

Designing with Nature

Pollinators, Wildlife, Native Plants



Living Earth Ecology

Sustainability for our Children's Future

Ethical questions:

Why should we care about the environment?

Are we the most important beings on the planet or are we just one of the earth's millions of different forms of life?

Do we have an ethical obligation to pass on to future generations the extraordinary natural world in a condition at least as good as what we inherited?



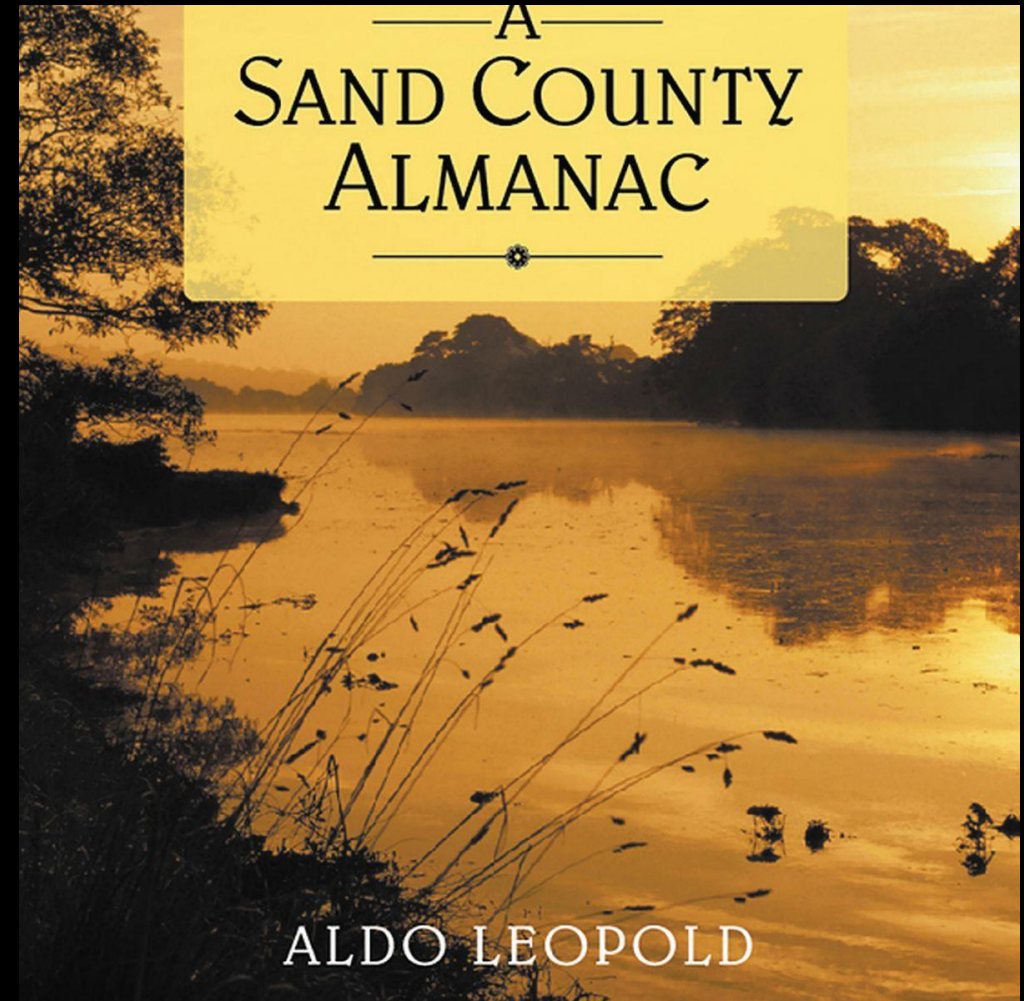
Tyler Miller, Living in the Environment

Aldo Leopold

Living Earth Ecology

Sustainability for our Children's

We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect. *Aldo Leopold*



INDIVIDUALS MATTER

Aldo Leopold's Environmental Ethics

According to Aldo Leopold (Figure 1-A), the role of the human species should be to protect nature, not conquer it.

In 1933, Leopold became a professor at the University of Wisconsin and in 1935, he was one of the founders of the U.S. Wilderness Society. Through his writings and teachings, he became one of the leaders of the conservation and environmental movements of the 20th century. In doing this, he laid important groundwork for the field of environmental ethics.

Leopold's weekends of planting, hiking, and observing nature at his farm in Wisconsin provided material for his most famous book, *A Sand County Almanac*, published after his death in 1949. Since then, more than 2 million copies of this environmental classic have been sold.

The following quotations from his writings reflect Leopold's *land ethic*, and they form the basis for many of the beliefs of the modern stewardship and environmental wisdom worldviews:

- All ethics so far evolved rest upon a single premise: that the individual is

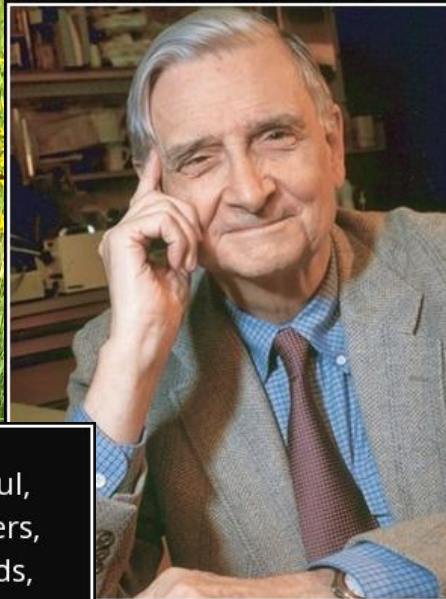


Courtesy of the University of Wisconsin—Madison Archive

Figure 1-A Individuals Matter: Aldo Leopold (1887–1948) was a forester, writer, and conservationist. His book *A Sand County Almanac* (published after his death) is considered an environmental classic that inspired the modern environmental and conservation movement.

- a member of a community of interdependent parts.
- To keep every cog and wheel is the first precaution of intelligent tinkering.
- That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics.
- The land ethic changes the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it.
- We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect.
- Anything is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.

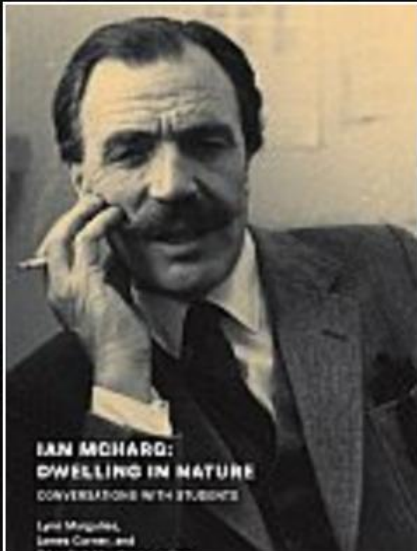
A natural community is an interactive assemblage of organisms, their physical environment, and the natural processes that affect them.



We should preserve every scrap of biodiversity as priceless while we learn to use it and come to understand what it means to humanity.

— E. O. Wilson —

AZ QUOTES



IAN MCHARG:
DWELLING IN NATURE
CONVERSATIONS WITH STUDENTS

Lynn Margulis,
James Lovelock, and

We are the bullies of the earth: strong, foul, coarse, greedy, careless, indifferent to others, laying waste as we proceed, leaving wounds, welts, lesions, suppurations on the earth body, increasingly engulfed by our own ordure and, finally, abysmally ignorant of the way the world works, crowing our superiority over all life.

— Ian McHarg —

AZ QUOTES



Principals Of Sustainable Landscapes

Function in harmony with natural processes in the environment - Use Plant Community Models

Create usable and enjoyable spaces for people

Create wildlife habitat through biodiversity

Provide food for wildlife and people

Reduce maintenance and long term costs for upkeep

Paradigm Shift in Landscapes



Designing with Nature and Native Plants

Begin by assessing the various conditions on your site

Determine which plant community type(s) best represents your site conditions

Define the human needs - circulation, entertainment spaces, water, gardening areas

Design to work with positive existing conditions and eliminate the negative issues in the space

Create landscapes that imitate nature by providing diversity and beauty



Why Native Plants

Native Plants, Birds, and Pollinators have co evolved

Native Plants Provide Food, Shelter, Hosts and Nesting

Native Plants Require Less Fertilizer and Chemicals

Bringing Nature Home to your Landscape

Native Plants Create a Sense of Place

Land Ethic Values



Biodiversity

Plants:

Sunlight to food

Produce oxygen

Mitigate weather effects

Insects:

(stealth drivers)

Food chains

Disease control

Agriculture



Insects- Why Should We Care?

75% of plants are pollinated by
pollinators

1 of every 3 bites of our food requires a
pollinator

Only 3-5% of land in the lower 48-states
is undisturbed, while...

Corporate agriculture + farms cover more
than 50%, and we have...

40-million acres of neighborhoods +
lawns!



Beneficial Insects

provide pollination,

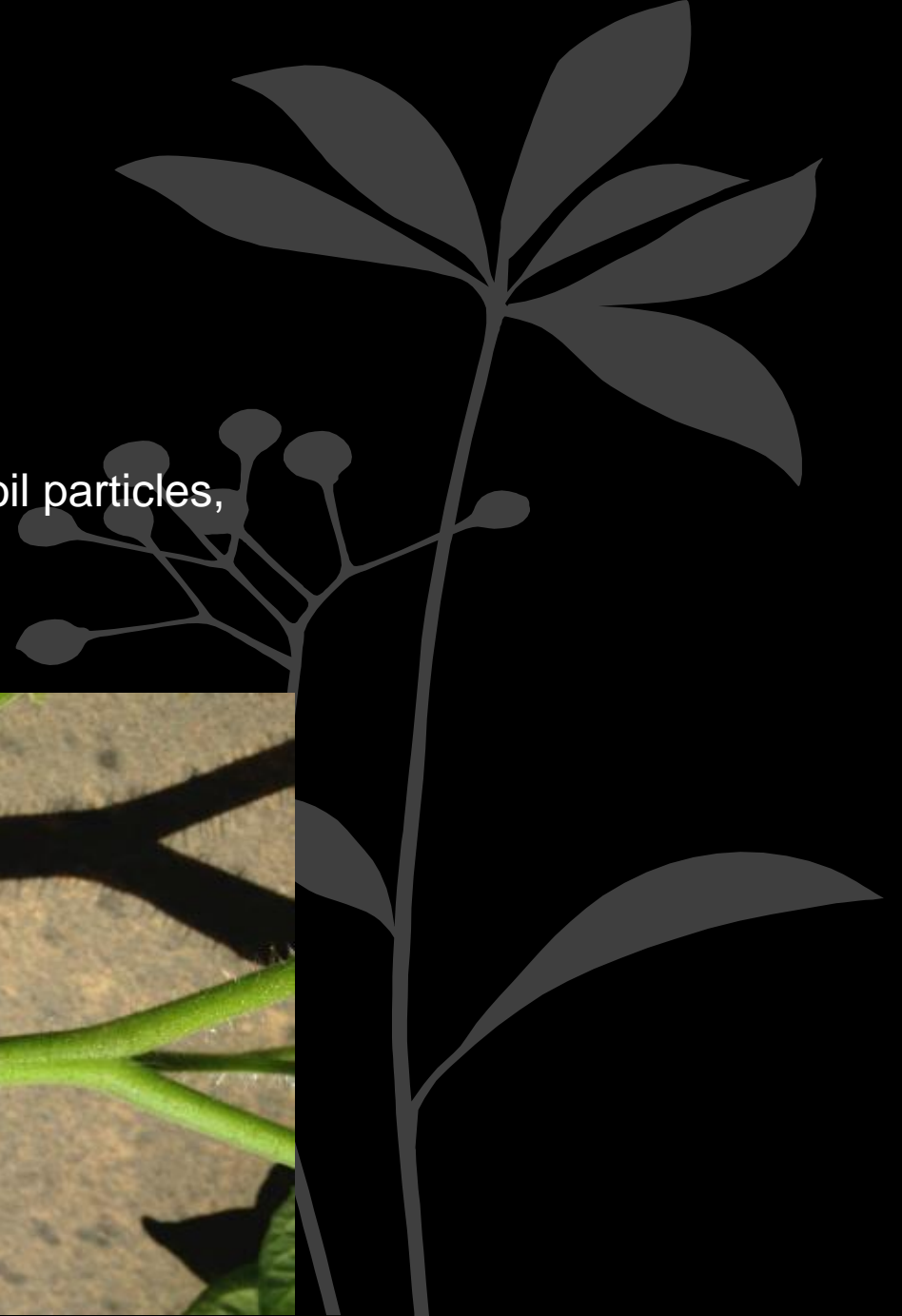
recycle nutrients,

help decompose plant and animal waste,

contribute to soil quality by churning and aerating soil particles,

attack crop pests and

are food for fish, songbirds and other wildlife.



Chickadees

Doug Tallamy

Parent birds bring a caterpillar to the nest every 3 minutes.

6 a.m. to 8 p.m.

16-18 days until fledging

350-570 caterpillars every day

6,000-9,000 per clutch!

Head high count:

White Oak- 410 caterpillars

19 species

Bradford Pear- 1 caterpillar



Prothonotary Warbler

(*Protonotaria citrea*)

Conservation Status: In decline

Habitat: Wetlands, bottom lands thickets

Diet: almost entirely insects, beetles, flying insects.

Nesting: Cavities are often old Downy Woodpecker nests.

Human aided: houses



Swanson's Warbler

Limnothlypis swainsonii

Conservation Status: In decline

Habitat: Bottomlands, canebrakes

Diet: almost entirely insects, beetles, flying insects.

Nesting: Thickets usually 4' above ground, loose colonies

Human aided: houses



Purple Martin (*Progne subis*)

Conservation Status: In decline

Habitat: Towns, open to semi open fields near water

Diet: almost entirely insects, feeding in flight, mosquitos, dragonflies, moths, wasps.

Nesting: Usually in colonies

Natural sites are in cavities, mostly old woodpecker holes, in trees.

Human aided: Gourds, houses on elevated poles



Pollination

WHAT IS POLLINATION AND WHO ARE THE POLLINATORS?

Pollination occurs when pollen is moved within flowers or carried from flower to flower by pollinating animals

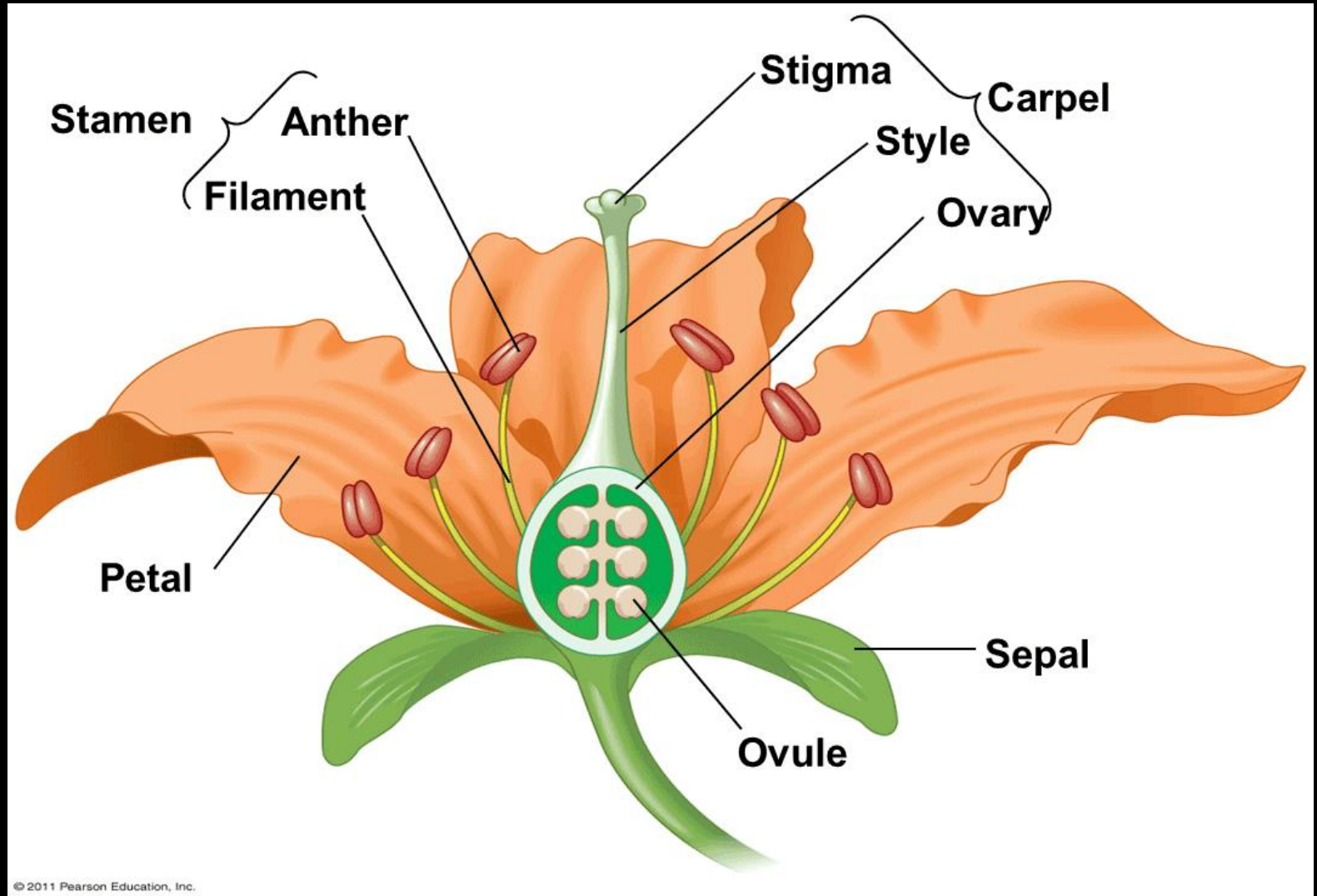
WHAT DOES POLLINATION DO?

The transfer of pollen in and between flowers of the same species leads to fertilization, and successful seed and fruit production for plants. Pollination ensures that a plant will produce full-bodied fruit and a full set of viable seeds.



Plant for Pollinators

How does it Work?



ARE POLLINATORS IN TROUBLE?

Worldwide there is disturbing evidence that pollinating animals have suffered from loss of habitat, chemical misuse, introduced and invasive plant and animal species, and diseases and parasites.

Many pollinators are federally “listed species,” meaning that there is evidence of their disappearance in natural areas.

The U.S. has lost over 50% of its managed honeybee colonies over the past 10 years.

A lack of research has hindered our knowledge about the status of pollinators. The E.U. has been so concerned that they have invested over \$20 million investigating the status of pollinators in Europe.



Habitat Loss

Development in breeding habitat



Wendy Caldwell

Increased use of herbicide tolerant crops in breeding habitat



USDA

Illegal logging in overwintering grounds



Wendy Caldwell

Other Factors

Insecticides

Climate change

Invasive species: Swallow-worts could serve as monarch “sinks”

Increased disease incidence

Natural enemies



Brad Johns/USFWS



Univ. of MN Monarch Lab

WHAT CAN YOU DO TO PROMOTE AND PROTECT POLLINATORS?

Changing the Landscape Culture

Cultivate native plants, especially those that provide nectar and larval food for pollinators

Install houses for bats and native bees

Supply salt or mineral licks for butterflies and water for all wildlife

Reduce pesticide use

Substitute flower beds for lawns

Diversity is key

Meet the Pollinators

Bees

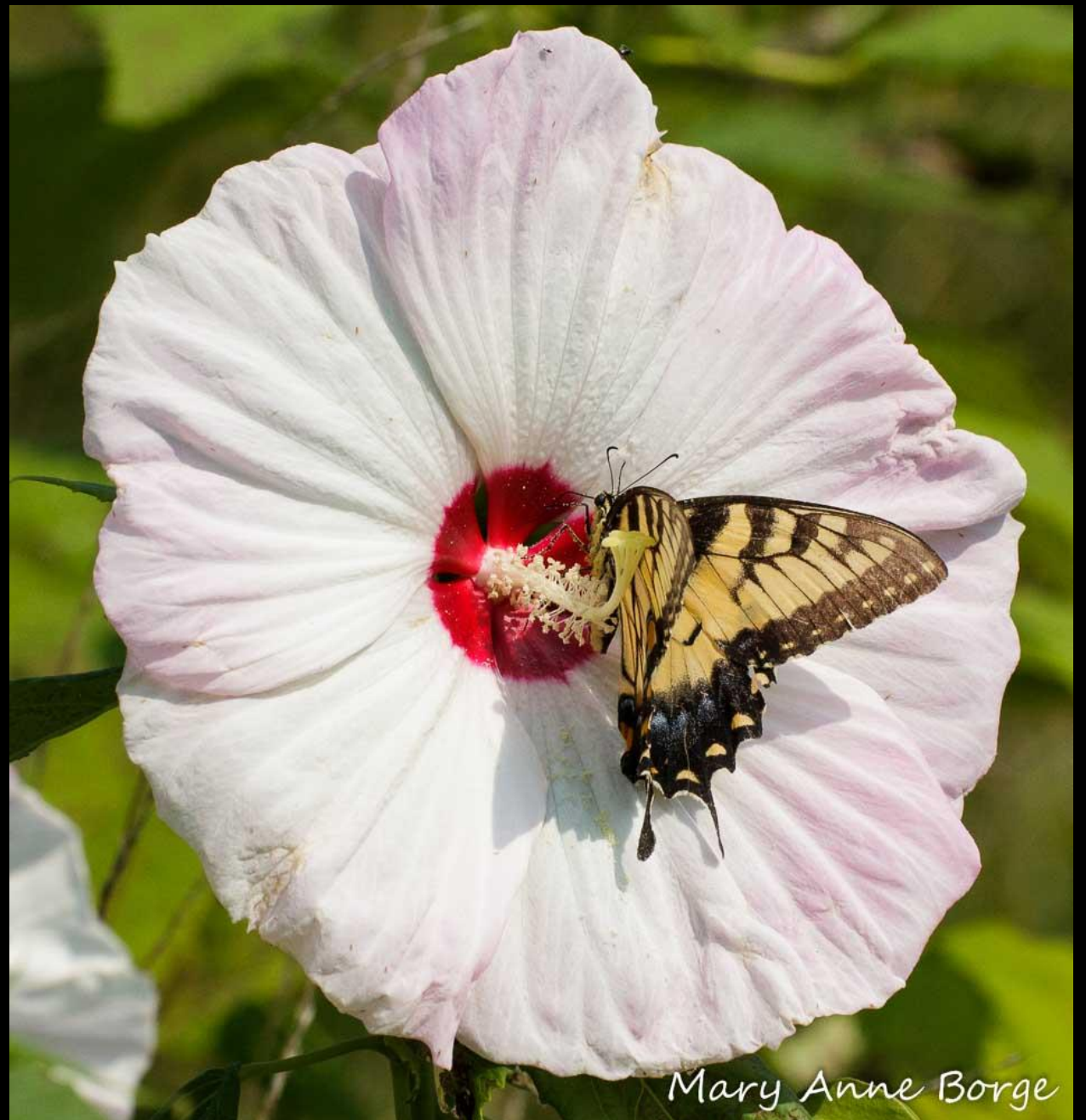
Bats

Birds

Butterflies

Moths

Animals



Mary Anne Borge

The Bees



The Bees



The Butterflies



The Bats and Birds



Adult Monarchs

Female monarch



Male monarch



Monarch overwintering, Michoacan, Mexico

Flight at overwintering site



Cluster in Olyamel fir



Monarch Butterfly

egg



caterpillar



Native milkweeds

Common Milkweed

Asclepias syriaca



Swamp Milkweed

Asclepias incarnata



Native milkweeds

Purple Milkweed,
Asclepias purpurascens



Butterflyweed,
Asclepias tuberosa



OUR EFFORTS WILL BE WORTHWHILE!



Monarchs use both
disturbed and
pristine habitats

Efforts will help
monarchs, as well
as many other
pollinators that
share their habitat.

Monarch migration
is unparalleled

Ecological Habitat Restoration & Mimicry



Open, sunny – Early Successional Plants





50 cm X 50 cm piece of prairie had 150 miles of fibrous root.

A single rye plant had 7,000 miles of root hairs after 4 months.





© Hoffman Nursery, Inc.

Open, dry, sunny – Early Successional Plants



Diversity Key for Pollinators



Shoreline Meadow

Open, dry, sunny – Early Successional Plants



Open, dry, sunny – Early Successional Plants



Open, dry, sunny – Early Successional Plants



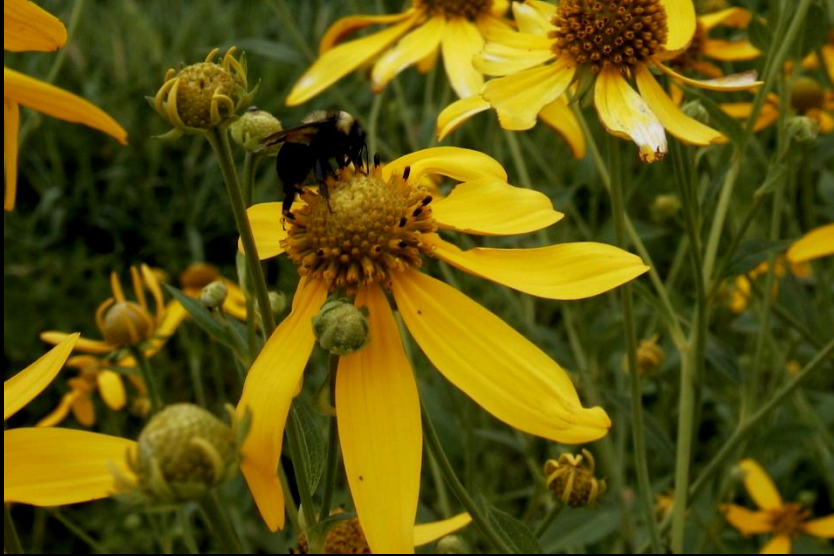
Shady, woodland



Sunny but moist



Sunny but moist



Shady, woodland



Shady, woodland



Shady, woodland





?

What are we doing now?

Common Landscaping Practices

26 billion gallons of water used daily in the US

7 billion gallons per day for landscape irrigation

80% of that irrigation water is used on lawns

Increased fertilizer

Increased pollutants

Low diversity

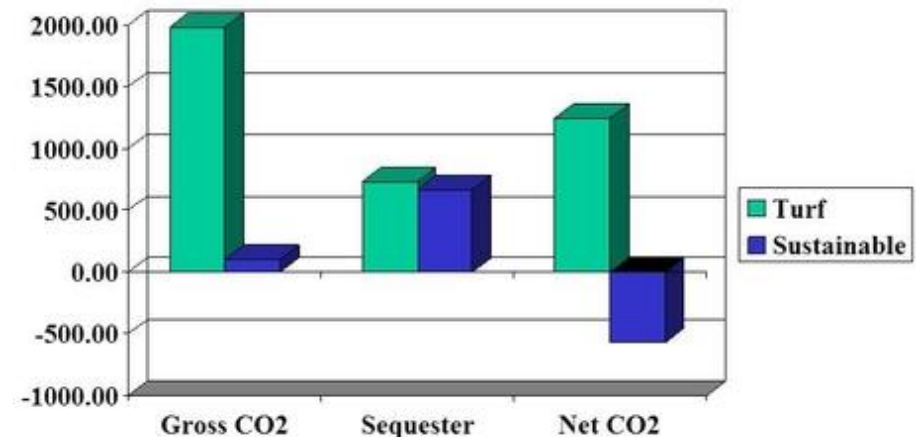
High maintenance

High energy consumption

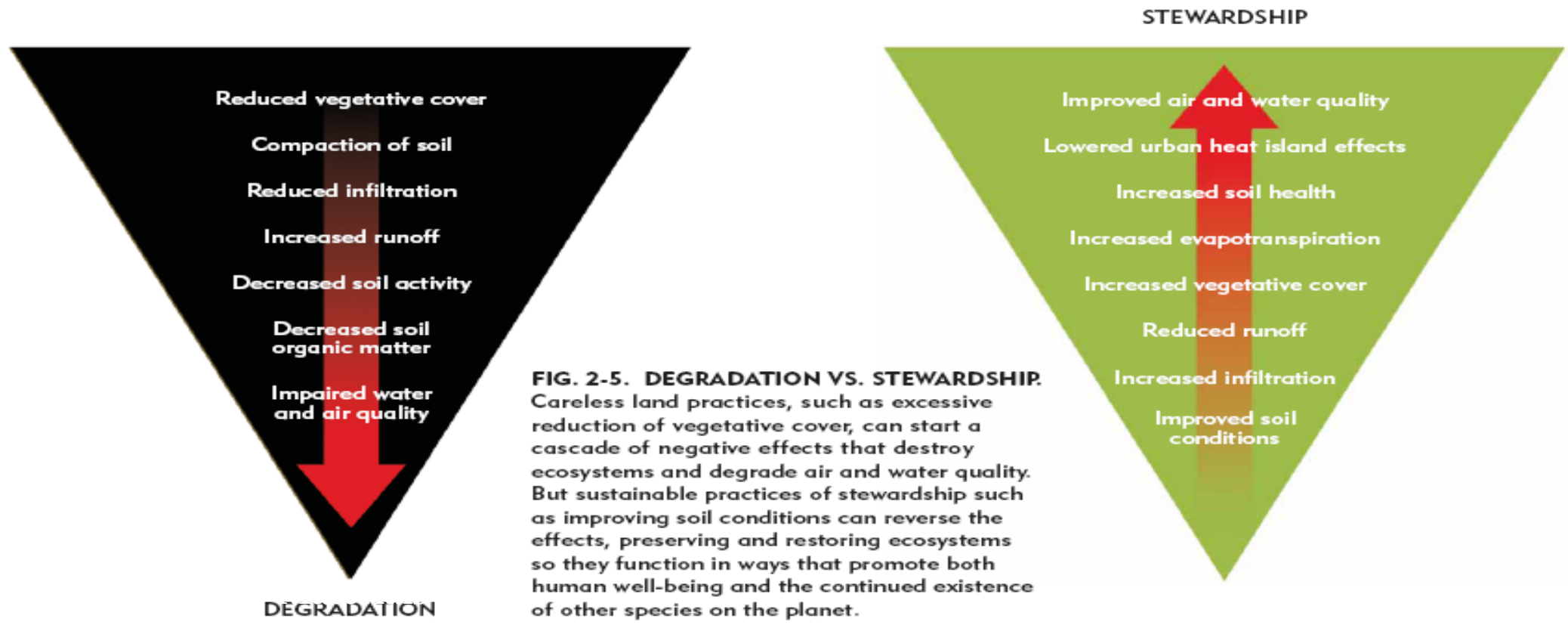
High carbon Footprint

<http://www.epa.gov/WaterSense/pubs/outdoor.html>

Pounds Carbon Dioxide per Acre/year
(Turf vs Established Native Prairie)



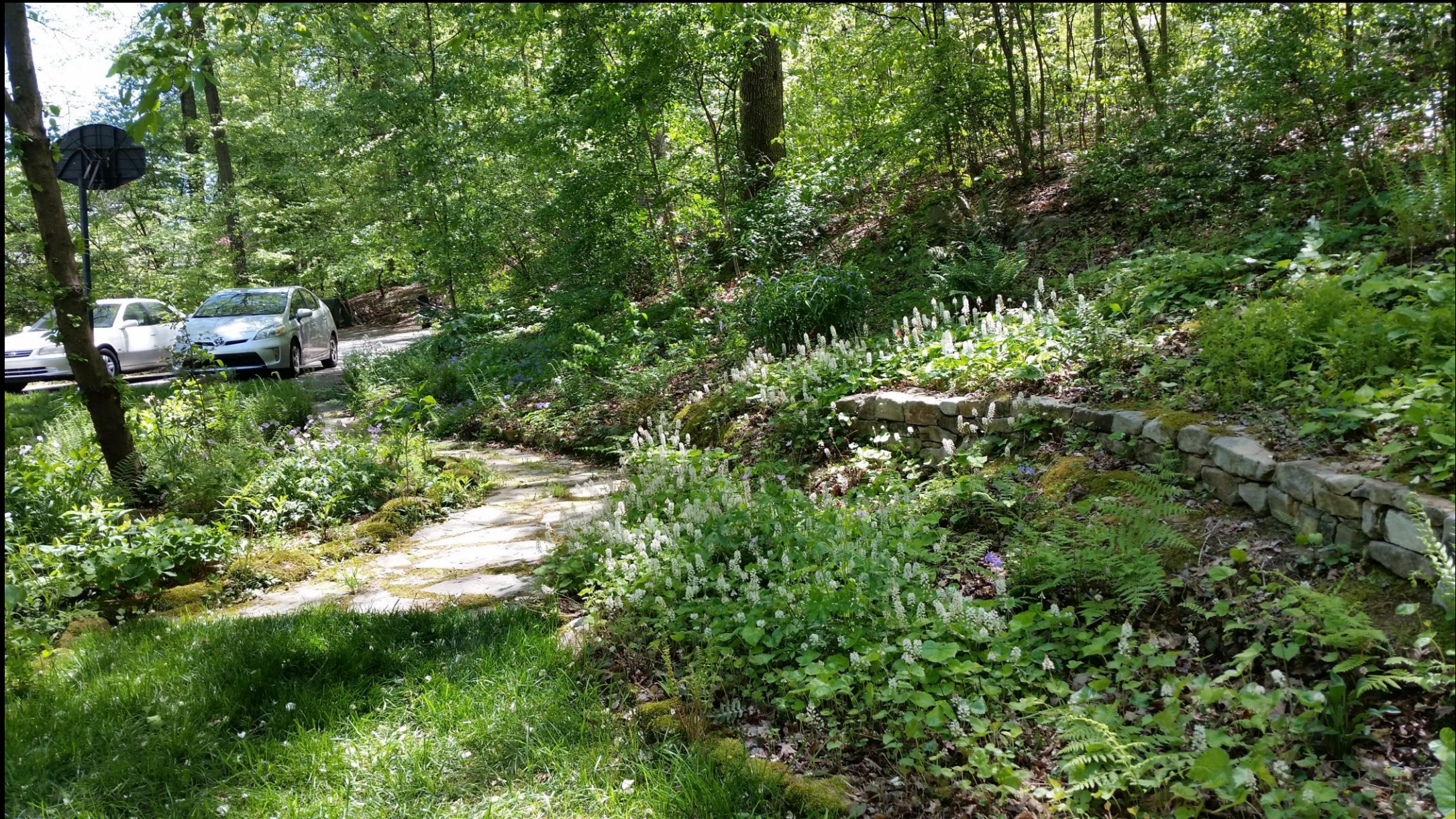
Paradigm Change



Conservation to Regeneration through Performative Landscapes







Form n Nature



Form, Style, Diversity



Native Azaleas, Hello Spring





Diversity and niche areas





Supporting Our Pollinators





Designing with Nature



Shady woodland gardens



Designing with Nature











Ecology in Public Landscapes



Sensory Landscapes



Ecology in Public Landscapes





Design Guidelines for Ecological Landscapes

Combine natural systems such as wetlands, prairies, and riparian models for site specific applications.

Begin by assessing the plant community type that best represents your site conditions. Design to flow with existing conditions.

Think like an ecosystem. Go Native.

