Ecological Complexity

What is Nature?

What is Nature?

Definition	Opposed concept	Particularities	Object of protection
The whole of material reality, considered as independent of human activity and history	Culture, artifice, rational intention	Static, Excludes Mankind	Pristine nature, wilderness
The whole universe, as it is the place, the source and the result of material phenomena (including man or at least man's body)	Supernatural, metaphysical, unreal	Static, Includes Mankind	Nothing (or everything)
The specific force at the core of life and change	Inertia, fixedness, entropy	Dynamic, Includes Mankind	Natural functions and processes, biodiversity, biogeochemical cycles
The essence, inner quality and character, the whole of specific physical properties of an object, live or inert	Transmutation, denaturation	Static, Includes Mankind	Archetypal state of a system or object

Source

What is an Ecosystem?

An ecosystem is a geographic area where plants, animals and other organisms, as well as weather and landscape, work together to form a bubble of life. Ecosystems contain biotic (living) factors, as well as abiotic (nonliving) factors. Biotic factors include plants, animals and other organisms. Abiotic factors include rocks, temperature and humidity.

Scales of an Ecosystem?

Ecological Complexity

Ecosystems can be broken down into parts or studied as whole, complex systems.

Ecological Complexity “The Whole”

Turing processes and spatial structure
Chaotic dynamics
Stochastic processes
Coupled oscillators
Multidimensionality
Trait-mediated indirect interactions
Critical transitions (catastrophe theory)

Source

Ecological Complexity

Biodiversity – species richness and abundance of plants, insects, birds, and microbes in garden systems.
Trophic interactions / Food webs – who eats whom (pollinators, herbivores, predators, decomposers).
Mutualisms and symbioses – e.g., pollination, seed dispersal, mycorrhizal fungi, nitrogen-fixing bacteria.
Disturbance and succession – how urban pressures (construction, mowing, human use) or natural disturbances (storms, pests) shape garden ecology.
Habitat fragmentation and connectivity – how gardens serve as patches or corridors for species movement in the city.
Edge effects – ecological differences at garden boundaries (sun, wind, predators, weeds).
Ecosystem services – pollination, soil fertility, pest regulation, climate cooling, water retention.
Abiotic factors – light availability, temperature (urban heat island), soil quality, water availability, pollutants.
Human–nature interactions – gardening practices, cultural values, land use, management choices.
Invasive species – competition with native flora and fauna, altering niches.
Temporal dynamics – seasonality, phenology (timing of flowering, insect emergence, migration).
Migration/extinction patterns – in fragmented ecosystems, species die off but also repopulate.

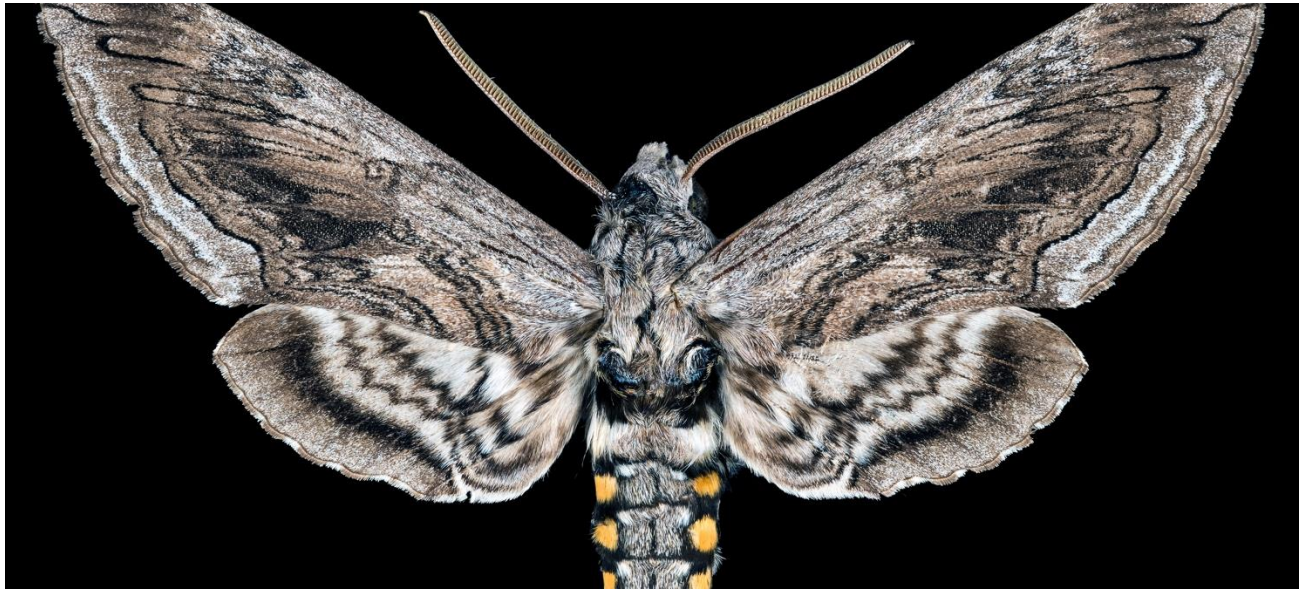
Ecological Complexity “The Biotic Parts”

- Plants (native vs non-native – invasive vs non-invasive)
- Invertebrates
- Pollinators
- Crop pests
- Soil macrobacteria and macrofauna
- Birds
- Mammals
- Other animals – reptiles, amphibians, fish.

Guess That Insect Game…

Is it helpful or harmful (or both) to the garden?


Lesley Wilson



Interactive Activity

Diet

- What do they eat?
- Are they herbivores, carnivores, omnivores, or decomposers?

Life Cycle

- Average lifespan
- Voltinism (how many generations per season)
- Stages of development (egg, larva, pupa, adult)

Habitat

- Where do they live in the garden (soil, leaves, stems, flowers, etc.)?
- What conditions help them thrive?

Role in the Garden

- Are they beneficial (pollinators, pest control, soil health)?
- Are they harmful (plant pests, disease carriers)?
- Neutral/other roles?

Predators and Threats

- What eats them?
- How do they defend themselves (camouflage, chemicals, behavior)?

Interesting Facts

- Unique behaviors, adaptations, or cultural significance

Thanks!

Questions, Concerns, Comments?