Grade 11 Environmental Science: Systems and Their Representation

(Submitted by Jose Carlos Alaniz Estrada, 2019, while serving as Sustainability Coordinator K12 / IB Environmental Systems Teacher / US Biology Teacher at The American School Foundation AC, Mexico)

Tool(s) used:	• Sustainability Compass • Systems Iceberg • Causal Loop Diagrams • Systems Mapping
Purpose of using tool:	• Generating Questions • Guiding Discussion **Overview:** With my environmental systems class, we learned about systems, their elements, cause and effect, loops, storages, flows and their diagrams. Then we watched the video "How Wolves Change Rivers" and created posters in teams to represent this process as a system with inputs, outputs, time-delays, storages, loops, flows so they could better describe how was it possible that the reintroduction of wolves into Yellowstone National Park affected the contour of rivers and thus their water flow.
Context of lesson/case study:	Environmental sciences class
Participants (# and description):	Juniors 11th graders
Topic, Theme, or Key Understanding of unit/project:	Systems and their representation
Length of unit/project:	One week
Resources/materials & setting required:	Projector, laptop, Apple TV, poster boards, markers

Lesson Plan/Description of the Project:

1. Defined a system and its elements and draw a symbol for one of them: Limits, inputs, outputs, flows, transfers, transformations, + and – feedback loops, storages, time delays, cause-effect relationships, nodes.
2. Before watching the video, instruct to identify these elements in the Yellowstone NP as the video is played.
3. Showcase "How Wolves Change Rivers", pause it to ask students to identify different elements of systems.
4. In teams draw the systems with their symbols on a poster board, include labels and short descriptions and even drawings.
5. Present your system to the rest of the class.

Reflection

Plusses:

- Students were able to identify the cause and effect of each part of the systems, the time delays and

nodes. They found out relationships they had not seen like different predators-prey like hawks to rodents and bears to berries and how some species shape the environment more than others like beavers.

- Understood how systems work and how everything is connected within it.
- Understood the importance of systemic analysis in the decision process to

Evidence and Resources: