To K-Cup or Not: socio-environntal analysis of Keurig coffee

All of the **K-Cups** sold in 2013 would wrap around Earth

10.5 times

Coffee Case Study
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HTTP://WWW.MOTH ERJONES.COM/BLUE-MARBLE/2014/03/COFFEE-K-CUPS-GREEN-MOUNTAIN-POLYSTYRENE-PLASTIC

HOW SUSTAINABLE IS OUR COFFEE?

This is a compilation of assignment handouts for students working on the Keurig coffee socio-environmental (S-E) case study. The handouts accompany 7 modules comprising the first semester of a CSU STEM Collaboratives First Year Experience course for incoming College of Science and Math students at Fresno State, breaking the case study and final student recommendations into several formative pieces:

- Systems and S-E Synthesis
- Introduction and Background
- Building Expertise
- Master System Map
- Problem/Solution Tree
- Identifying and Evaluating Interventions
- Student Recommendations

Student Handouts and Assignments

The modules and handouts contain activities with in-class prompts and at home, homework activities. The assignments were built based on guidance and support provided by the National Socio-Environmental Synthesis Center (SESYNC), the National Science Foundation (NSF), and the structure of vetted geoduck case study work by Kate Mulvaney, Simone Pulver, Clare Ryan and Yen-Chu Weng (2014).

Complex S-E Systems

Many of today's problems occur due to poor understanding of connections between social and environmental systems. New approaches to reconciling socio-ecological problems involve creating system maps that serve as good representatives of complex systems, as well as analysis tools for making decisions about issues that involve several perspectives: i.e., economics, cultural-social, environmental, and political lenses.

Case Motivation

The case study is motivated by conflicting reports about the sustainability of Keurig coffee cups, and builds on students' own experiences with coffee consumption to engage them in a conceptual analysis of the the global coffee SES. Students will work in small groups (3-4) to synthesize information about different aspects of the coffee SES, discuss impacts from different stakeholder perspectives, collaborate to develop a conceptual model to analyze the coffee SES and find sustainable solutions.

In a nutshell, the coffee case study is initiated with students watching and reading several conflicting YouTube videos, news articles, and sustainability literature of coffee.
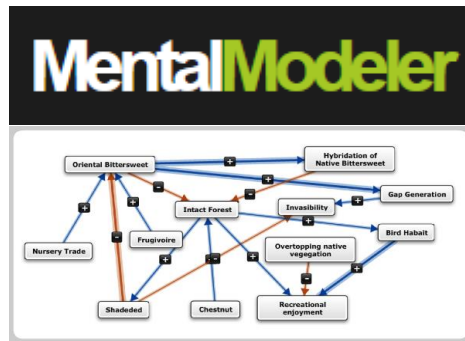
Mapping Complex Systems

In this section you'll learn how to define important components of a system and show interconnected relationships between them. To do this, you'll use Mental Modeler online modeling software as a tool to represent coupled socio-environmental systems. The online resource can be accessed at www.mentalmodeler.org.

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Assignment 1 – Coffee Break

Module 1

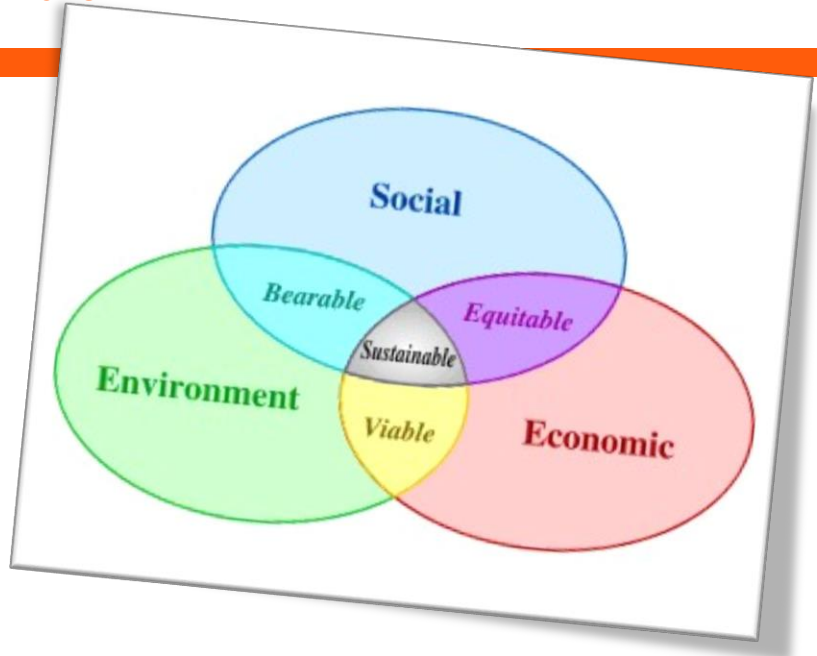## Make a Concept Map of the Classroom S-E System

To build up to being able to build good and useful representations of social-environmental systems, a good starting point is to break down the system into COMPONENTS. One way of doing this is by identifying social components and environmental (or ecological) components separately. From there, you can work on identifying more complex subsystems.

Assignment 1

Class Activity – Pre Module

Before mapping the complex interactions of dynamic S-E systems involved in our consumption of coffee, we first have to take a step back and learn the basics of concept mapping. We'll do this starting with simpler systems. A helpful place to begin is by using your classroom as a socio-environmental system. Take a look around IT B290 – your classroom. See if you can identify all of the different COMPONENTS of the classroom system. Take a few minutes to confer with your classmates, seeing if you can come up with at least 7 individual components:

1

_____

2

_____

3

_____

4

_____

5

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6

_____

7

_____

Exploring the model system

Now that you have a model of the classroom system, let's use it!

Constructing concept maps often takes many iterations. Once a well-grounded map is made, it can be used to make predictions about perturbations and how systems will bear change that aren't readily transparent. For this class, we'll use MentalModeler, but there's also CMAP and other tools available. More background on concept mapping and other useful tools can be explored at Schrockguide.net.

Most university and colleges, including Fresno State, are under ever-increasing demands to serve more students. For Fall 2016, Fresno State had ~20,000 applications for~3,400 open freshman spaces (Visalia Times article).
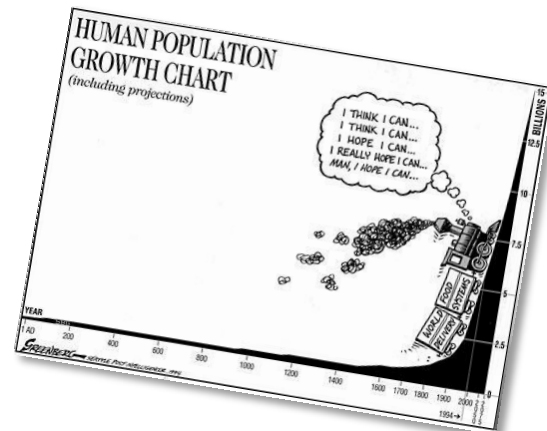
Use your model to predict what would happen if 100 more students were added to the classroom. Answer:

1. What would the impacts be on the classroom environment?
2. What would the impacts be on the social environment?
3. What are other perturbations that could change the system? What would they impact?

SAVE THE TURTLES! AND THE GRIZZLIES?
OR THE WOODPECKERS? PRIORITIZING
ENDANGERED SPECIES CONSERVATION

Save the Turtles! And the Grizzlies? Or the Woodpeckers?
Prioritizing Endangered Species Conservation

Dr. Judy Che-Castaldo, Dr. William Burnside, and Dr. Cynthia Wei
National Socio-Environmental Synthesis Center (SESYNC), Annapolis

$100 Million

Dollars available to conserve threatened species

5%

Budgetary cut is needed – how will you determine how much money is taken from each threatened species?

In this case study, use biological, economic, threatened, and socio-cultural perspectives to rank the importance of continued funding for conserving the following threatened U.S. Fish and Wildlife species:

- ⭕ Sea Turtles

- ⭕ Woodpeckers

- ⭕ Snails

- ⭕ Grizzly Bears

CLICK THE LINK BELOW TO GO TO THE CASE STUDY:

Save the Turtles! Case Study

Assignment 2

Identifying Stakeholders and Their Perspectives

Stakeholders

A stakeholder is a person, group or organization that has an interest or concern in any issue. In the case of socio-environmental issues, typical stakeholders include policy-makers, economists and industry, environmentalists, and socio-cultural considerations. Ideally, stakeholders should encapsulate all of the resource users, and well as the resources provided by the system.

In crafting all of the components and factors involved in complex-interdisciplinary systems, it is helpful to spend time considering all of the "players" involved in a system. One way of doing that is illustrated in the Save the Turtles! And Grizzlies? Or the Woodpeckers? SESYNC case study. The exercise does a good job exemplifying the idea of competing perspectives: socio-cultural, biological, threatened, and economical.

CLICK HERE TO GO ONLINE TO THE CASE STUDY

Case Study Notes:

This case study is authored by Dr. Judy Che-Castaldo, Dr. William Burnside, and Dr. Cynthia Wei who work at the National Socio-Environmental Synthesis Center (SESYNC). The exercise is a good primer for building upon what was learned in Assignment #1, relating to socio-environmental synthesis. In moving towards higher level, more integral work that you'll do in subsequent exercises, Che-Castaldo et al.'s case study is a good practice in exploring and understanding different stakeholders' perspectives.

It also is a good first practice in trying to reconcile conflicting and competing information. Those interested in additional readings related to the case study can explore these readings:

1. Endangered Species Program
2. ESA Fact Sheet
3. Defenders of Wildlife Fact Sheet
4. Political and Economic aspects of ESA

Competing Perspectives

More often than not, the different stakeholder perspectives to an issue are often conflicting and competing. Take the case of Governor Gerry Brown's Delta Bay Conservation Plan, which proposed building two tunnels to divert water south, away from the San Francisco. While supported by Valley farmers, residents living on the delta are highly opposed to the tunnels.

PART I
INTRODUCTION & BACKGROUND IN THE CASE OF COFFEE

MOVIE TIME! In class, we'll watch a sequence of YouTube videos.

WRITE DOWN MAIN TAKE-AWAY POINTS FROM EACH VIDEO.

ONCE YOU'VE WATCHED ALL THE VIDEOS, TAKE SOME TIME TO COMPARE AND CONTRAST THE VIDEOS WITH YOUR CLASSMATES.

REPORT OUT AS A GROUP YOUR FINDINGS

Video viewing order:

1. Film Trailer for Dulake's Dream
2. Keurig's Laughing Man Coffee Video
3. Keurig Founder John Sylvan's Interview
4. Kill the K-Cup Video

Movie Main Ideas

Write what each movie conveyed below:

DUKALE'S DREAM

_____
_____
_____
_____
_____
_____

LAUGHING MAN COFFEE

_____
_____
_____
_____
_____
_____

JOHN SYLVAN'S INTERVIEW

_____
_____
_____
_____

KILL THE K-CUP

_____
_____
_____
_____
_____

Assignment #3

Starting a Socio-Environmental Synthesis on Coffee

Module #1

PART 2
WHO ARE THE PLAYERS?

BRAINSTORMING TIME! Who and what are all the stakeholders involved in coffee's socio-environmental system? Now, you'll brainstorm with your group to name as many aspects, components, and potential players you can think of.

WRITE EACH PLAYER ON A POST-IT NOTE, WHITEBOARD, OR A COMPARABLE TABLET APP

AFTER YOU HAVE ALL OF THE PLAYERS IDENTIFIED, SEE IF THEY GROUP INTO 4 OR 5 CATEGORIES.

HOW DO YOUR CATEGORIES COMPARE TO THE 5 CATEGORIES IN THE STORY OF STUFF?

USE MENTALMODELER TO MAKE A SYSTEM MAP
When you're done What 4 – 5 broad categories did your group come up with? List the categories below:

In 2013 alone, just one of Keurig's affiliate brands produced enough K-Cups to wrap around the Earth 10 1/2 times.

EatDrinkBetter.com

CATEGORY 1

Examples

Compare Categories!

THE STORY OF STUFF PROJECT

CATEGORY 2

Examples

CATEGORY 3

Examples

CATEGORY 4

Examples

CATEGORY 5

Examples

Make a System Map!

MentalModeler

This assignment is an adaptation from Emilie Stander and Myla Aronson's "**Designing an Urban Green Infrastructure Network: Balancing Biodiversity and Stakeholders**" SESYNC case study. This exercise is really geared on helping us identify the information needed to address any S-E problem. Following up on this activity, student-experts will be able to find and evaluate more relevant sources of necessary information needed for structuring the coffee case study.

The class has been assigned a case study on the sustainability of coffee. In the previous assignment, you identified all of the players involved in coffee's complex coupled social-environmental system. Now that you've identified the main components of the system in the last exercise and have a preliminary concept map of the system, the next step is for you to become an expert of one of the components—that is, one of the 4-5 categories identified in the last assignment.

Once your group has an expert assignment, and once the group had made a preliminary concept map your part of the coffee system, the next step is for you to complete an **INFORMATION NEEDS ASSESSMENT** to figure out what you need to know to become true experts in your perspective. Once you identify and locate all the information you need, you will use the information you find to make data fact sheets, like those you worked with in the Save the Grizzlies! case-study. Once done, your group will then revise and refine your concept mapped part of the coffee system—you can also actively revise your concept map as you collect and synthesize the needed information. This will take some time, and expect a lot of revisions.

The expert map made by your group, once done, will be used in a few weeks to improve upon the initial coffee concept map made by the class in the previous assignment.

Circle or write in what your group will become an expert in:

- Socio-Cultural (consumption)
- Environmental
- Agricultural
- Industrial
- Economics
- Political-Institutional
- Medical
- Ethical – Social Justice

What is USEFUL information?

Often, we're bombarded with information overload and questions about the validity of presented data—is the information we get from a quick Google search as helpful as we think, and where can we find the data and information we need to really become experts in our perspectives? No matter what perspective of coffee you represent, for good decisions and syntheses to be made, expert knowledge should be grounded in the most useful, vetted, and credible information.

Information Literacy

One way to make sure that the information you find is of good quality is to subject it to the "CRAP TEST." The Crap Test is a great way to evaluate content using criteria such as:

- How current is the information?
- Is the information reliable?
- Is it provided by reputable authors?
- Is the information on evidence?
- What are the biases of the provider?

Building Content Knowledge

(a.k.a "becoming an expert")

A good model for building team knowledge comes from Deanna van Dijk and Calvin College's SERC teaching activity, which states: "at the beginning of a [course project]…a mix of provided readings and readings found by the students…is [reflected and reported] in an annotated bibliography." This endeavor aims to familiarize you with the process of finding and recognizing good primary literature that passes the CRAP test, and provides strong underlying basis for understanding S-E systems.

Know Fact vs. Opinion

Many people think that an opinion cannot be wrong, when in fact, opinions and beliefs are really are no more than individual preferences. There's nothing wrong with opinions, but there's an important distinction between opinions and facts. This Houston Press article by Jef Rouner does a good job breaking down common factual misconceptions.

Assignment #4 – Information Needs Assessment

To become an expert, there are three things you'll need to do:

1. Make a *new concept map* of the coffee system, focusing solely on 4-5 components that comprise your expert part of the system
2. Identify the information you need by making a "*needs assessment table*"
3. Use the information you find to make an *expert fact sheet*, like the ones you used to rank species in Save the Grizzlies! Instead of animal categories, what are the categories for coffee? Talk about this as a class, and determine 4 coffee-related categories you'll rank similar to Save the Grizzlies.

Category of Information	Specific Piece of Information	Use of Provided Information	Need for Additional Resources
1			
2			
3			
4			
5			

Example Coffee Mind Map