Do Trophic Cascades Affect the Storage and Flux of Atmospheric Carbon? An Analysis of Sea Otters and Kelp Forests

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Introduction

* Core Biological Ideas - ***Systems***
  * Predator-Prey Relationships
  * Carbon Cycle
  * Ecosystem Effects of Predator-Prey Dynamics
* Student Misconceptions:
  * Students visualize relationships as linear and unidirectional (Hogan, 2000)
  * Students have difficulty formulating answers to questions based on relationships within food webs (Webb and Boltt, 2010)
* Rationale for Lesson:
  * Address student misconceptions about biological systems
  * Provide students tools to construct system-based models and scientific arguments

Learning Objectives

* Students will be able to build a ***model*** that shows the relationship between predator-prey interactions and atmospheric carbon levels.

* Students will be able to ***construct*** an argument (claim, evidence, and reasoning) regarding the relationship between keystone species and atmospheric carbon.

Activity

* ***Engagement*** (Active Homework)
  * Watch video: https://www.youtube.com/watch?v=PzVa4cr0CFY
  * Think about the relationships covered in the video

* ***Exploration*** (In Class)
  * In groups, sketch a box and arrow model that reflects the relationships shown in the video
    * Based on your model, construct a scientific argument relating sea otters to atmospheric carbon
    * 3 minutes
  * Groups share their models and scientific arguments with the class

Summative Assessment

* Students create a ***box and arrow model*** of the effects of wolves on atmospheric carbon sequestration in a grassland ecosystem
  * Use models to create a ***scientific argument*** predicting the impact of wolf removal on atmospheric carbon flux in the grassland ecosystem
  * Possible boxes: wolves, deer, rabbits, grass, carbon