GEOG 340: Environmental Geography
Final Exam Study Guide
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Important Exam Information:
Final Exam Date: Tuesday, December 17 th (2:45pm-4:45pm)
Final Exam Points: 100 points (20% of total course grade)
What Does the Midterm Cover?
? All In-Class Lectures, and Discussion Activities (all .ppt slides are posted on BeachBoard)
? All Assigned Readings
? Roughly half of the exam will be pulled from midterm materials and half will be on materials, readings, and concepts covered post midterm (including data collection methods & exercises).
What to Bring?
? You need only to bring a PEN or PENCIL to write with.
? I will provide all the paper necessary for the Final exam, no essay booklets needed
? The Midterm is a closed book exam (no notes allowed, no phones, tablets, or computers)

Final Exam Study Guide:
Real World Themes/Cases

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? Lawns
• Turfgrass lawns are a million dollar business
• Grass is natural, but perfect turfgrass lawns require mechanical equipment and chemicals that are toxic to humans, pets, and ecosystems

• Turf grass was domesticated for livestock grazing, so they do better when clipped frequently (ie. mowed)
• Turf grass seeds were brought to the Americas as part of the Columbian exchange
• The modern lawn emerged after World War II
  – Automobiles contributed to the growth of suburbs, where people have more lawn space
  – Chemical inputs became widely available to the public
@The Chemical Revolution
• Early lawn chemicals were crude and dangerous
• DDT replaced early chemicals – seemed safer (DDT are insectides)
  – DDT was banned in 1972 because it is so toxic for marine and avian species
• Subsequent chemicals are also known to be toxic

for humans and ecosystems
• Nutrients from fertilizers cause eutrophication
    – Algae consume the nutrients and greatly increase in number (algal blooms), leading to deoxygenated water and ecosystem collapse
• Chemical inputs are necessary when lawns are monoculture (a single cultivated species)
    – Agrodiversity can help replenish nutrients or fill in the gaps if one species does not thrive

@The Explosion of Lawns
• Lawns cover a large portion of the U.S. and are increasingly common around the world
    – Lawns are the largest irrigated crop in the U.S.
• Negative impacts:
    – Toxins and costs of chemicals (fertilizer)
    – Demand for fresh water (irrigation)
• Positive impacts:
    – Absorption of carbon dioxide from the atmosphere (carbon sink)
    – Reduced urban heat island effect

@Risk and Chemical Decision-Making
• Why do people continue practices of lawn care that are known to be harmful to human and environmental health?
• If keeping perfect monoculture lawns is known to be a hazard, people must be calculating risks associated with lawn care activities
• Risk perception may be impeded by lack of information or risk perception biases
• A national survey suggests that people who use chemicals are more aware of the dangers than people who do not
    – More information will not change the behavior

@What Influences Lawn Decisions?
• Well-maintained lawns are a sign of status, responsibility, and good citizenship
• People keep good lawns for the social benefits – they do not want to let their neighbors down
– But doesn't using chemicals that are harmful to humans, pets, and the environment hurt neighbors
-Social Pressures

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[?] Hazards & Natural Disasters
@Important Definitions

• Hazard – a thing, a condition, or a process that threatens individuals and society in terms of production (making a living) or reproduction (being alive)
• Risk – the known (or estimated) probability that a hazard-related decision will have a negative consequence
• Vulnerability = the capacity to be harmed, based on exposure to a hazard and sensitivity level
• Adaptation = Actions taken to adjust to risks or hazards to lessen the impact
• Maladaptation = potential for adaptation measures to unexpectedly/inadvertently increase vulnerability
• Adaptive Capacity = the ability of a group to prepare for risks and cope with hazards when they do occur

@Cultural theory of Risk
• Preferred risk management strategies depend on views of the environment
– Mary Douglas's "cultural perspectives of risk"
Approach View of nature

Approach	View of nature	Action
Trial and error	Nature is resilient, disturbances are temporary	Experiment, continue until proven harmful
Precautionary principle	Nature is fragile, disturbances may be permanently damaging	Exercise caution until proven safe

@Role of Uncertainty
• Uncertainty – the degree to which the outcomes of a decision or situation are unknown
• 3 conditions of knowledge:
– Know what you know (known knowns)
– Know what you don't know (known unknowns)
– Don't know what you don't know (unknown unknowns)

How do we make decisions when there is so much uncertainty?

@Unknown Unknowns
• Highly complex behavior of environmental and technological systems
• First encounters with new hazards
• The more we advance technologically, the more uncertain risks become
– Ulrich Beck's theory of the "Risk Society"

@Risk is augmented by a number of factors, including:
• "physical" = living in a hazardous area
• "personal" = your age/gender/education/race influences your risk
• "economic" = poverty reduces your options
• "structural" = poor quality buildings and lifelines
• "political" = limited access to information and/or resources
• "institutional" - your local, state or national government does not enforce regulations

@What does this mean in terms of environmental justice?
- Risk is at the intersection of complex, interrelated social processes
- In order to understand risk and the natural hazards, we also need to understand the social and political systems that govern peoples lives
- Once again, science and the humanities are inextricable

Disasters Through the Lens of Disparities: Elevate Community Resilience as an Essential Public Health Service
-- Maureen Lichtveld (Video of Puerto Rico no water, electricity)

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? E-Waste
@E-Waste
Definition: "End-of-life electronic products including computers, printers, photocopy machines, television sets, mobile phones, and toys, which are made of sophisticated blends of plastics, metals, among other materials"

@E-Waste Disposal
-Lagos, Nigeria, China..

-“Only 25% of all e-waste is accounted for and recycled safely by official means, the remaining 75% is lost in the illegal e-waste stream” (Orlins et al, 71).

@Unsustainable Systems – The Production of E-Waste
Story of Stuff Video Link: https://www.youtube.com/watch?v=sW_7i6T_H78
While watching, look out for the concepts:
• Unsustainable materials economy
• Designed for the Dump
• Externalities
• Planned Obsolescence

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[?] Urbanization & Eco Gentrification
@Urbanization
• Population growth is lower
• Infant mortality is lower
• Education is higher
• Urban penalty – people died faster in cities
• No longer true, but what could cause this to emerge again?
• Water is more accessible
• Sanitation is improved
• More people have access to electricity

@Second nature
• The adaptation of nature to human needs – second nature
• A city – a physical and social mechanism to acquire & deliver ecosystem services to a concentrated human population
• Physical = infrastructure
• Social = markets, government & community organizations
• *Still relies on First Nature*

@Why is urbanization a grand challenge?
• Capital intensive infrastructure needed

• Challenge of building infrastructure after the fact
• Poor cities lack planning and capital; maintenance a challenge
• Institutional and financial barriers
• Growing cities replace one landscape, largely natural in its functions, with one in which humans dominate
• Poor planning – even in richer areas

@Jacob Riis (1849 – 1914)
• Journalist ("Muckraker")
• Social Documentary Photographer
• How the Other Half Lives (1890)

Read up @Richard Hugo &
Philipsburg, MT
Degrees of Gray in Philipsburg (1984)
You might come here Sunday on a whim.
Say your life broke down. The last good kiss
you had was years ago. You walk these streets
laid out by the insane, past hotels
that didn't last, bars that did, the tortured try
of local drivers to accelerate their lives.
Only churches are kept up. The jail
turned 70 this year. The only prisoner
is always in, not knowing what he's done.
The principal supporting business now
is rage. Hatred of the various grays
the mountain sends, hatred of the mill,
The Silver Bill repeal, the best liked girls
who leave each year for Butte. One good
restaurant and bars can't wipe the boredom out.
The 1907 boom, eight going silver mines,
a dance floor built on springs—
all memory resolves itself in gaze,
in panoramic green you know the cattle eat
or two stacks high above the town,
two dead kilns, the huge mill in collapse
for fifty years that won't fall finally down.
Isn't this your life? That ancient kiss
still burning out your eyes? Isn't this defeat
so accurate, the church bell simply seems
a pure announcement: ring and no one
comes?
Don't empty houses ring? Are magnesium
and scorn sufficient to support a town,
not just Philipsburg, but towns
of towering blondes, good jazz and booze

the world will never let you have
until the town you came from dies inside?
Say no to yourself. The old man, twenty
when the jail was built, still laughs
although his lips collapse. Someday soon,
he says, I'll go to sleep and not wake up.
You tell him no. You're talking to yourself.
The car that brought you here still runs.
The money you buy lunch with,
no matter where it's mined, is silver
and the girl who serves your food
is slender and her red hair lights the wall.

@Skid Row, Los Angeles
"Rats are likely contributing to a typhus outbreak on Los Angeles' skid row, experts say, prompting the city and county to take steps to reduce the spread of diseases." - Mark Ralston / AFP - Getty Images file

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[?] Environmental Policy [Environmental Action and Policy]
@Legitimate coercion
• Heart of democracy
• How we manage our resources, manage the commons, and pass laws
• Environmental problems are usually approached through the political system, and this is what is assumed in classical environmentalism

Neoliberalism: A modified form of liberalism tending to favor free-market capitalism.
Fiduciary Duty: an obligation to act in the best interest of another party.
In terms of Capitalism: a corporation's board member has a fiduciary duty to the shareholders
"Despite the fact that almost half of all households owned stock shares either directly or indirectly through mutual funds, trusts, or various pension accounts, the richest 10% of households controlled 84% of the total value of these stocks in 2016."

Citation: Edward N Wolff, "Household Wealth Trends in the United States, 1962 to 2016: Has Middle Class Wealth Recovered?"

This is an environmental geography class, why should we care if capitalism is antidemocratic?
Who gets a say over how we treat the environment?
In a democracy, you should. We all, collectively, have a say.

Who gets a say in how a private enterprise operates?
The bosses, board members, major shareholders.
So, what happens when the interests of private capital dominate political systems?
-Who sets the boundaries of what we get to critique in society?
-What type of critiques get taken seriously? What type of critiques are not allowed?

@Environmental politics
Who makes the laws?
Who is influencing the decision-making?

@Special interest groups
& Balance
• Concentrated or special interests – fewer members, greater ease of communication, direct financial interest in governmental action, focused issue
• Diffuse interests – shared by wide range of citizens, nonfinancial benefits, so less potically attentive

@what's the force that holds powerful interests accountable?
Journalism & Media
"It's not a dishonor to me—I think it's a great honor to me—that I've never been invited to the White House for dinner, and I don't want to go to the correspondents dinner—the Gridiron Club. It's not our job; our job is to be a pain-in-the-ass to these guys." –Seymour Hersh
Why does this matter...

@Dissemination of Information & understanding reality
• What is the reality? What counts as real? What do we focus on?
• The role of science – Objectively attempt to understand and quantify the processes and nature of reality.
• The role of the arts – Subjectively seeks to understand and show us the experience and lived conditions of (a) reality.
• The role of journalism/media – Objectively report the reality of events & subjectively contextualize that reality within a larger framework.
• How are these all working right now who influences each of them?

• Rise of alternative media

@How is mainstream media doing
on environmental issues?
Broadcast TV news coverage of climate change dropped 45% from 2017-2019
.. ..

.. ..

@Fossil fuel spend $3 tril
$500 Billion globally on pre-tax oil subsidies
• Think about externalities
• Very hard to estimate
• Rough idea of how our current system supports
fossil fuel consumption

@What's the state of modern
environmental Politics?
The science is clear; sweeping and drastic
changes need to be made very quickly if we
hope to keep the planet habitable.
So, the question is:
How seriously is the federal government
responding to this crisis?
Is climate change legislation simply a
partisan issue?

@We had 8 years of a democratic
administration though
• Why aren't our climate problems solved
already????
• What is the reality of environmental
politics?(pic)

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🄿 Plastic & Global Pollution
@Environmental Damage
"Micro" Problems:
- Photodegradation: process by which a substance is
broken down by exposure to light.
- Microplastics - piece of plastic between 0.3 and 5
millimeters in diameter.
- Chemical leaching: BPA (bisphenol A) - toxic
- Absorption: PCB (polychlorinated biphenal)
carcinogenic; heavy metals

@The (Marine) Food Web

• Plastic blocks sunlight, killing off plankton and algae
•Fish and sea turtle populations decrease
• Shark, whale, tuna decrease
• Bird populations decrease (seagulls, albatross, eagle)
• Loss of lower levels of the food web impact apex predators
• “When we try to pick out anything by itself, we find it hitched to everything else in the Universe”
• What other impacts can you think of ?
• Does this have to be linear?

@Where is it coming from?
• Point Source Pollution - any discernible, confined and discrete conveyance from which pollutants are or may be discharged (Ex: Pipe dumping oil into a waterway)
• Nonpoint Source - any source of water pollution that does not meet the legal definition of "point source“ (oil runoff from pavement that enters a waterway).
• What difference does it make?

@Where is it coming from?
Largest Ethylene producers :
United States – 31,166.8 Thousand tons
Saudi Arabia – 13,392.2 Thousand tons

@How did we get here
1945 - World War II ends
- 1955 - “Throwaway Living”
- What do we call this?
- Who Benefitted?
- Who Lost?
- 2018 Coca-Cola produces 128 Billion bottles
- Net profit: $8.2 Billion

@Waterway Degradation
• Riparian Corridor – Typically vegetated area of floodplain near a given waterway.
• Turbidity - a measure of the degree to which the water loses its transparency due to the presence of suspended particulates
• Eutrophication - excessive richness of nutrients in a lake or other body of water, frequently due to runoff from the land, which causes a dense growth of plant life and death of animal life from lack of oxygen.

@Pasig River, Philippines
Watershed- the area of land where all of
the water that falls within it and drains
off of it, goes to a common outlet.
1990 - Declared Biologically Dead (no longer able to support aquatic life)

@Thames River, London
- 1957 Declared Biologically Dead
- In 1959, a member of the House of Lords was reported as suggesting that purifying the river was unnecessary. He claimed that “rivers” were "natural channels for the disposal of waste," and that letting them break up organic waste gave them "something to do.”

@Is Plastic All bad?
• Medical uses
• Makes cars and planes lighter (wastes less fuel)
• Makes wind shields safer
• Keeps food fresher for longer (good or bad?)

@How do we go Forward?
• Recycle
• Reduce
• Reuse
• Refuse?
• Scientific solutions
• Societal solutions
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? Agriculture [Lawns]
///?

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? Geoengineering
@Definition: The deliberate large-scale manipulation of
an environmental process that affects the earth's
climate, in an attempt to counteract the effects of
global warming.
– Use technology to manipulate the environment
Environmental Geography Methods

@Cloud Seeding
• A form of weather modification, a way of increasing
precipitation, by dispersing substances into the air that serve
as cloud condensation nuclei
– Idea: More clouds ? More rain
– Usually the substance silver iodide is used
– Regional scale

– Uneven evidence of if/how effective cloud seeding

@Cloud Brightening
• Shoot salt water high into the sky over the oceans, creating clouds that reflect sunlight and thus counter global warming
• Adding particles, in this case sea salt, to the sky over the ocean would form large, long-lived clouds
• Clouds appear when water forms around particles - adding more particles creates more, but smaller, droplets
• A greater number of smaller drops has a greater surface area, so the clouds reflect a greater amount of light back into space

@Solar Radiation Management (SRM)
• Idea – block incoming solar radiation, leading to cooler planet
• Method: Disperse sulfur aerosols into the stratosphere
– Planetary-scale

@Volcano Effect
• When volcanoes erupt, they release particles of dust and ash, sulfur dioxide, and greenhouse gases into the atmosphere
• These particles shade sunlight
  ->temporary cooling
• Sulfur dioxide is much more effective than ash particles at cooling the climate
• Sulfur dioxide moves into the stratosphere and combines with water to form sulfuric acid aerosols
• Sulfuric acid makes a haze of tiny droplets that reflects incoming solar radiation -> cooling

@Carbon Capture & Storage (CCS)
• Capture carbon dioxide (CO_2) emissions and store them so that they are unable to enter the atmosphere
• Possible locations for storing carbon: former gas and oil fields, deep saline formations or depleting oil fields

• Once injected into the rock, the CO 2 will move up through the microscopic pores within the rock where it will become indefinitely trapped within the formation

@Ocean Fertilization
• Iron fertilization is the intentional introduction of iron to the upper ocean to stimulate a phytoplankton bloom
• This is intended to enhance biological productivity, which can benefit the marine food chain in hopes of increasing carbon dioxide removal from the atmosphere

Space Mirrors
• Reflect sunlight back into space -> cooling

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[?] Transects
@Transect
• a straight line or narrow section across the earth's surface, along which observations are made or measurements taken.

@What is the purpose?
• Gather spatially explicit data about a given location
• Measure distance and occurrence of some object or phenomenon
• Understand the presence or distributions of species or the lack thereof
• Assess the condition of a species across space

@Types of transects
• Line transect – single line along which you gather data
• Belt transects – Area between two lines from which you gather data

@Background:
• The central Quad of CSULB is intersected by a number of paved concrete paths.
• These paths are used primarily for pedestrian traffic, though they are accessed by cars & utility vehicles too.
• Between these concrete paths are swaths of grass.

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[?] Quadrats
@Quadrat

• each of a number of small areas of habitat, typically of one square meter, selected at random to act as samples for assessing the local distribution of plants or animals.

@What is the purpose?
• Limit the field of study to a manageable, standardized unit (1m, .5m)
• Gather population estimates for large areas or large populations
• Compare density and frequency of species across space & time
• Estimate the percent of vegetation coverage and assess biomass

@Types of Quadrats
• The size of the quadrat is determined by the object of study
• Quadrats can be adapted to fit the needs of the experiment
• Circular quadrats, triangular quadrats etc.

@CRISIS IN THE QUAD!
• The central Quad of CSULB is being overtaken by 2 species of very fast growing conifers!
• Facilities management has tasked you with estimating the amount of each species present in the field.
• Facilities management also wants to know what relationship conifer establishment has to the percent vegetation coverage of the grass.

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🄀 Document Content Analysis
@What is Document Content Analysis?
• Research method where existing documents and reports are the sources of data
• Gather and evaluate information from documents
• Includes: reports, laws, public policies, government publications, media articles, private papers (ex. journals, letters), emails, meeting minutes
• The research interprets and analyzes the data extracted from the documents

Limitations/ Drawbacks
• Requires a lot of reading (often have to read and re-read a document)
• Some documents may contain bias or untrue information
• Researcher interpretation of qualitative (textual) data is subjective and can be vulnerable to bias
• Difficult to stay organized when many documents are involved

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Articles & Book Chapters Post Midterm:

1. Robbins, Paul. 2007. Lawn People (Chapter 1).
2. Lichtveld, Maureen. 2018. Disasters Through the Lens of Disparities: Elevate Community
Resilience as an Essential Public Health Service
3. Orlins, Sabrina & Guan, Dabo. 2016. China's toxic informal e-waste recycling: Local approaches
to a global environmental problem.
4. Khafagy, Amir. 2018. Gentrifying the Los Angeles River. Jacobin.
5. Wolch, J., Byrne, J., & Newell, J. 2014. Urban Green Space, Public Health, and Environmental
Justice: The Challenge of Making Cities 'Just Green Enough'
6. Parker, Laura. 2018. Planet or Plastic? National Geographic.
7. Green New Deal Resolution. 2019; Alexandria Ocasio-Cortez, Sponsor.
8. The Intergovernmental Panel on Climate Change: Global Warming of 1.5 oC. Executive Summary.
2018.
9. Berry, Wendell. The Unsettling of America: Culture & Agriculture (Chapter 2 & 3)

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Agrodiversity vs. monoculture (in relation to lawns)

Chemical inputs are necessary when lawns are
monoculture (a single cultivated species)
– Agrodiversity can help replenish nutrients or fill in the
gaps if one species does not thrive

Influences on residential lawn care practices (ex. irrigation and chemicals)

•What Influences Lawn Decisions? Well-maintained lawns are a sign of status, responsibility,
and good citizenship
•People keep good lawns for the social benefits – they do not want to let their neighbors down
– But doesn't using chemicals that are harmful to humans, pets, and the environment hurt neighbors?

Risk, Natural Disasters, Vulnerability etc

• Hazard – a thing, a condition, or a process that threatens individuals and society in terms of production (making a living) or reproduction (being alive)
• Risk – the known (or estimated) probability that a hazard-related decision will have a negative consequence
• Vulnerability = the capacity to be harmed, based on exposure to a hazard and sensitivity level
• Adaptation = Actions taken to adjust to risks or hazards to lessen the impact
• Maladaptation= potential for adaptation measures to unexpectedly/inadvertently

increase vulnerability
• Adaptive Capacity = the ability of a group to prepare for risks and cope with hazards when they do occur

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Mitigating Natural Disasters

In order to understand risk and the natural hazards, we also need to understand the social and political systems that govern peoples lives

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Community Resilience & Natural Disasters
(Guess) risk management

The life cycle of electronics & e-waste
Households -> Street Collecters -> e-waste dealers ->dismantlers, raw mats, sorters, OR resellers of 2nd hand boys (some return to the dismanterlers and etc.) -> formal/ imformal recycling facilities -> smelters refinery -> land fill or incineration.

E-waste and injustice
“Only 25% of all e-waste is accounted for and recycled safely by official means, the remaining 75% is lost in the illegal e-waste stream” (Orlins et al, 71)
• Why is it difficult to regulate the informal E-Waste market?
• Why do people choose to work in the dangerous E-Waste informal sector?

E-waste and capitalism
• Why do E-Waste workers not want more regulations?
• What do you think China and other countries should do to improve the working conditions of E-Waste workers? And help make E-Waste less harmful to the environment?

Urbanization and Injustice (Jacob Riis, Richard Hugo, Skid Row)

Urbanization -
• Population growth is lower
• Infant mortality is lower
• Education is higher
• Water is more accessible
• Sanitation is improved
• More people have access to electricity

Urban penalty - people died faster in cities
• No longer true, but what could cause this to emerge again?

Jacob Riis
How the other half lives
Richard Hugo- poem shit
Skid row - “Rats are likely contributing to a typhus outbreak on Los Angeles' skid row, experts say, prompting the city and county to take steps to reduce the spread of diseases.” - Mark Ralston / AFP - Getty Images fil

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Gentrifying the LA River

“Gentrifying the LA River” Article Discussion
1. Is the LA River Revitalization plan “a Trojan horse for gentrification?”
2. Why is the LA River Revitalization an environmental justice issue?
3. Why does Khafagy describe the LA River as a symbol of economic divide and social marginalization?
1. Do you agree/disagree that the river could become an engine of prosperity? An urban oasis?

The conflict between urban greenspace, gentrification, and displacement

When cities and towns are constructed, the natural landscape is dramatically altered:
• Vegetation and soil are replaced with hard, impervious surfaces and buildings
• Buildings and dark pavement materials absorb heat, leading to the Urban Heat Island effect
• Evaporation decreases in urban areas, due to reduced vegetation cover
• Flooding increases, because of changes to urban hydrology from paved surfaces and roof tops
• This leads to the development of unique urban climates that are quite different from those of surrounding natural environments
• Common results: increased air pollution, modified rainfall patterns, and higher air temperatures

Urban Green Commons? Privatization? Egalitarian?

The ecosystem services and benefits provided by greenspace

Is Green Infrastructure a Solution?
• An approach to water management that protects, restores, or mimics the natural water cycle
• Increases water capture and infiltration to recharge groundwater

• Decreases urban heat island by increasing evapotranspiration (vegetation)
• Filters pollution
• Can be applied at multiple scales, from the home/building to the street-level to the neighborhood to the entire city

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Environmental Policy

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Relationship between journalism, media, and environmental action

The role of journalism/media – objectively report the reality of events & subjectively contextualize that reality within a larger framework.

The influence of money in politics (fossil fuel subsidies & campaign contributions)

-Price of the environment for a healthy economy
-$500 Billion globally on pre-tax oil subsidies

Climate change

... (check environmental policy)

History of plastic and throw away living (consumerism)
1945 - World War II ends
1955 - “Throwaway Living”
..
2018 Coca-Cola produces 128 Billion bottles
- Net profit: $8.2 Billion

Plastic & global pollution

Where is it coming from?
Point Source Pollution - conveyance from discrete
discernible, confined and (Ex: Pipe dumping oil into a waterway)
which pollutants are or may be discharged

Nonpoint Source - any source of water pollution that source does not meet the legal definition of "point source" (oil runoff from pavement that enters a waterway).

What difference does it make?

Oceanic garbage patches & marine impacts

No: Solid island of Yes:
trash with some larger objects

Waterway degradation, riparian corridors, and watersheds

• Riparian Corridor - Typically vegetated area of floodplain near a given waterway.
• Turbidity - a measure of the degree to which the water loses its transparency due to the presence of suspended particulates.
• Eutrophication -
excessive richness of nutrients in a lake or other body of water, frequently due to runoff from the land, which causes a dense growth of plant life and death of animal life from lack of oxygen.

Who is responsible for plastic pollution?
“In 2010, half the world’s mismanaged plastic waste
generated by just five Asian countries: China,
Indonesia, the Philippines, Vietnam, and Sri Lanka.”

Largest Ethylene producers: United States – 31,166.8 Thousand tons Saudi Arabia – 13,392.2 Thousand tons
Ethylene - the building block of polyethylene, one of the most widely used plastics.

Relationship between society and agriculture
..

Specialization & social responsibility
..

Geoengineering (broadly)

Definition: The deliberate large-scale manipulation of an environmental process that affects the earth's climate, in an attempt to counteract the effects of global warming.
– Use technology to manipulate the environment
