

Lesson 1

**Introduction to the challenge
question**

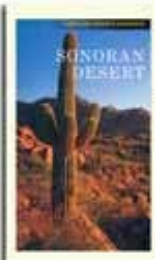
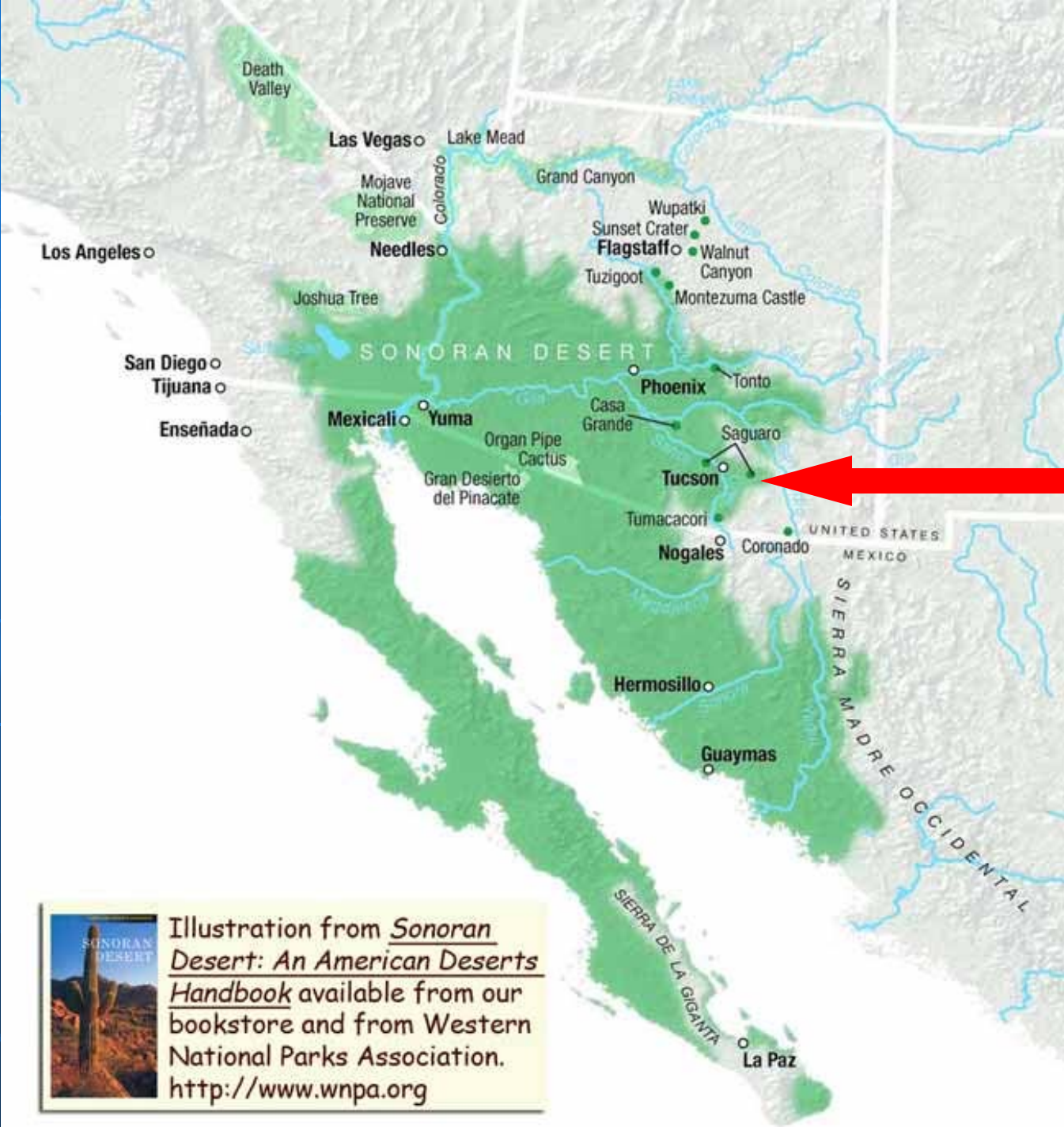


Illustration from *Sonoran Desert: An American Deserts Handbook* available from our bookstore and from Western National Parks Association. <http://www.wnpa.org>

Author's own picture
Tucson, AZ



Saguaro Cactus
Authors' own
picture



Lesson 2



“In the end we will conserve only what we love, we will love only what we understand, we will understand only what we are taught.” -Baba Gioum

Authors' own picture, Franklin, TN sunrise

Ecology

- **Study of living and nonliving parts of the environment and how they affect organisms**
- **Ecology is only one aspect of biology but all LIFE depends on a healthy environment, food resources and water.**
- **Man's actions must protect these resources against pollution and depletion.**

Nonliving Things

```
graph TD; A(Nonliving Things) --> B(Matter); A --> C(Energy);
```

The diagram features a large black-outlined oval at the top containing the text 'Nonliving Things'. Two thick, bright pink arrows with black outlines point downwards from the bottom of this oval to two smaller black-outlined ovals below. The left oval contains the word 'Matter' and the right oval contains the word 'Energy'. The background is a dark blue grid pattern.

Matter

Energy

➤ **Living Things**

```
graph TD; A([Living Things]) --> B([Plants]); A --> C([Animals]); D[Bacteria, Protozoans, Fungi];
```

Plants

Animals

➤ **Bacteria, Protozoans, Fungi**

WEB OF LIFE

- All life is interconnected

- INTERDEPENDENT

- Not

- **INDEPENDENT**

- Destroyed links = Unhealthy, less stable earth

-



Strands of Life

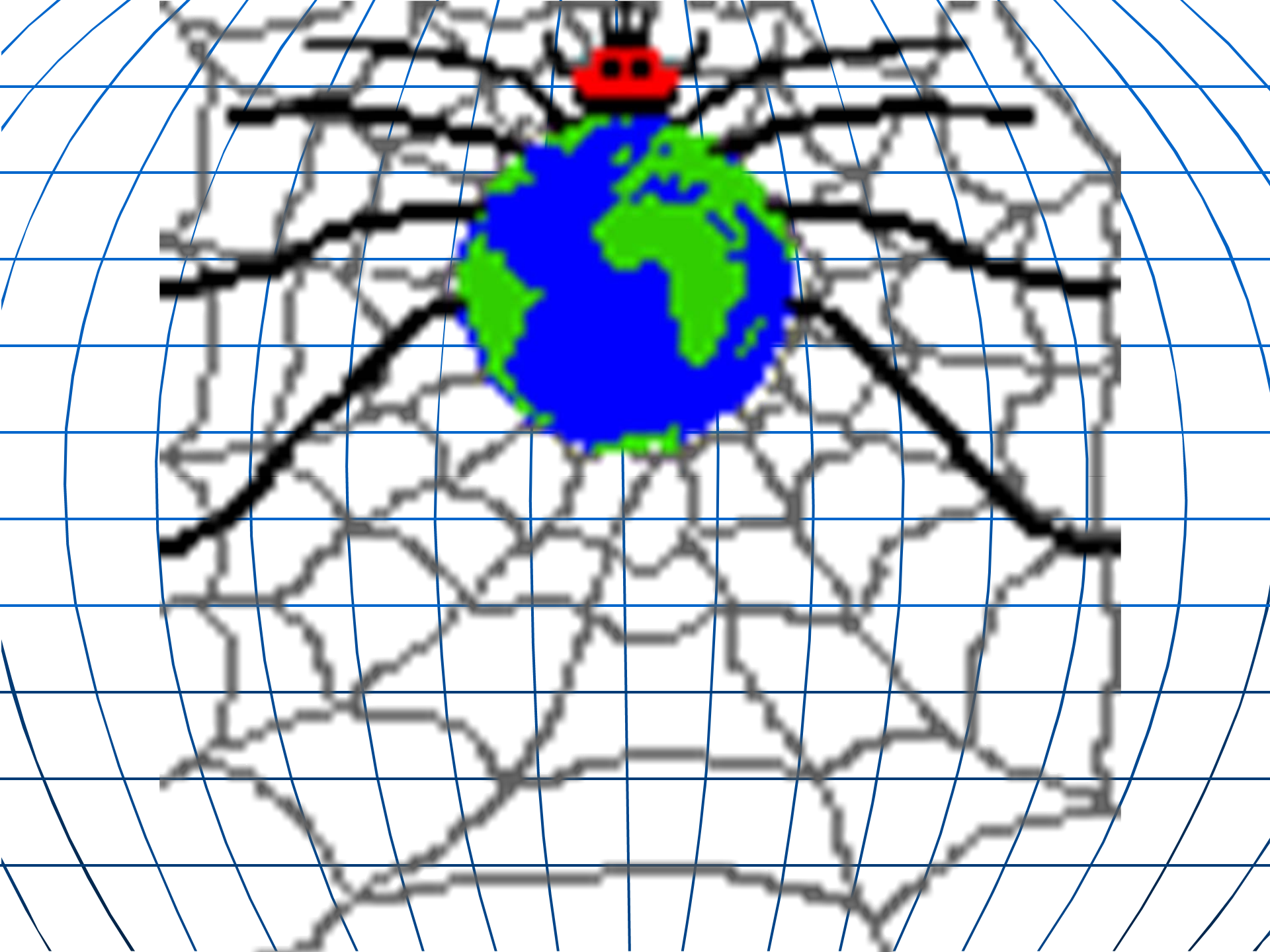
- **Feeding relationships are major strands**
- **Organisms are connected to each other by their need for energy**
 - **supports life's metabolism**
 - **growth**
 - **reproduction**
 - **cycling of nutrients and chemicals**

"Tug on anything at all and you'll find it connected to everything else in the universe."

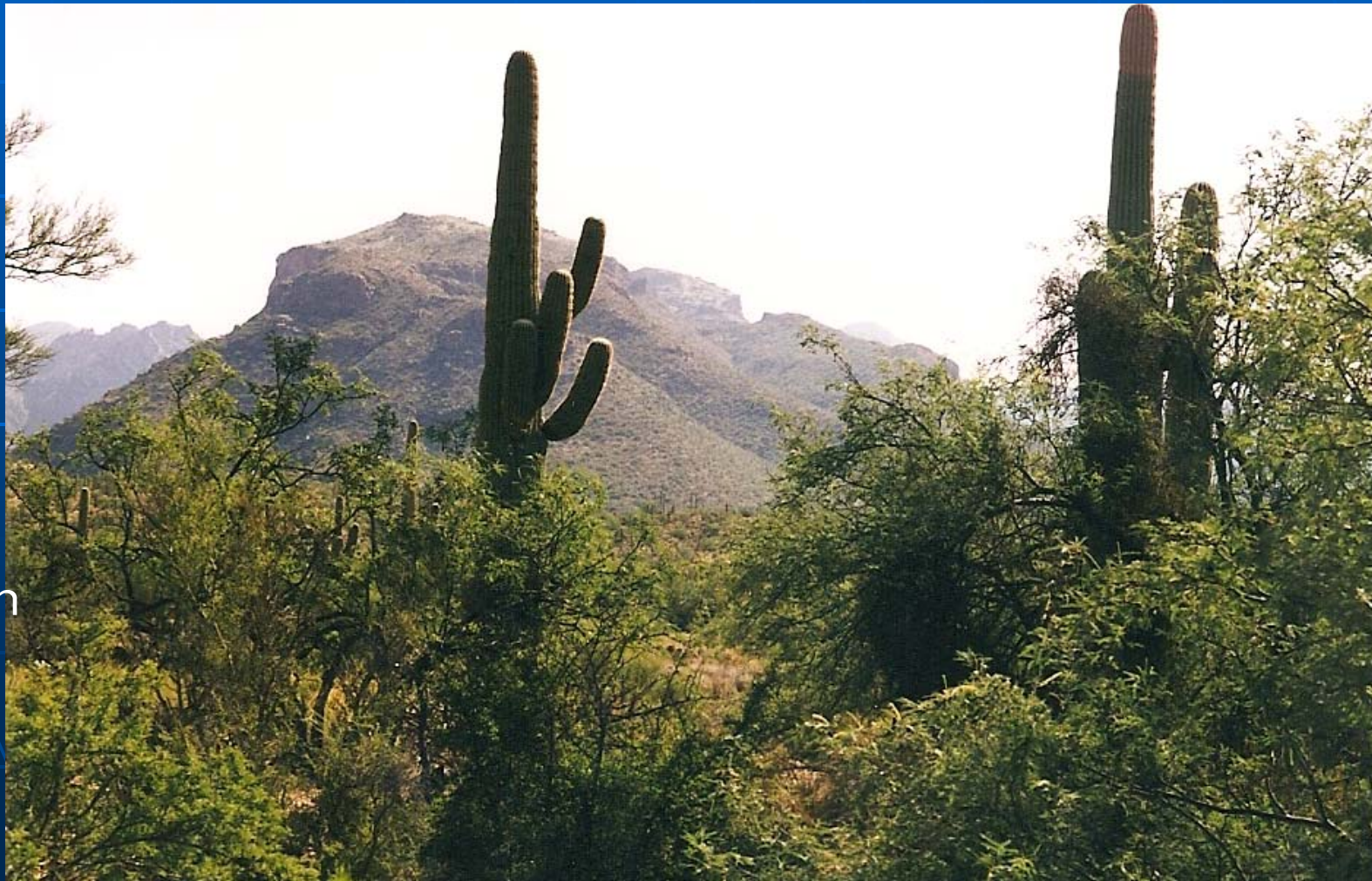
-John Muir, Founder of the Sierra Club



Authors'
own
picture –
Tucson, AZ



- “I am I plus my surroundings and if I do not preserve the latter, I do not preserve myself.”
- **Jose Ortega y Gasset**
- **Meditations on Quixote 1914**



Authors' own
Picture
Tucson, AZ

Who Composes the Strands of Life?

- **Producers - Autotrophs:** plants
 - able to use **energy from the sun** to make
 - their own food
- **Consumers - Heterotrophs:** animals
 - **unable** to make their own food
- **Decomposers:** organisms which cause decay

- **WHY** is decomposition vital to the health of the environment???
- **Bacteria, Mushrooms, Fungus**

Organisms And Groups

➤ **Organisms in an ecosystem can be grouped by the way they acquire and contribute food.**

➤ **Producers**

➤ **Consumers**

➤ **Herbivores: plant eaters**

➤ **Carnivores: meat eaters**

➤ **Omnivores: generalists (eat both)**

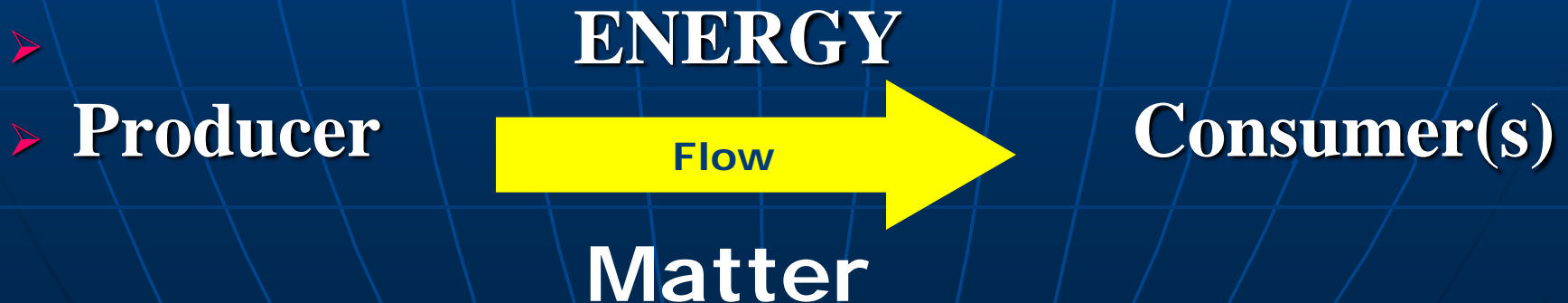
➤ **Scavengers**

➤ **Decomposers**

➤

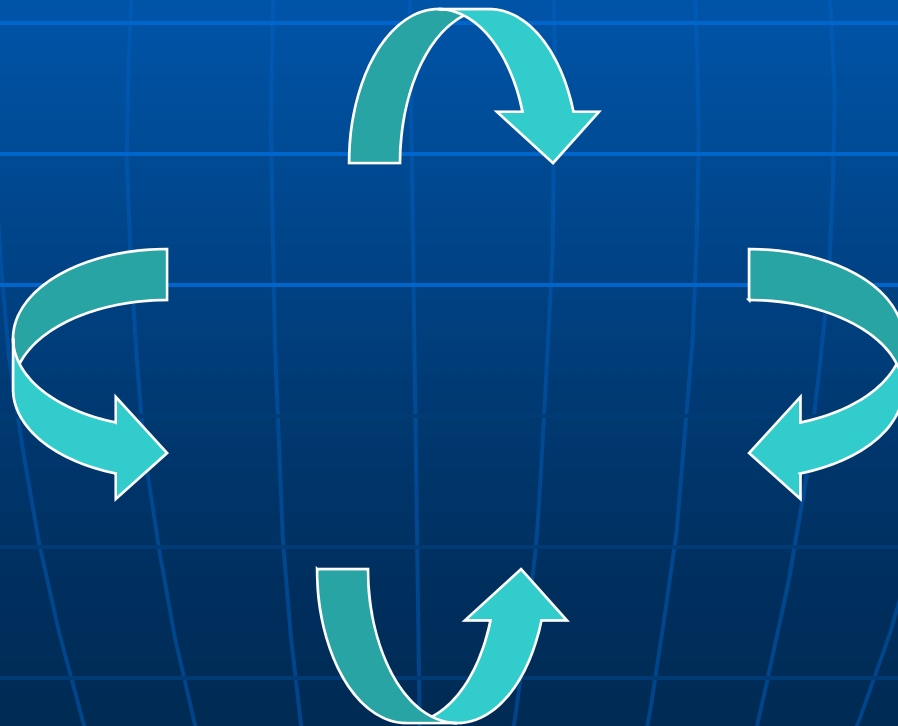
All Biological Activity Requires Energy

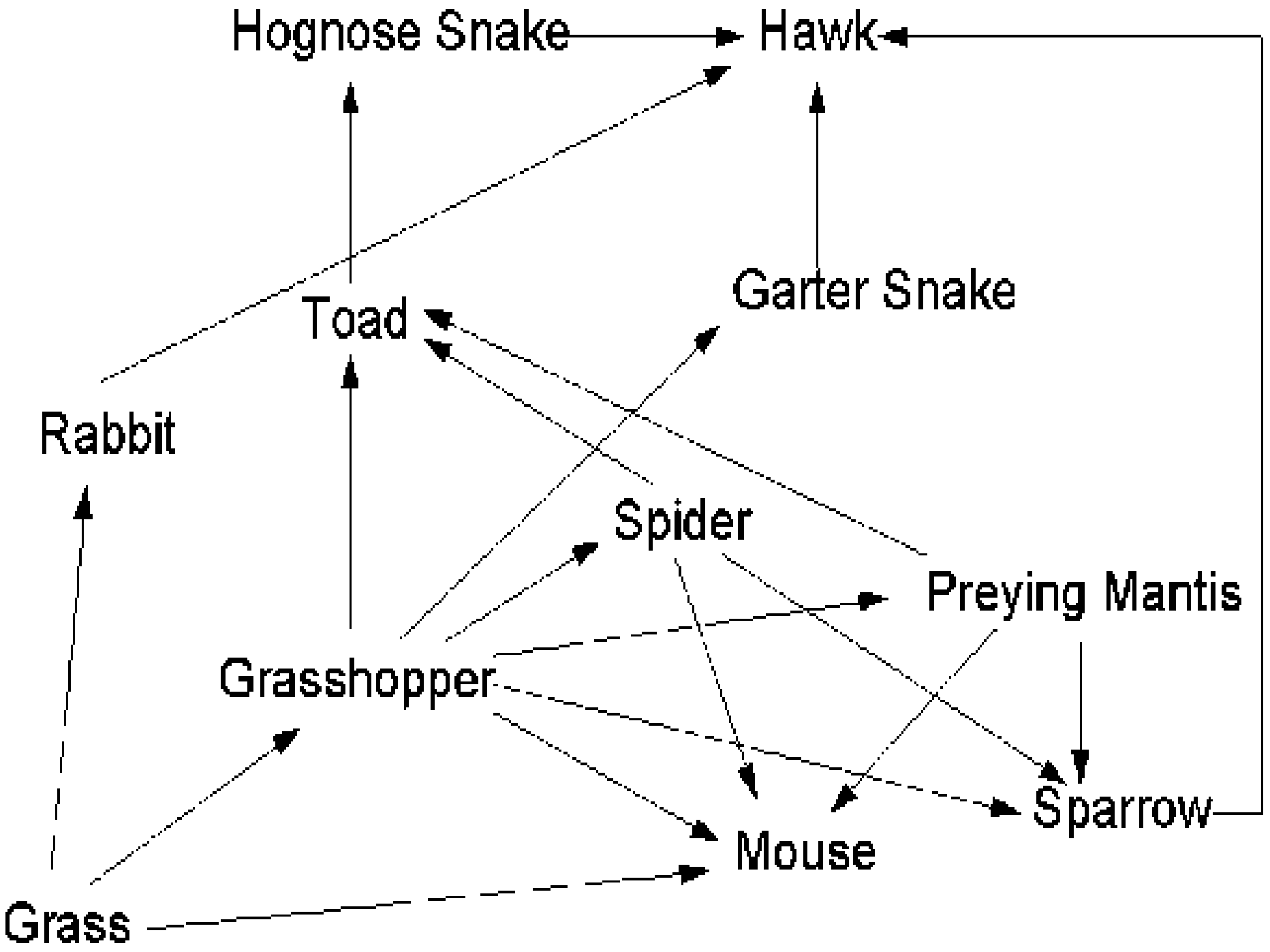
- Food chains and food webs are based on the flow of **energy** and **matter** from one organism to another.



Food Web

- Connection of **all** food chains in a community





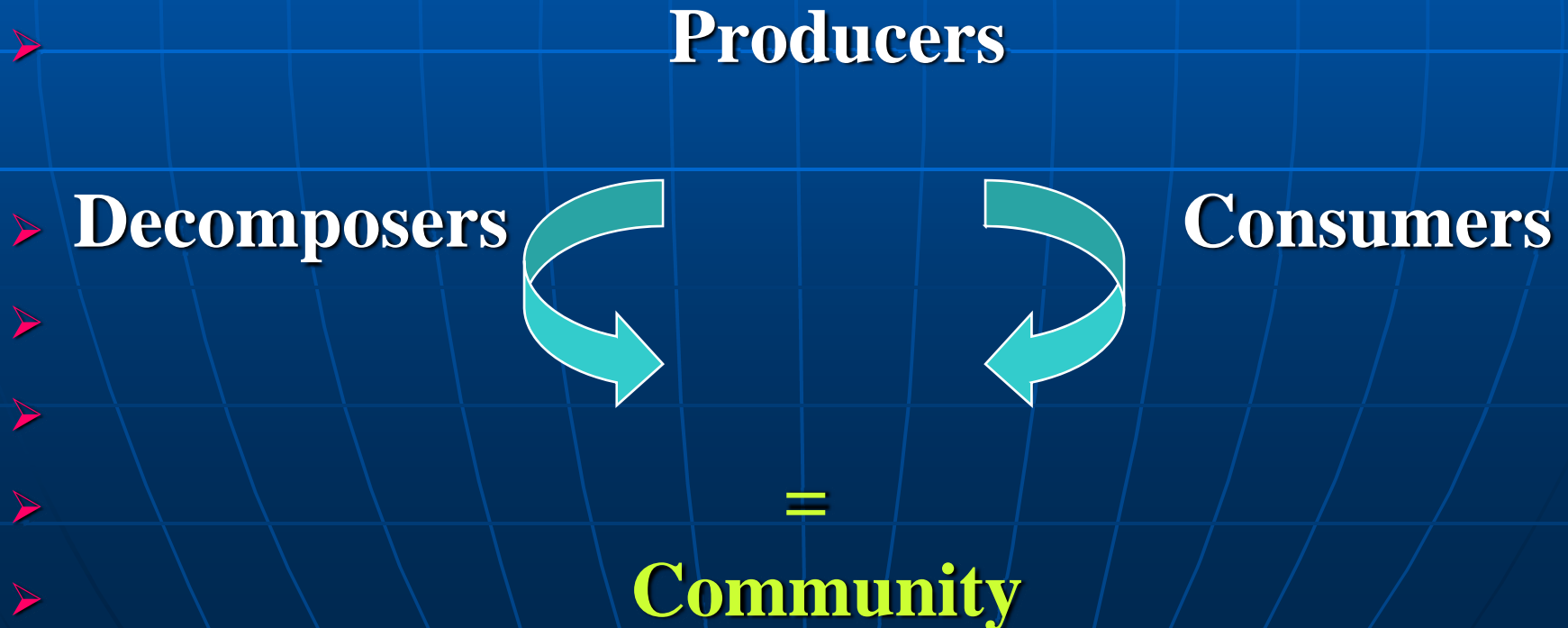
Balance of Life

- Food webs and food chains keep living organisms in balance.
- These interactions keep population numbers in check.

➤ **HOW??????**

Community

- Producers + Consumers + Decomposers that all live and **interact** in one area



Energy of Food Chains

- Animals receive chemical energy from the food they eat (plants and/or other animals).
- Plants are producers. Where does their energy come from?

➤ Sunlight



Life Involves Activity & Activity Requires Energy

- If supply of energy stops, life stops
- A constant cycle of matter is also needed because **matter traps energy and transports it within the organism or to another organism**
- Food is matter and contains energy

Flow of Energy is Inefficient

- Energy escapes a food chain as **heat**.
- Energy must constantly enter a community, beginning with photosynthesis, or the community will die.

Why is Energy Lost??

- Energy received from food is used:
 - to warm body
 - maintenance of body
 - growth reproduction
- Organisms have selfish needs that make energy unavailable to next consumer
- HEAT loss – escapes into the environment, and back out into space.

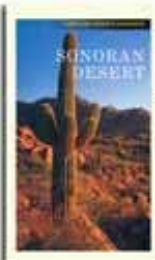


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➤ How do these 2 communities differ?

➤ Biotic and Abiotic Variables???



Author's own picture
Tucson, AZ



Desert Community

- *****Provide pictures of Sonoran Desert species** and ask the students to research their feeding preferences in order to construct a desert food web.

- **Badger** **Horned Toad** **Road Runner**
- **Javelina** **Bobcat** **Jack Rabbit**
- **Lizards** **Cacti** **Harvester Ants**
- **Toads** **Snakes** **Prickly Pear**
- **Kit Fox** **Gambel's Quail** **Mesquite Tree**
- **The list is endless...!!**

Author's own picture
Roadrunner
Tucson, AZ



Author's own picture
Horned Toad
Tucson, AZ

