

EcoChains: A Multiplayer Card Game to Teach Food Webs, Climate Change and Systems Thinking

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Overview

EcoChains: Arctic Crisis is an educational multiplayer card game for all ages, focusing primarily on middle school students through adults. It is designed to be a fun, accessible, collaborative experience with a short session length (approximately 30 minutes), playable within the classroom or at home. The game is for 2 to 4 players.

Learning Objectives

Players learn about Arctic ecosystems and the impact of a changing climate as they build and manage food webs based on predator-prey relationships. Various threats to Arctic marine ecosystems arise (e.g., carbon pollution, other impacts of climate change such as invasive species, etc.) that encourage participants try out strategies to build more resilient food webs and reduce environmental stress (e.g., the development of alternative energy).

Players realize the importance of sea ice as they act as stewards over their food webs. As global warming progresses and the area of perennial sea ice diminishes, the range and quality of a player's ice habitat will also decrease, leading to the loss of Arctic species. When their food source is lost, a species first tries to migrate to another player's food web looking for new prey, or perishes if unable to do so. The game is designed to teach players the importance of ice to key Arctic species, and that biodiversity leads to more resilient food webs. In this way, the game promotes systems thinking, an important skill for the 21st century (Gee, 2005).

Gameplay

Players set up a base of sea ice cards and play Arctic species cards to gradually build up marine food webs according to predator-prey relationships. In each round, representing an annual cycle, various Arctic species, "Action" and "Event" cards are drawn. The Event cards have an impact on specific species in the environment, allowing players to see the potential impact of specific environmental stressors on ecosystems. On a player's turn, they may draft Arctic species or Action cards to mitigate the impacts on their ecosystem. In this way, players learn how to build a more stress resilient ecosystem and understand the consequences of pro-active versus reactive responses.



Figure 1: Food webs with a base of Arctic sea ice.



Figure 2: Four students play EcoChains.

Players also draw “Goal” cards and earn bonus points by accomplishing secondary objectives as they build and manage their food web. Goal cards provide additional reinforcement to the EcoChains learning objectives, drawing attention to desirable outcomes such as biodiversity and resilient food webs. The game ends once a player constructs three webs of four or more Species cards or loses all of his or her sea ice. Players are awarded points for every Arctic species that remains alive; the player with the most points wins.

Design

EcoChains: Arctic Crisis is collaborative effort between designers, subject matter experts, and learning scientists. Its success is the result of several cycles of design, scientific content review, playtesting, evaluation, and redesign. There is a need for more accessible educational games that address systems thinking and climate change issues from biophysical, impact, and adaptation perspectives (Reckien, 2013). This is the first of a series of ecosystem-based food web games in response to this challenge that is not only educational in scope but is also entertaining to play. For more information, please visit EcoChainsGame.com.

References

- Gee, J. P. (2005). Learning by design: Good video games as learning machines. *E-Learning and Digital Media*, 2(1), 5-16.
- Reckien, D. & Eisenack, K. (2013). Climate change gaming on board and screen: a review. *Simulation and Gaming*, 44(3).

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