of the monarch butterfly are laid on milkweed, the only host plant for the Monarch.
- The eggs hatch into caterpillars in about five days. Caterpillars, also known as larvae, will shed their skins five times in the 10 to 14 days of their lives as caterpillars. They grow very fast!
- The caterpillar hangs upside down and makes a chrysalis.
- After another 10 to 14 days, the caterpillar emerges from the chrysalis as a beautiful butterfly.
- The monarch butterfly can live two to six weeks. Fall monarchs live six to eight months and migrate south for the winter.
- Monarchs east of the Rocky Mountains migrate to Mexico and monarchs west of the Rocky Mountains overwinter in California.

PAINTED LADY BUTTERFLIES

- Painted lady butterflies are found in all 50 states and are the most widely distributed butterfly in the world. They live everywhere except the continent of Antarctica.
- Their eggs are light green and usually laid on hollyhocks, thistle, or mallow leaves.
- After about five days, the eggs hatch into caterpillars (larvae) and begin eating for about 10 days.
- Caterpillars make chrysalises and after about 10 days emerge as beautiful butterflies.
- Painted lady butterflies live for about two weeks.

TIGER SWALLOWTAILS

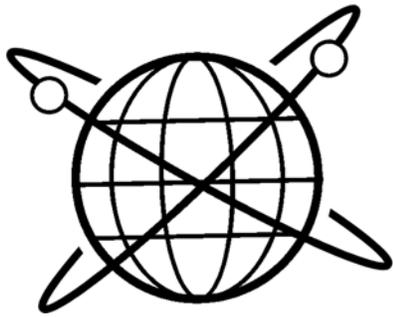
- There are at least 20 different species of swallowtails in North America and about 550 different species worldwide.
- Tiger swallowtails use some trees plus plants as their host plants. Host trees are the ash, birch, cherry, tulip and willow trees.
- Host plants are dill, parsley, fennel and carrots.
- Plants such as purple coneflowers, butterfly bushes, zinnias and *Tithonia* (Mexican sunflowers) are nectar plants for the tiger swallowtail.
- Adult swallowtail butterflies live three to four weeks.

HOW CAN YOU HELP BUTTERFLIES?

- Plant their host plants. The space can be as small as a 5 x 5- foot plot or as large as an acre.
- DO NOT, under any circumstances, use chemicals on these gardens. Chemicals kill everything and those little worms eating your plants may be your butterflies.
- In the fall, collect at least one-half ounce of milkweed seeds native to your area and send to Monarch Watch, University of Kansas, 2021 Constant Avenue, Lawrence, Kansas 66047. The seeds will be grown and sent to your area as plugs to be planted to attract monarchs. [www. MonarchWatch.org](http://www.MonarchWatch.org)

Let's work together to prevent butterflies from becoming threatened.....endangered.....extinct.

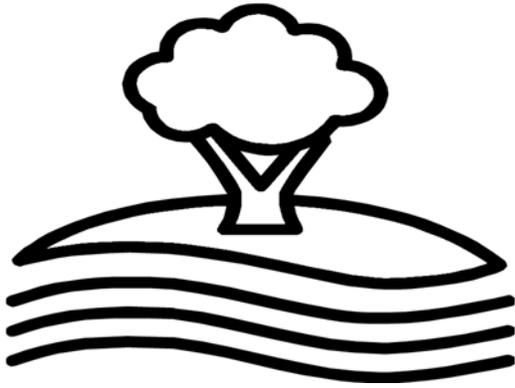
Remember: Extinct means gone forever; never to be seen again.



Energy

Energy cannot be destroyed or created—only transformed.

- **There are two basic groups of energy: renewable energy** (biomass, geothermal, solar, water, and wind power) and **nonrenewable** (fossil fuels, coal, oil, natural gas, and nuclear). **Three-quarters of the world's energy is generated by burning fossil fuels.**
- **Renewable energy supplies will never run out.** While the supplies of coal, oil, and natural gas are limited, sunshine, wind, biomass, and water power are naturally replenished and are considered almost limitless resources.
- Only 10% of energy in a light bulb is used to create light. Ninety percent of a light bulb's energy creates heat. Compact fluorescent light bulbs (CFLs), on the other hand, use about 80% less electricity than conventional bulbs and last up to 12 times as long.
- Refrigerators in the U.S. consume about the same energy as 25 large power plants produce each year.
- Enough sunlight reaches the earth's surface each minute to satisfy the world's energy demands—for an entire year. Our energy problems would be solved if we find a way to harvest that energy.
- Ten countries produce 2/3 of the world's oil and hold the same percentage of known reserves. Saudi Arabia tops both lists.
- Ten countries produce 2/3 of the world's natural gas and hold about the same percentage of known reserves.
- According to the *World Fact Book 2008*, the world's oil reserves will last until 2052 and gas reserves will last until 2065.
- **In the average home, 75% of the electricity used to power home electronics is consumed while the products are turned off.** The average desktop computer idles at 80 watts, while the average laptop idles at 20 watts. A Sony PlayStation 3 uses about 200 watts and nearly as much when idle. Idle power consumes more electricity than all the solar panels in America combined.
- More than 1/5 of the world's primary energy is used for transport, followed by industry, construction, and agriculture. Much is in the form of gasoline, of which nearly 792.5 million gallons is burned every day.
- America burns nearly half of the world's gasoline.
- Nuclear power produces around 13% of the world's electricity.
- Brazil has one of the largest renewable energy programs in the world, involving production of ethanol fuel from sugar cane. Ethanol now provides 18% of that country's automotive fuel.



Forests

DID YOU KNOW THAT.....

Test your knowledge of any of the common trees in your area. Are there any important facts that you can add to any of the following specimens?

Be a tree detective. Investigate!

1. Trunks of the **tulip tree** (*Liriodendron tulipifera*) were hollowed out and used as canoes by Native Americans. For what other use is this tree noted?
 2. When **bald cypress trees** (*Taxodium distichum*) grow in the native swamp habitat, their roots grow knees that stick out of the ground water. What common plant is usually draped across its branches?
 3. The **oleander** (*Nerium oleander*) is a poisonous evergreen shrub with red, pink or white flowers. What other plant belongs to the same family?
 4. The **giant sequoia redwood trees** (*S. sempervirens* 'Adpressa') are the largest trees on earth. Some are more than 2000 years old! How tall is the world's largest specimen?
 5. The oils from the **sassafras tree** (*Sassafras albidum*) are used to flavor root beer. What part of the tree is used for this purpose and for what other drink is this tree noted?
 6. The **eastern hemlock** (*Tsuga canadensis*) is one of the few shade tolerant, needle-leaved conifers that bear their cones at the tip of a branchlet. Can you name one of the few deciduous conifers that loses its needles in the winter?
- All trees produce life-giving oxygen and remove air pollution as they lower air temperature.
 - Trees prevent erosion by holding soil in place.
 - Caution! Many trees may be poisonous. Read about them; know what poisonous plants look like before you touch unknown trees, shrubs or vines!
 - Be aware of invasive plants that may spread and devastate your area.
 - Preserve and conserve! Trees are valuable resources that take many years to replace once they are destroyed.

Answers: 1. Furniture 2. Spanish moss 3. Dogbane 4. 275 feet tall and still growing 5. The root and sassafras tea 6. Larch



Invasive Plants

Over 100 invasive plant species are recognized as a threat to native plants and animals.

Every day, invasive plants invade an additional seven square miles of public lands.

What is an invasive plant?

Invasive plants are exotic (or non-native) species that have adapted to areas where they have never grown naturally. Not all exotic plants are invasive. Invasive plants grow rapidly and spread aggressively. Because they have few natural disease or insect controls in the new location, they thrive and become established over large areas. This unchecked growth allows them to overwhelm native species and form dense one-species stands.

How did they get there?

Some invasive species were introduced to the U.S. by accident. Perhaps they arrived as seeds in grains or other shipments from overseas, came attached to the fur or hide of animal or people's clothing, or stowed away in a ship's ballast water. However, the great majority of invasive plants were brought here on purpose. Sixty percent of invasive species in the U.S. were brought here because they were beautiful, unusual, exceptionally hardy, drought-tolerant, or fast-growing. In other words, they are just what an adventurous gardener is looking for. The plants later escaped from arboretums, public gardens and home gardens. Many of the same attributes that appeal to horticulturists make them invasive.

Why are invasive plants a problem?

An invasive species may overwhelm an area because the insects, diseases, and foraging animals that naturally keep its growth in check in its native range are not present in its new habitat. Some invasive plants are worse than others. Many non-native plants are welcome and manageable additions to our gardens. However, some non-native species cause serious damage. Invasive species compete directly with native species for moisture, sunlight, nutrients, and space. In the worst cases, invasive plants ruthlessly choke out other plant life. This puts extreme pressure on native plants and animals, and threatened species may succumb to this pressure. Ultimately, invasive plants alter habitats and reduce biodiversity.

What can you do?

1. Prevent any new, potentially invasive introductions, because once they gain a foothold they are costly and time-consuming to control.
2. Avoid disturbing natural areas. Know your plants; use only native or non-invasive landscape plants.
3. Detect and control infestations. Invasive species outbreaks are most easily controlled when stands are small and the plants are young.
4. Control the infestations by removing the plants entirely or by managing them to prevent their spread outside your property. This may include pruning to prevent flowering and seed dispersal or cutting, mowing or herbicide use to prevent vegetative spread.
5. Make others aware of invasive plants. Ask nurseries and garden shops to not to sell these species. Request your local governments to use native plants in urban and suburban landscapes. Volunteer to work in exotic plant removal projects.

Land Conservation



Do you care about the land? Is there a special place, public or private, that you want to help protect? Do you want it to be green, healthy and sustainable? This page is a gateway to ideas, information and resources that can help you protect and preserve the land you love – today, and for future generations.

- If the land has been deforested, overused or abused, consider ecological restoration techniques to restore its plants, animals, soil and natural beauty.
- Protect and encourage biodiversity in the soil, garden, fields and forests. Use native plant and native tree species – they're likely to be healthier, longer-lasting, and require less water, pesticides and other inputs.
- Protect and preserve the soil – it is the foundation of healthy land and water. Use ecological and organic gardening, landscaping and lawn care techniques, plant windbreaks, and do whatever you can to prevent erosion.
- Planting trees makes the property warmer in winter and cooler in summer – they also add beauty, improve the quality of the air and water, prevent erosion, block out noise, reduce heating and cooling costs, and attract songbirds. "The best time to plant a tree was twenty years ago. The second best time is now."
- If you have a woodlot or forest, consider eco-forestry techniques to strengthen and preserve it.
- Whether you want a lawn, flowers, or a garden brimming with fresh food, try to do it without pesticides – for your own health as well as the health of your children, neighbors, and wildlife.

Ten Ways to Conserve Soil:

1. Plant trees
2. Build terraces
3. No-till farming
4. Contour plowing
5. Crop rotation
6. Maintain soil pH
7. Water the soil
8. Salinity management
9. Promote helpful soil organisms
10. Grow indigenous (native) crops

Good farming and gardening practices can help restore soil health and preserve this natural resource.

If you want to preserve nature, wilderness, agricultural lands, or urban public space, consider joining a group or organization that reflects your concerns. Every member makes a difference, whether as an active participant or as an interested party.



Recycling

**The most important recycling fact is.....
YOU can make a difference.**

Aluminum

- We use over 80,000,000,000 aluminum soda cans every year.
- **Used aluminum beverage cans are the most recycled item in the U.S.**, but other types of aluminum, such as siding, gutters, car components, storm window frames, and lawn furniture can also be recycled.
- A used aluminum can is recycled and back on the grocery shelf as a new can, in as little as 60 days.
- An aluminum can that is thrown away will still be a can 500 years from now!

Paper

- **The average American uses seven trees a year in paper, wood, and other products made from trees. This amounts to about 2,000,000,000 (2 billion) trees per year!**
- We throw away enough paper and wood each year to heat 50,000,000 homes for 20 years.
- Each ton (2000 pounds) of recycled paper can save 17 trees, 380 gallons of oil, three cubic yards of landfill space, 4000 kilowatts of energy, and 7000 gallons of water. This represents a 64% energy savings, a 58% water savings, and 60 pounds less of air pollution!
- The 17 trees saved (above) can absorb a total of 250 pounds of carbon dioxide from the air each year. Burning that same ton of paper would create 1500 pounds of carbon dioxide.
- If all our newspapers were recycled, we could save about 250,000,000 trees each year!

Plastic

- Americans use 2,500,000 plastic bottles every hour! Most of them are thrown away!
- Plastic bags and other plastic garbage thrown into the ocean kill as many as 1,000,000 sea creatures every year!
- Recycling plastic can save twice as much energy as burning it in an incinerator.
- Americans throw away 25,000,000,000 Styrofoam coffee cups every year.

Glass

- Every month, we throw out enough glass bottles and jars to fill a giant skyscraper – all of which are recyclable! A glass bottle would take 4000 years or more to decompose -- longer if it's in the landfill.
- The energy saved from recycling one glass bottle can run a 100-watt light bulb for four hours or a compact fluorescent bulb for 20 hours. It also causes 20% less air pollution and 50% less water pollution than when a new bottle is made from raw materials.
- Mining and transporting raw materials for glass produces about 385 pounds of waste for every ton of glass that is made. If recycled glass is substituted for half of the raw materials, the waste is cut by more than 80%.

Miscellaneous

- An estimated 80,000,000 Hershey's Kisses are wrapped each day, using enough aluminum foil to cover over 50 acres of space -- that's almost 40 football fields. All that foil is recyclable, but not many people realize it.
- Rainforests are being cut down at the rate of 100 acres per minute!
- A single quart of motor oil, if disposed of improperly, can contaminate up to 2,000,000 gallons of fresh water. Motor oil never wears out; it just gets dirty. Oil can be recycled, re-refined and used again, reducing our reliance on imported oil.
- A typical family consumes 182 gallons of soda, 29 gallons of juice, 104 gallons of milk, and 26 gallons of bottled water a year. That's a lot of containers -- make sure they're recycled!

Source: recycling-revolution.com

Water

Fresh Water is Essential for Life

1. Water covers **70%** of the earth's surface.
2. Oceans and seas comprise **97%** of the water on the earth's surface.
3. A scant **3%** of the water on the earth's surface is **fresh water**.
4. Ice caps account for 2% of the fresh water on the earth's surface.
5. **Only 1% of earth's water is available for our use and only a miniscule percentage of that 1% is actually accessible.**
6. Of that small percentage of accessible water 98% is used for agriculture and industry.



- **We use 127% more water today than we did in 1950.**
- **About 95% of water delivered to our houses goes down the drain.**
- A garden hose can use almost as much water in an hour as an average family of four uses in one day.
- Americans spend 29 billion dollars annually maintaining the nation's entire water system. We spend almost as much money each year buying bottled water - 21 billion dollars.
- We only recycle 27 percent of our plastic water bottles. We throw away the other 36 billion plastic water bottles each year.
- Freshwater ecosystems cover less than one percent of the earth's surface, but are home to 35 percent of all vertebrate species.
- Global extinction rates for freshwater species are four to six times higher than those for terrestrial or marine species. **In the United States nearly half of the 573 animals on the threatened and endangered list are freshwater species.**
- Forty percent of all fish species in North America are at risk of extinction.
- **The amount of moisture on earth has not changed.** The water the dinosaurs drank millions of years ago is the same water that falls as rain today. Water is constantly being recycled as it evaporates, condenses and returns to earth as precipitation.
- The water coming out of your kitchen faucet is four billion years old and may have been lapped up by a *Tyrannosaurus rex*.
- **Of all the water on earth only 3% is freshwater.**
 - Of that 3%...
 - 60% is trapped in glaciers and icecaps.
 - 10% is found in surface waters including lakes and rivers.
 - 30% is found in groundwater, but some of that is deep and out of reach.
- Of all the water we take out of rivers, lakes and the ground...
 - 70% is used for agriculture.
 - 22% is used for industrial purposes.
 - 8% is pumped into cities and homes for drinking, watering and washing.
- The average American uses about 100 gallons of water a day – more than 15 times that used by many people in developing countries.
- A staggering one person out of eight – nearly 900 million people in total - lacks access to clean water.
- Every day 4,800 people worldwide die from waterborne diseases such as cholera, leptospirosis and botulism. Most waterborne diseases cause diarrheal illness, which is the second largest killer of children worldwide.



Wildlife

Bees, Butterflies,
Endangered Species and
Pollinators



- Attracting bees, butterflies and other wildlife is a fun way to enjoy nature in your own yard, or garden. Imagine your garden covered with great numbers of colorful butterflies, beautiful plants and a water source.
- A water source is an important element to attract wildlife. All animals need water, not only for survival, but some need it for bathing, keeping cool, and in some cases for breeding as well.
- Trees, shrubs, and other plants provide a home for pollinators.
- The environment and economic impact that will follow extreme loss of honeybees, native bees, birds, bats, and butterflies, all of which are experiencing population declines, demands attention and is a wake-up call for all of us.
- Honeybee pollination accounts for \$15 BILLION worth of crops, giving us the vegetables and fruits we need to live.
- It is imperative that we provide comprehensive education on pollinator loss to increase awareness about the dangers of declining pollinator population. Forming partnerships in the public and private sector to protect pollinators and improve their habitats should be the goal of every citizen of all ages.
- Today 3079 animals and 2655 plants are listed as endangered worldwide, compared with 1998 levels of 1102 animals and 1197 plants.
- **40 % of the entire species dwelling on this planet are facing a high risk of extinction.**
- The most important cause of the decline of endangered species is caused by the loss of habitat. Other factors driving animals to near extinction are pollution, climatic changes and disease.
- The seven most endangered species in North America are the : ivory-billed woodpecker, red wolf, California condor, Vancouver Island marmot, Ramsey Canyon leopard frog, Caribbean electric eel, and island fox.
- The seven most endangered species in South America are the: oxapampa poison frog, glaucous macaw, brown-headed spider monkey, Galapagos damsel, kaempferi woodpecker, long-tailed chinchilla, and orinoco crocodile.
- Two of the many available websites which provide information on Endangered Species include:
earthendangered.com and fws.gov/endangered

You can create a wildlife-friendly garden that provides birds, butterflies and other backyard wildlife with the four components of habitat: food, water, cover, and places to raise their young. These things will make your garden attractive to all sorts of beautiful and interesting wildlife for you to watch and enjoy.