

## A Lesson of Ecology

**Natural systems are maintained  
and constrained by processing  
energy.**

*True of the Earth & smaller ecosystems too!*

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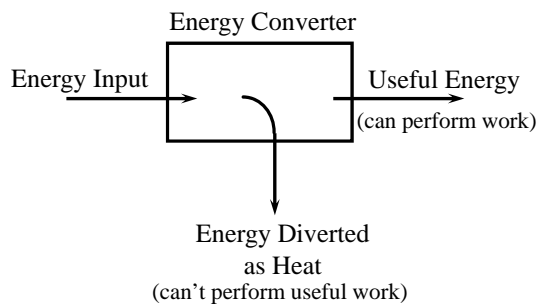
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Note: The first law of thermodynamics is met.  
 $E_{\text{input}} = \text{Diverted } E + \text{Useful } E$

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## Species in an ecosystem are divided into trophic levels

- Trophic levels are determined by the main source of nutrition for a species.
- Trophic levels are given names:

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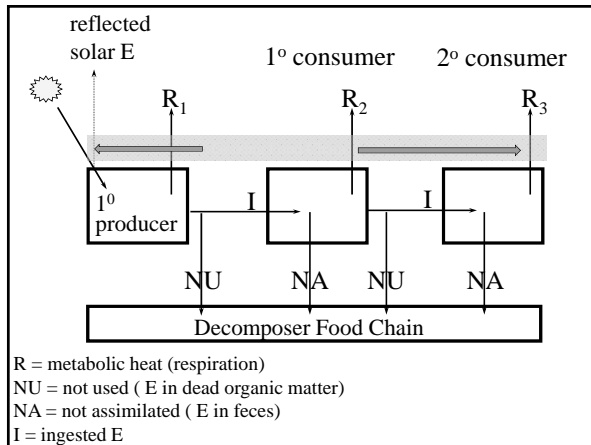
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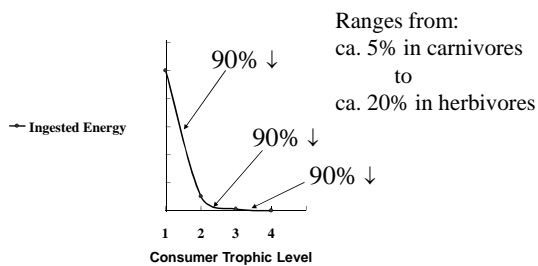
## Lectures 20

### Trophic levels

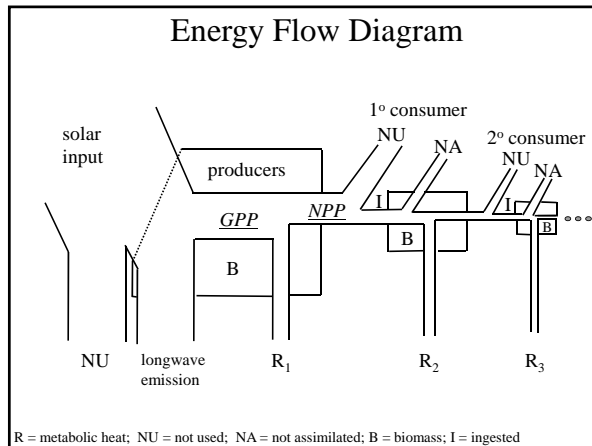
- In most terrestrial ecosystems, there are usually no more than 4 trophic levels.
- The transfer of energy as food (chemical E) from producers to higher trophic levels forms a food chain.



### 10% rule of thumb



## Lectures 20




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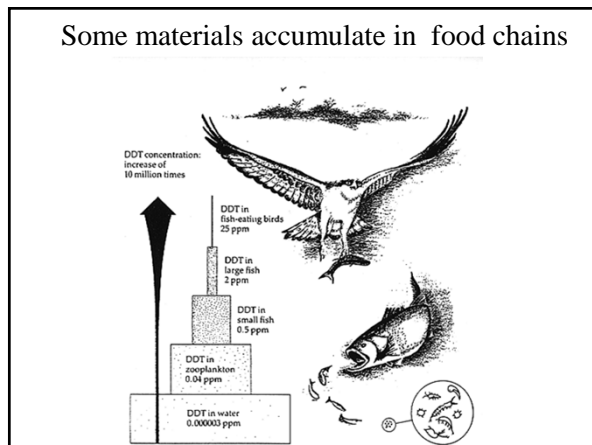
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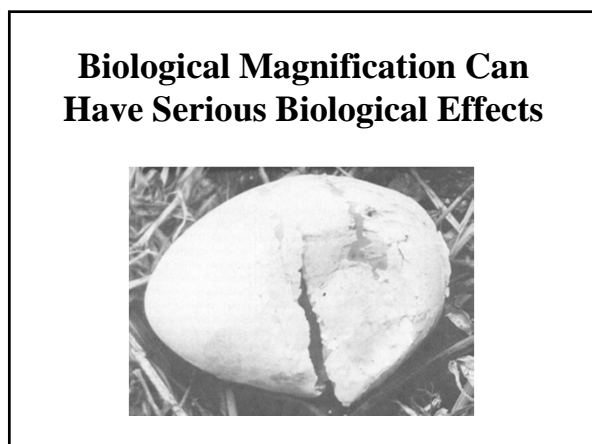
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## Lectures 20

Biological amplification may affect populations the least able to cope with high concentrations.

Two – Four eggs per year



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