

SUSTAIN 2A03 Summary

Author: Kemal Ahmed
Instructor: Dr. Michael Mikulak
Course: SUSTAIN 2A03

Please join GitHub and contribute to this document. There is a guide on how to do this on my GitHub.

Table of Contents

Collection: Chapter 1: Humanity and the Environment	1
Aspects of Sustainability.....	3
IPAT.....	3
Rebound	4
Jevon's Paradox	4
Collection: Chapter 2: Environmental Policy	4
American Conservation Movement	4
Rise of Environmental Risk Management	4
Integration of social and economic factors	4
Week 6: Cultural Turn	6
Aside: my personal 3D Recycling Initiative.....	6
Back to the Lecture	6
Week 7: Course Refinement	8
MIETL	8
Utopia Assignment.....	9
Economic Sustainability	9

Collection: Chapter 1: Humanity and the Environment

Agriculture uses so much oil that biofuels probably use more oil than oil.

“We cannot experience climate, but we can experience weather”

*show the video about the sun to professor: <http://youtu.be/UuYTcnN7TQk>

Increasing albedo effect amplifies the effect of climate change, since more reflective, white permafrost is becoming dark soil.

“What difference does it make if humans caused climate change or not?”

Greenhouse gases trap IR, which, although necessary for maintaining a liveable climate, can have drastic effects if too thick. Think about Venus, which is, in fact, hotter than Mercury, although it is further from the sun, since it has more greenhouse gases.

Humans struggle with seeing long-term changes. Climate has been quite stable for the past 100k years, however, that has ensured the success of the agricultural revolution.

How much of climate change is natural? Some, but not all.

Sulfur and smog actually causes cooling? Certain greenhouse gases trap IR in and some gases keep IR in. For example, some people cover mountainsides with plastic tarps.

Read “The Long Emergency” by Kunstler

- peak oil
- “Every day, our world goes through ~1 million years of plant productivity”

A lot of people don’t have interest in climate change, so they aren’t motivated to act upon it.

Watch “An Inconvenient Truth”

360 movement

National Geographic Series: putting one person’s lifetime of stuff in one spot

Holocene: post ice age
are we in the Anthropocene or Holocene?

Teacher’s Blog? www.michaelmikulak.com/blog

You understand your product and have an emotional connection with the pieces when you know where you got it from.

Mustard Seed Co-op

hamilton.ca/climatechange
www.mapclimatechange.ca/maps.htm

Try to get McMaster to turn off their lights at night or have a 30 second timer for all lights, except for lecture halls.

Smaller companies are larger consumers, since they aren't as educated and they have fewer regulations that they need to follow

Meat farms consume much more in terms of emissions than other farms

Job losses reduce commuting costs

Share tools more

Encourage growing plants in backyards

Encourage washing in cold water

Improve dumpster diving: similar to how if companies can't sell clothing after a certain period of time, they can return it/sell it to Winners, there can be a company that buys the food or companies donate to the program 3 days before expiry date/damaged food/food close to being destroyed.

Cars not only have an environmental impact from use, but also from manufacturing them.

Are we the only animals who are unsustainable?

Companies often fail because materials don't actually work the way they are supposed to. For example, corn starch bags don't biodegrade. Reduce and reuse before we recycle.

Blue box regresses from glass bottle deposits

Problem is more company-based than consumer-based

Taxation might cause increase in prices of products or out-sourcing.

Aspects of Sustainability

- Economic
- Environmental
- Societal

IPAT

- **I:** Impacts of given action on environment
- **P:** Relevant human population
- **A:** Consumption/person
- **T:** Impact per unit consumption

Worldwide GDP increases by ~3.5% annually

Rebound

Rebound: Increased consumption that negates an efficiency increase

Overconsumption: backfire

Jevon's Paradox

Technology will increase efficiency of usage of a resource, increasing consumption

$$I = P \times \left[\frac{GDP}{P} \right] \times \left[\frac{Q}{GDP} \right] \times \left[\frac{R}{Q} \right] \times \left[\frac{I}{R} \right]$$

Q: quantity of goods & services delivered

R: Quantity goods consumed to deliver goods

R/Q: Resource intensity

I/R: impact per unit resource consumed

$$R = Q \times \left[\frac{1}{\text{eco-efficiency}} \right]$$

In a world of finite resources, our consumption patterns cannot continue indefinitely.

Strong Sustainability: few trade-offs available between natural, human, and social capital available

Weak Sustainability: virtually no limits on trade-offs

Collection: Chapter 2: Environmental Policy

Major steps for environmental policy:

- [American Conservation movement](#)
- [Rise of Environmental Risk Management](#)
- [Integration of social and economic factors](#)

American Conservation Movement

blah

Rise of Environmental Risk Management

blah

Integration of social and economic factors

blah

Cheap energy encourages more transportation of goods

Labour is cheap in China, since so many things are still hand-made. So robots can actually be good for the environment, since it's cheap production closer to where they will be sold, reducing transportation costs.

Extraction is most destructive part of resource consumption.

Phantom carrying capacity: 2-5 billion people are provided for by food run by oil (fertilizer, transportation, machinery, etc.)

Energy density

Natural gas lifecycle makes coal cleaner than it due to transportation costs; look at the lifecycle analysis of where energy comes from in addition to the emissions.

Extremely costly to decommission nuclear plants, so they always run at a loss.

Deep water wells and tar sands are two examples of places where they have used technology to find new locations to obtain more fossil fuels. Estimate “5 × more available than is safe to burn.”

We’ve come to a point where all other necessary components to living require energy. Energy cannot be replaced with something else.

Waste water is often an externalized environmental cost when assessing an energy source

“We’ll never run out of oil, but we may run out of energy to extract that oil.”

1970 Oil Embargo?

Chemical dispersants from oil spills can be worse because they only reduce the visible effect of the oil. They are toxic and ironically increase the affected area.

Arctic is too dangerous at the moment

Burnable energy sources can be considered “energy debt”; also how 10 calories of oil are required to produce 1 calorie of food

Energy sources will progressively become “more expensive and less convenient”

Emotional appeal is more apparent in certain documentaries than actual facts

Fracking: hundreds of chemicals and immense pressure causes fissures that allow for easy extraction of oil. It is guaranteed to pollute the water. The wastewater is occasionally sprayed onto streets, since the salt melts the snow.

Accounting for natural gas leaks (since pipes are hundreds of years old), less than 50% of it reaches the destination

Why does opposition of renewables prevail, whereas opposition of non-renewables is always thrown under the table?

Get inspired from Germany in terms of how to get wind turbines installed. In Germany, they ask a community where the best locations should be for them and they don't have an option of whether or not it will be installed.

“Living close to a windmill makes no worse noise than living close to a highway”

Can you absorb additional energy from the vibrations of windmills? Maybe installing springs at the base of windmills will absorb the vibrations. What causes the noise? Can you change how the noise sounds to make it sound cool? Play songs through it? Subwoofer you can plug into?

Why aren't nuclear plants more weather-proof?

Can't you simply slow down the flow of the water instead of requiring a dam to increase the speed by a large rate

Week 6: Cultural Turn

Do you believe we'll get over this crisis?

Without making this issue important, we won't even be able to survive

Aside: my personal 3D Recycling Initiative

- Advertisement parallels to dropping off film and picking it up later
- Drop off your 3D CAD design and/or plastic
- Donating plastic reduces price
- Or you could select from a catalog of pre-made CAD designs
 - You could call / order online, too
- Pick it up in an hour

Back to the Lecture

Reflect upon the times when you try to make a change and you face barriers. Take note of those because we are already quite motivated people, so if we have these barriers, other people have waaay more that we don't even know of.

Fish stocks will die by 2048. Will we go to measures of obtaining fish that we go to for oil?

shudders

It's difficult not to be **Apocalyptic**.

Our legacy is our waste, not our technology

Nature is doing amazing in Chernobyl because humans aren't there. “Humans’ effect on nature is worse than a nuclear disaster.”

Apocalyptic preparedness promotes individualism. Some people actively prepare for the apocalypse. However, the way they do this, such as stocking up on guns, is usually malicious,

although some elements could include buying solar panels or starting a farm to grow your own food. It's a "race to the bottom."

Think: grocery stores have 3 days of food

Some people say Global Warming is good because it will bring about the rapture. Even for those who believe in God, rapture is supposed to be brought about by God. We are also supposed to respect nature, animals and our fellow humans, although allowing global warming is indirectly murder.

Neoliberalism: fight against collective actions; individualist

Countries can prevent companies from avoiding your laws by moving away by applying tariffs.

"We have a dystopia to avoid"

Should I write a book on technology and how it can influence environmental saviour?

Can you 3D print with garbage?

What drives you to make changes?

- Fear
- Hope
- Feeling accomplished
- Some see it as an economic reward

Harnessing this desire will bring about change

How do you make this issue relevant? What extents would you go to make it relevant?

We should move away from accepting the imminent apocalypse and towards working towards avoiding it.

"It is easier to imagine the end of the world than the end of capitalism"

What systems would the prof prefer?

How to create a culture of sustainability?

Food is a great way to discuss sustainability because it is such a pleasant thing that is relevant to everyone

It's funny how non-liberal Russia is, although it used to be communist.

Simple interventions can cause powerful results, such as if everyone grew one plant.
Indoor raised beds

Why do we even have lawns? Just grow food! It tastes better, too! If I grow too much food, would I sell the excess? Should I look into canning? Get people to give you cans. Deposit for jar returns included. Where is a great place to get seeds? [Here](#). You can give food to local food banks!

To get people to want to do things, you do it with them. Also, you have to target the youth. Also you make them feel accomplished by showing them exactly how their worth was useful.

Week 7: Course Refinement

MIETL

McMaster Institute for Innovation and Excellence in Teaching and Learning (MIETL)

- Great prof
- More inter-disciplinary learning
- I like guest speakers
 - Well-researched
 - Less “shock-value”
 - Get more; maybe a different one every week
 - However, they should be from a more interdisciplinary approach
 - Preferably more profs from McMaster, especially if you want to do research with them
- I liked the open-ended-ness of the discussions in lectures
 - However, we would prefer more of these
- I like the idea of the life experiment
 - The reflections should be more focused on ways that it would impact our world and less of a narrative perspective
 - “Reflection” is too broad of a term; should be better defined, since everyone has their own interpretation of what they involve and thus their own criteria in terms of what should go into them
 - *Encouraging* different platforms of submitting, such as video blogs or something
 - It was more useful after the TA went over an example of what was expected from the reflection
 - We acknowledge the difficulty in allowing for this, while keeping it open-ended
 - Clarifications of the assignment should be done outside of class in an FAQ or in a tutorial. NOT in lecture
- Using the tutorial as a debate period, instead of a Q&A period
- Tutorials can also be useful for discussions
- Encourage both TA’s to go to both tutorials, since it can be difficult to address all groups in each tutorial, especially because it seems like you get a completely different experience from each one
- Less larger projects because otherwise you don’t take it as seriously. This can be done with a longer due date
- There should be better communication between the professor and the TAs
- People who have questions in class may feel scared to speak up in class could bring up questions on Avenue or on an anonymous online chat

- Little overlap with lectures and projects
 - perhaps a midterm/exam
 - iClickers will force people to pay attention and ensure attendance
- Online lecture on how to do the reflections at the beginning
- ~Unweighted initial reflection (minimal support)
- Streamline Avenue interface
 - No active discussion board
 - Weekly question on the board asked by prof
 - Could it be marked?
- Learning portfolio seems useless right now—should be better integrated in the current assignments
 - Why is it better?
 - No feedback
 - More difficult to upload than a dropbox
 - Could be a webpage or that defines our life experiment
- Little interdisciplinary stuff, since the project is alone (so far)
 - Explaining sustainability from multiple disciplines in lecture
- Textbook has little connection with course

Utopia Assignment

- What types of quotations must we include from “The Politics of the Pantry”?
- You aren’t required to do more research than what is asked, but you certainly may if you want
- March 10th
- See Rubric online

Economic Sustainability

- Going green *can* be economic; “The Greening of Capitalism”
- Isn’t the environment a resource and thus part of our economy (just not our monetary economy)
- Environmental groups are generally **antagonistic** instead of embracing a green economy
 - Seen as a polar opposite to politics, economy, etc.
- Environmentalists are better served by using the powers of the systems to bring about change
- Often, the biggest changes have come from people “voting with their dollar”—voting by buying things that support their values
- Climate change: “the largest market failure ever seen”, since it is a pro-growth method
- Myths: “technology will be cheaper later” and “your newly-established company will be richer”
- “Green” shouldn’t be broken down into each component (air, land, water, etc.)
- If you have a factory with emissions:
 - Don’t:
 - build higher smokestacks
 - include scrubbers
 - etc

- Reduction the emissions to begin with
- Ecological modernization: politicians accommodating radical sustainable demands, while maintaining current lifestyle
 - The solutions tend to be quite meager
- Instead of it being a challenge to a system, it becomes a source of innovation that propels the system
- Anticipating environmental impact should be put in place, instead of simply learning how to cure forest fires
 - e.g. not allowing development in known burn areas
- Carbon Dioxide is seen as an externality, instead of a part of the system
- Examples:
 - BP is Beyond Petroleum?
 - Organic: largest growing aspect of food industry
 - Organic whipping cream?
 - “All natural”
- Ecuador recognizes “rights of ecosystem” in their Constitution
 - they can petition on the behalf of their ecosystems
 - However, the country is a poor, developing country
 - Even though a huge oil location was found in a diverse location, president said the international community must raise \$3.6 billion to cover the cost of such a location or else it will be exploited
 - However, it is seen as blackmail, where people should be paid for things people did, but not what people didn’t do
 - Not enough money was brought in (\$13.3 million)
- Computerized taxi service (computer drivers)
 - register credit card ahead of time
 - calling requires a payment
 - computer optimizes route
 - if something is left behind, it is dumped out
 - how to clean? yuck! nvm

Week 8: Morality and Money

Apocalyptic

Earth needs to be seen as a closed-system, instead of a **frontier economy** (limitless resource).

What can you do with sand? How can sand become a resource?

How are textiles recycled? Can you 3D-sow a shirt, using recycled textiles at home?

Most of costs are externalized or unaccounted for

What is a natural way to deal with Arroyo McMaster?

- Rain Garden

- <http://www.mcmaster.ca/erm/greatidea/index.html>

You need to include the clean-up process in your costs in order to decide which alternative is best

PUMA measures [their externalities](#).

- Improves transparency and forces the companies to evaluate themselves
 - Improving transparency even improves forward directions *within* a given company
 - This could be a disincentive, however, for some companies
- Externalities are difficult to measure precisely
 - How much can you value the extinction of a species?
- Taxing externalities based off a mandated externality evaluation?
 - They could take it the wrong way and simply
- Can shareholders be a great voice against environmental degradation?

Can we use old buildings or other waste (that won't be toxic) to replace coral reefs when they re-build?

[Professor's book/](#)

Home is now looked as an investment, not...a home

- **Imperative discourse**
- changes view of house
- You might not add your own character because it won't be as "sellable"
- You might do a renovation because it'll be *more* sellable

Capitalism alienates each other

- You end the relationship
- You wouldn't bill your daughter
- We should never feel entitled to get something in return

The environment is actually a sensible investment if you look at all the aspects of the story

Al Gore did a great job at connecting to the majority because he took an approach that teaches less technical people how to interpret some of the data in a simple way such that they begin to trust scientists

- He's like a translator
- He demonstrates the concepts in a visual way
- You should be able to communicate like this in your journals
- However, make sure you also spend a significant amount of time focusing on how others can change their own lives
 - "Write to politicians" and be specific

What is an offset credit? Paying someone to increase their wind production or plant trees, etc.

Scares can create industries, such as when recalls of apples due to certain chemicals caused an increase in the organic market

Week 9: Techno-Utopia Recap

- There's a large emphasis on technological solutions
- Can be too expensive for small-scale, which is what happens often in 3rd world
- Damaging effects on soil

Farming is damaging:

- maybe it's always been
- chemicals
- caused a lot of problems (compared to hunting/gathering), like decreased nutrition, but allowed for larger production of food, so people could settle
- don't know how to eat certain crops—need to be sensitive of culture

Vertical Farming

- great example of a technological solution
- indoor farming technique
- allows for control of sun, water, etc.
- avoids insecticides
- reduced land requirement
- skyscraper
- a 30-story tower that provides food for ~10k people
- energy/water consumption?
- green roof?
- how to get light to the middle?
 - different plants require different types of light
 - could you focus on reflecting certain frequencies onto specific plants
 - varied floors
- desalination plant with vertical farm?
- look at Singapore as a model
- make circulating system, where water goes into top pots, making them heavier, so they fall downward
- seed collection
- angle solar panels at different levels?

Cause of Hunger

- typical supermarket throws out 40-50% of produce
- weirdly-shaped foods are also thrown out (another 40-50%)
- cash crops:
 - benefits:
 - simple machinery

- good year is *really* good
 - droughts mean *no* output
- don't even make money on a good year because so much supply
- Best solution is not to recreate the system, but to help them improve the things they are doing well
- how do you transport the product to market?
- how to use less water? how to extract water from air? make clouds?

Progress vs Regress

- Think of excess
- spiritual dimension of nature
- how do you exploit nature without damaging/changing it? is it even possible?
- Techno-utopia is more of an “anti-utopia” because it simply projects current onto future, while calling it new
- you're battling the wrong issue by using technology. instead you need to improve the system
- too many suburbs
- The issue isn't a lack of stuff, but rather a broken system
- 50 years ago vs now: genetic and nutritional change in food; energy requirement change in food
 - Should we grow crops with lower energy input?
- Cheapest food possible is given to people who cannot afford the food
- Most of corn/soy goes towards meat production
- Food is an inelastic commodity, so to make people eat more, they make snack food
- Food shouldn't be a commodity, but it is being “bred” to become a commodity
- Picking food green allows for better transportation, but worse nutrition
- ~25% of products contain corn: can be stored, broken up and put together really well
- most of corn is GMO
- Monsanto's license agreement is against saving seeds, so you need to buy new ones each year
- Some seeds have hybrid genetic resistance to herbicides because then you can put whatever you want. However, it will fail in the next generation
- Patented lifeforms?