

### Resource Issues and Sustainable Development

- Resource Depletion
  - Fisheries
  - Forests
  - Coral Reefs
  - Fossil Fuels
- Alternative Energy Sources
  - Solar
  - Nuclear
  - Hydroelectric



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### Resource Issues

- Pollution
  - Global Warming
  - Ozone Depletion



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### Technology, Energy Consumption, and Environmental Impact

**There has been a dramatic increase in:**

- individual energy use over time: 3,000 kcal/person in prehistory - 300,000 kcal/person today
- the power of technology to change the environment: think stone axe versus bulldozer versus atomic bomb.
- The scope and severity of environmental impacts.



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Type of Change	Characteristic	Examples
Systematic	Direct impact on globally functioning system	<ul style="list-style-type: none"> <li>◆ Industrial and land-use emissions of 'greenhouse' gases</li> <li>◆ Industrial and consumer emissions of ozone-depleting gases</li> <li>◆ Land cover changes in albedo</li> </ul>
Cumulative	Impact through worldwide distribution of change	<ul style="list-style-type: none"> <li>◆ Groundwater pollution and depletion</li> <li>◆ Species depletion/genetic alteration (biodiversity loss)</li> </ul>
	Impact through magnitude of change (share of global resource)	<ul style="list-style-type: none"> <li>◆ Deforestation</li> <li>◆ Industrial toxic pollutants</li> <li>◆ Soil depletion on prime agricultural lands</li> </ul> <p>Figure 1.3, Goudie and Viles</p>

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## Fisheries

The world's great marine predators are being wiped out. Populations of marlin, swordfish, tuna, cod, and rays have crashed by more than 90% since the advent of industrial-scale fishing (around 1950). 80% depletion occurred in just the first 15 years of industrial fishing. Moreover, fish are on average roughly 50% of the size they once were.



*Nature*, May 15, 2003

Harpooned swordfish in 1930s averaged 300 lbs. By the mid 1990s they averaged barely 90 lbs. - NYT July 29, 2003

Longline factory processor fishing is main culprit; simple overconsumption.

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## Fisheries

Fish (date)	% Decline
Western Atlantic Bluefin Tuna (2000)	97
Atlantic White Marlin (2000)	94
Atlantic Blue Marlin (2000)	80
Atlantic Bigeye Tuna (1998)	72
North Atlantic Swordfish	64
Large Coastal Sharks	50-80

"Rebuilding North Atlantic Swordfish, a Report for the U.S. Congress and the Administration" 1998, Recreation Fishing Alliance





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## Is Aquaculture the Answer?

- On rise all over the world, 1/4 of all finfish and shellfish consumed worldwide!
- Much of the fish and shrimp you buy today is farmed in shallow bays or in holding tanks.
- There are many environmental and health impacts with this type of agriculture.



Arizona Catfish Farming



Norwegian Salmon Farming

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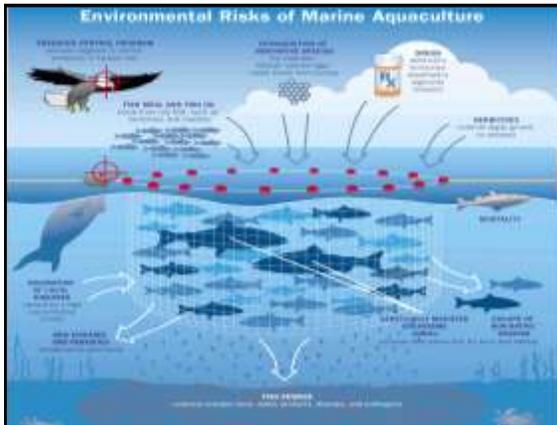
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## You will complete two assignments on Human Impact on Water:

- 1) Read the article "The Copper Mine Ran Through It: Tales of a River's Rescue" and complete questions a-p.
- 2) Complete the National Geographic lesson "Making the Grade: Health Indicators in the Chesapeake Bay Watershed" at this website:  
<http://www.nationalgeographic.com/xpeditions/lessons/14/q912/chesapeakeescience.html>
- 3) Complete the National Geographic lesson "WHAT'S WRONG WITH THE OCEANS? CAN PHOTOGRAPHY HELP?" AT:  
<http://www.nationalgeographic.com/xpeditions/lessons/18/q912/doublewrong.html>
- 4) Complete the National Geographic lesson "Contaminants in the Water Cycle" at:  
<http://www.nationalgeographic.com/xpeditions/lessons/14/q912/tgsouhegan.html>

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### Forests

Region	Thousands of square kilometers		
	Original forest cover	Current frontier & non-frontier forest	Current frontier forest
	Africa	6,799	2,302
Asia	15,132	4,275	844
North America	10,877	8,483	3,737
Central America	1,779	970	172
South America	9,736	6,800	4,439
Europe	4,690	1,521	14
Russia	11,759	8,083	3,448
Oceania	1,431	929	319

World Resources Institute, www.wri.org, 2003

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Agents	Links to Deforestation
slash-and-burn farmers	- clear forest to grow subsistence and cash crops - clear the forest to plant commercial cash crops, sometimes displace slash-and-burn farmers who then move to the forest
commercial farmers	- clear the forest to plant pasture, sometimes displace slash-and-burn farmers who then move to the forest
cattle ranchers	- intensification of herding activities can lead to deforestation
livestock herders	- intensification of herding activities can lead to deforestation
loggers	- remove commercial timber, logging roads provide access to other land users
commercial tree planters	- clear mostly forest fallow or previously logged forests to establish plantations to supply fibre to the pulp and paper industry
firewood collectors	- intensification of firewood collection can lead to deforestation
mining and petroleum industrialists	- roads and seismic lines provide access to other land users, localized deforestation related to their operations
land settlement planners	- relocation of people into forested areas as well as settlement projects displacing local people who then move to the forest
infrastructure developers	- new access for other land users from road and highway construction through forested areas, flooding by hydroelectric dams

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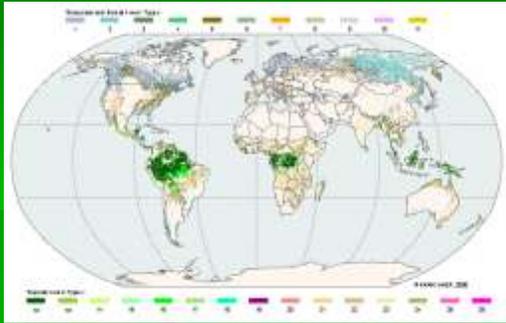
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### Tropical Rainforests: 7 % of land area, 50% of species



UNEP (<http://www.unep-wcmc.org/forest/world.htm>)

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### Tropical rainforest destruction



- Accelerating with population growth and economic development
- How many species (foods, medicines, beautiful spots) have disappeared as a result?



True color satellite images from NASA (<http://visibleearth.nasa.gov>)

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### Why should we care?

- Where did your breakfast originate?
  - 200 food crops derived from 250,000 species of flowering plants; 80% of food supply is from only 20 plants.
  - Many crops (wheat, cotton, tobacco, sugar cane, bananas, potatoes, safflower, corn) are hybrids from wild and domesticated plant species.
  - Many of these crops originate in the tropics, along with:
    - Oranges (SE Asian tropics); coffee (Ethiopian highlands), chocolate (S. American tropics), ...




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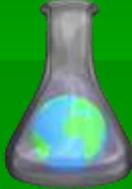
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## Energy Resources

- Non-renewable Energy Sources are natural resources that can replenish themselves with proper management and care.
- Renewable Energy Sources are natural resources that are limited and will run out over time.



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## Energy Resources

- Non-renewable Energy Source
  - Coal, Oil, Natural Gas
  - Nuclear Power/Uranium
- Renewable Energy Sources
  - Hydroelectric
  - Solar
  - Wind
  - Biomass Fuels



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## Nonrenewable Resources

- Some examples of nonrenewable resources are:
  - A. Fossil fuels (coal, oil, natural gas)
  - B. Metals (gold, silver, iron, copper, bauxite)
  - C. Gems (diamonds, rubies, emeralds)
  - D. Minerals

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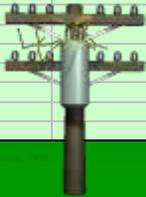
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## California Electricity

Energy Resources	California's 1998 Energy Portfolio
Renewable Resources	11.00%
Biomass and waste	2%
Geothermal	5%
Small Hydroelectric	2%
Solar	<1%
Wind	1%
Coal	20%
Large Hydroelectric	22%
Natural Gas	31%
Nuclear	16%
Other	<1%
Total	100%




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## Fossil Fuels



- **Coal** - most polluting; L.D.C.s
- **Oil** - used extensively in all countries, with the developed world consuming the most
- **Natural Gas** - cleanest of the fossils fuels; developed countries

Average American releases 5 tons of carbon per year into the atmosphere. Average Indian: 1/4 ton

• Natural gas supplies the US with 26% of its energy, 18% for the UK, 4% for India and 3% for Japan  
 • Oil supplies the US with 30% of its energy, 50% for the UK, 10% for Japan, 22% for India and 90% for Nigeria  
 • The former Soviet Union is the largest oil (nearly 12 million barrels per day) and gas producer (25,000 billion cubic feet per year)

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## Fossil Fuels: How much is left?

- **Proven Reserves vs. Potential Reserves**
  - Much thought to lie under South China Sea and in NW China
- **Oil**: at current rates of consumption, petroleum gone in 40 years. Rate of discovery is lower than increasing rate of consumption.
- **Natural Gas**: 80 years; much less if we switch from oil to gas.
- **Coal**: hundreds of years.




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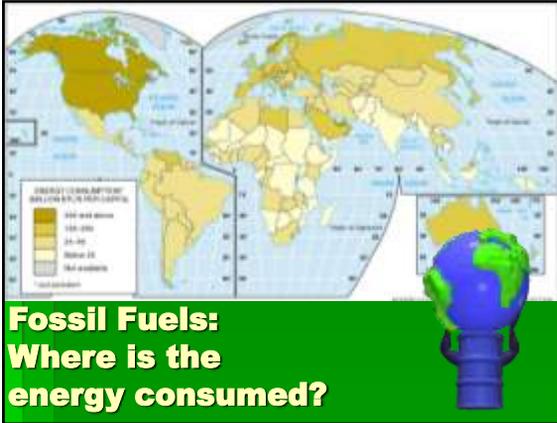
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**Activity #1 on Natural Resources-  
Questions to Consider:**

- 1) What do you consider the single most important natural resource? Why?
- 2) Is your daily life directly affected by the location of this resource? If so, how?
- 3) Do you think the resource has similar significance to others? Why or why not?
- 4) Has the resource always been important to you? Why or why not?
- 5) Is it finite? If so, how will your life be changed if and when it runs out?

Based on the National Geographic Lesson "A Web of Resources" at <http://www.nationalgeographic.com/xpeditions/lessons/1e/g612/web.html>

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**Now, divide into groups of 3-4, consider each statement and write at least one question pertaining to each statement on a large shared sheet of paper.**

- Not all substances can be considered resources.
- Not all resources are natural.
- Human perception of a resource's value changes over time.
- Regions can be created based on the distribution of resources.
- Human settlement is affected by the distribution of resources.
- Resources play a role in a region's industrial development.
- The need or desire for resources has affected people economically, politically, and socially.
- Resources are unevenly distributed throughout the world.
- Nations do not have to be self-sufficient in resources.
- Resources can be misused or overused.

Divide the class into ten groups and distribute the paper and markers. Ask the groups to consider the above statements and write at least one question pertaining to each statement on a large shared sheet of paper.

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## Question Examples:

- Not all substances can be considered resources: To be considered a resource, what characteristics must something possess?
- Not all resources are natural: What is another category of resources?
- Human perception of a resource's value changes over time: Why might human perception of a resource change? Provide an example.

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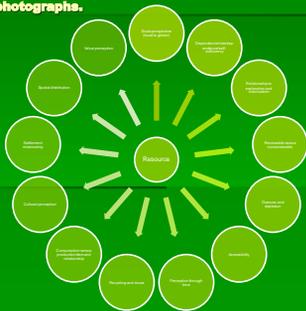
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**Make a Resource Web! You can use PowerPoint! You need a center circle and thirteen surrounding circles. Your group will be given one of the following resources to research: water, soil, forests, cotton, gold, copper, iron, aluminum, coal, and oil. You must complete the Web template below to present to class. For each resource web entry (circle), each group should write a question and an answer. Students may also include maps, drawings, or photographs.**




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## Activity #2: Resource Extraction

- **Opening:** List the types of natural resources that we depend on for our modern American lifestyle. Think of as many examples as you can; some good examples would be oil, aluminum, and coffee.
- **Development:** Have you ever thought about where these materials come from? Have you thought about the people and processes involved in getting these materials to our markets? What types of processes do you think would be used, and what might be some of the impacts of these processes?

\* Based on the National Geographic Lesson: "Natural Resources Extraction" at <http://www.nationalgeographic.com/grades4-5/lesson/16/gd16.html>

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## Activity #2 continued...

- Divide into small groups or pairs. Each group will be assigned one of the following resources: oil, diamonds, aluminum, gold, or coffee. Conduct Internet research to answer as many of the following questions as you can.
    - How is this resource used in the United States, and why do we "need" it?
    - Where does this resource come from?
    - What are the environmental, cultural, and human rights concerns, if any, concerning this resource?
    - What is industry doing to address these concerns?
    - What, if anything, are governments doing to assist the industries and to address these concerns? (Students may or may not be able to find answers to this question.)
  - Students must check the sources of their information very carefully to make sure they understand why opinions differ among the resources they examine.
- Closing/Assessment:**
- Each group will briefly present the results of its research, and discuss the things students have learned from this investigation as posters or multimedia presentations that contain the following sections:
    - How this product is used in the United States
    - The environmental consequences of extracting this product
    - The cultural consequences of extracting this product
    - What the industry says it's doing about the environmental and cultural issues related to its business
    - What students think should be done about issues regarding this resource

Resources: [Natural Resources Defense Council](#)  
[USDA-Natural Resources Conservation Service](#)

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## Activity #3: "GOLD: FROM THE MINE TO YOU"

- Complete the lesson at the National Geographic website:
  - <http://www.nationalgeographic.com/xpeditions/lessons/16/g912/frommine.html>

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## Renewable Energy! What are the benefits? Any drawbacks?

- A. Soil (Arable land is land that can be farmed)
- B. Hydroelectric
- C. Biomass fuels (Plants such as trees or even food crops)
- D. Animals
- E. Solar
- F. Wind

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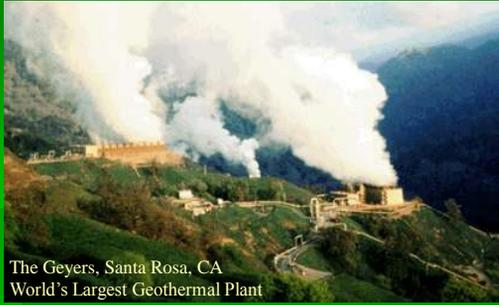
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## California Geothermal (<5%)



The Geysers, Santa Rosa, CA  
World's Largest Geothermal Plant

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## California Wind (1%)

- Works profitably in very windy locations.
- Large and unsightly.
- Requires lots of land.
- Works well in windy deserts where few people live. Texas has huge potential.



Wind Turbines along San Geronio Pass, Interstate 10, Palm Springs, CA

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## California Solar (<1%)

- Passive Solar
- Active Solar - Photovoltaics
- Initially expensive
- Interconnectivity and grid issues
- Huge Untapped Potential
- Federal and State Government incentives come and go.



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## California Nuclear (16%)

- Uranium is a limited, non-renewable resource.
- Nuclear power is inherently dangerous.
- Targets for terrorism.
- Earthquake risks.
- Inevitable radioactive waste.



Diablo Canyon Nuclear Plant, Central Coast

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## California Hydroelectric (24%)

- Clean, renewable energy
- Little growth since nearly all rivers in the MDCs dammed.
- Globally dams are still being constructed aggressively.
- China currently building Three Gorges, the largest dam ever.



Shasta Dam, Lake Shasta, Mt. Shasta

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## Dams and Global River Degradation

Shasta Dam, CA



Aswan Dam, Egypt



Lake Nasser

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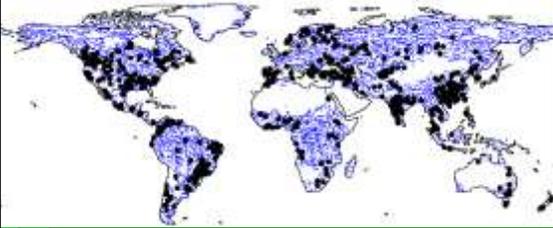
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## The Geography of Large Dams



- Over 39,000 large dams by 1986

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## World Reservoir Inundation



- Area submerged
  - size of France or California

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## Upstream Impact of Dams

- Cultural / social
  - Loss of cultural resources
  - Displacement of families (villages, regions)
  - Water quality hazard
- Economic
  - Shift in land use / economy
  - Water loss via evap.
  - Water loss via seepage
- Aesthetic
  - landscape inundated



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### Upstream Impact of Dams

- Glen Canyon Dam: 1956-1966.
- Aesthetics: Glen Canyon, Colorado



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### Downstream Impacts of Dams

- Altered hydrology - no seasonality
- Altered water quality/character
- Modify nutrient cycling
- Reduce sediment supply
- Channel adjustments
- Habitat modification
- Species impacts
- River fragmentation



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### Three Gorges Dam

- World's largest hydroelectric dam, Three Gorges, Yangtze River.
- 1.2 - 1.9 million will be displaced.
- The entire project is to be completed in 2009.



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### Optional Assignment on rivers and dams:

- Complete the National Geographic lesson "Changing Nature's Course: A Look at the Kissimmee River" at this website:  
<http://www.nationalgeographic.com/xpeditions/lessons/14/q912/kissimmee.html>

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### Global Atmospheric Issues



- The Ozone Hole
- Global Warming

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## The Global Warming Hypothesis

Human-induced rise in CO<sub>2</sub> levels is theorized to lead to unnatural warming of atmosphere.

- Likely effects:
  - Increased storminess
  - Rising sea level (2-7 ft. in 100 years - EPA, 1991)
  - Loss of arable land (some areas hotter, others cooler)
  - Extinction of thousands of species
  - Loss of nearly all coral reef
- Possible effects even include climate "flip-flop" wherein dangerous rapid cooling sets in!

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## The Modern Atmosphere (500 mya to the present)

- Nitrogen, N<sub>2</sub> (78%)
  - Oxygen, O<sub>2</sub> (21%)
  - Argon, Ar (0.9%)
- Trace gases
- water vapor (0-4%)
  - carbon dioxide (.036%), methane (greenhouse gases)
  - nitrogen oxides, sulfur oxides (acid rain and more)
  - many other trace gases
  - particulate (dust)

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## The Importance of Stratospheric Ozone

- Ozone forms naturally in stratosphere
  - light
  - $O_2 \rightarrow 2 O$  then  $O + O_2 \rightarrow O_3$
- UV radiation (sun) --> mutations
  - plankton reduced (food chain base), crops decline
  - weaker immune systems, skin cancer
- Stratospheric ozone (O<sub>3</sub>) absorbs UV rays

UV rays




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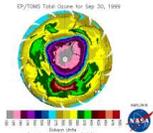
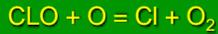
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# The Importance of Stratospheric Ozone

CFC's

- link to ozone hole established in 1970s
- Chloroflourocarbons (refrigerants, aerosols)
- one Cl can decompose more than 100,000 O<sub>3</sub>
- Montreal Protocol, 1987: U.N. agreement on ban
- up to 10 years for rising CFC gases to reach stratosphere; once in the stratosphere, CFC's can last up to 50-100 years




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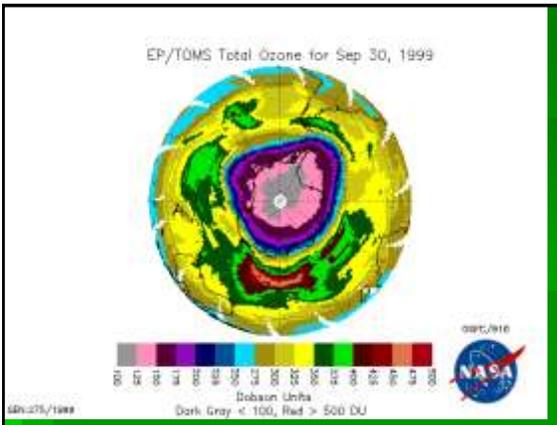
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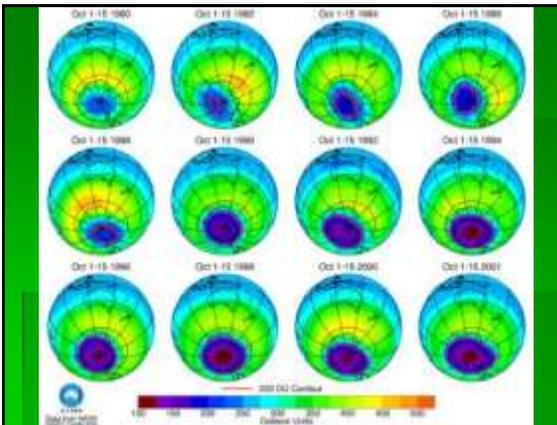
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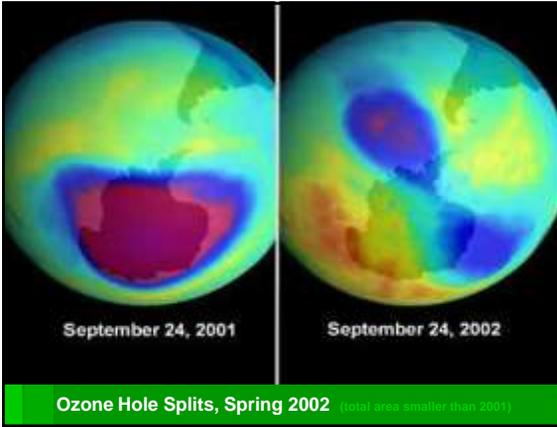
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## GLOBAL WARMING?

Bondi Beach, Sydney Australia, Study Abroad - 01/2001

Franz Joseph Glacier, New Zealand Study Abroad - 01/2001

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## The Greenhouse Effect

A climatic warming effect caused by permitting incoming solar radiation but inhibiting outgoing terrestrial radiation.

Three gases are the primary cause:

- Carbon Dioxide (CO<sub>2</sub>)
- Methane (CH<sub>4</sub>)
- Water Vapor (H<sub>2</sub>O)

The effect is possible because outgoing earth radiation is of much longer wavelengths than incoming insolation.

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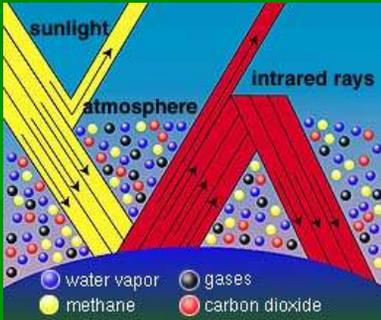
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## The Greenhouse Effect




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## The Greenhouse Effect

- Keeps Earth's average temperature 35°C warmer (15°C now, -20 °C otherwise)



Venus 480°C  
thick carbon dioxide



Mars -62 °C  
little carbon dioxide

- Human role?



'A heated debate'

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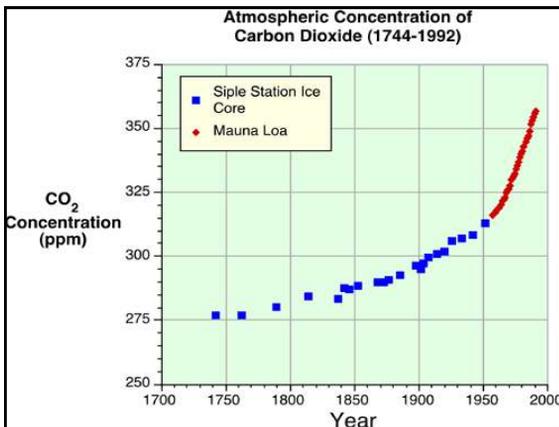
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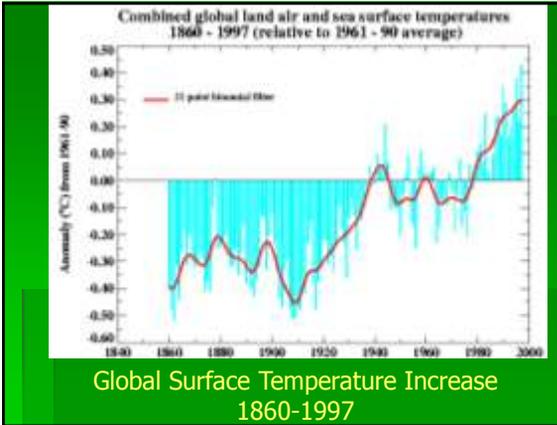
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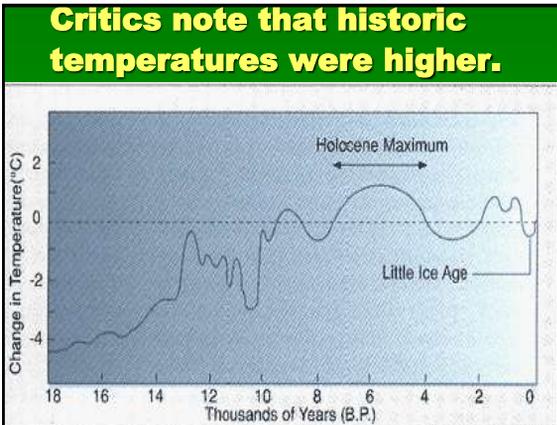
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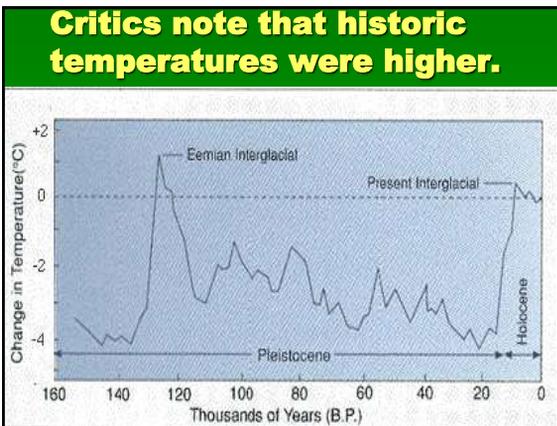
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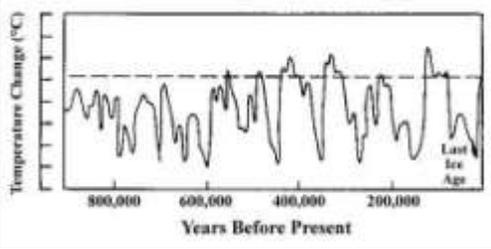
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## Critics note that historic temperatures were higher.



The Pleistocene is the geologic epoch that covers the period from 10,000 to 2 million years ago. The Pleistocene was marked by a series of glacial and interglacial periods.

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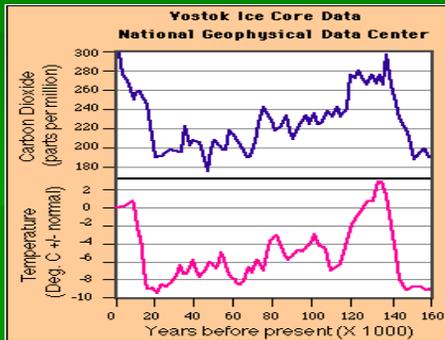
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## Historic correlation between CO<sub>2</sub> and temperature




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## Changes in Solar Radiation

Milankovitch Cycles explain much (60%+) of the changes:



- **21,000 year cycle:** perihelion shifts throughout the year
- **41,000 year cycle:** +/- 1.5° change in Earth's tilt
- **100,000 year cycle:** Orbital eccentricity of the elliptical orbit of the Earth

The most recent ice age lasted 100,000 years. We are currently in an interglacial period (Holocene).

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## So is Global Warming Happening?

"...a wide range of careful studies shows that the changes in global temperature observed during the 20th century, including some patterns of change, were likely to have been significantly greater than those resulting from natural variability alone. The world's best climate scientists agree that the balance of evidence suggests that there is a discernible influence on global temperature. This conclusion is steadily being strengthened." (Engineers for Social Responsibility, 2002)

"We must act to ensure continued economic growth for our citizens and for citizens throughout the world." - George W Bush, June 2001, Explaining his opposition to the 1997 Kyoto Protocol, a document that calls for only 5% reduction of greenhouse gases.

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## So is Global Warming Happening? How much?

"Climate change will bring warm, wet weather, which will encourage plants to grow, followed by long periods of drought, during which they will burn. We can already see this in Florida," - Meinrat Andreae, Max Planck Institute for Chemistry, August 2001.

"One person flying in an airplane for one hour is responsible for the same greenhouse gas emissions as a typical Bangladeshi in a whole year." - Beatrice Schell, European federation for Transport and Environment, November 2001.

GLOBAL average temperatures will likely rise by between 1.4C and 5.8C over the next century, according to the most authoritative report yet produced by the UN Intergovernmental Panel on Climate Change (IPCC). These are massive increases over the .5C rise seen over the last 100 years.

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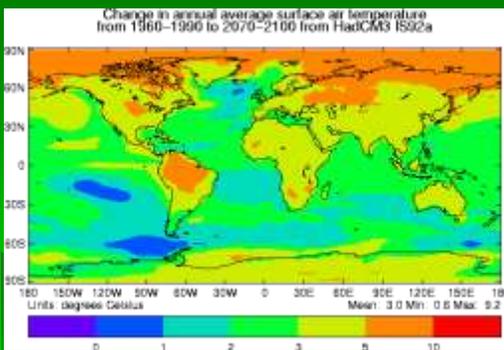
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## Predicted temperature changes: Hadley Centre model



Source: UKMO Hadley Center [<http://www.met-office.gov.uk/research/hadleycentre/>]

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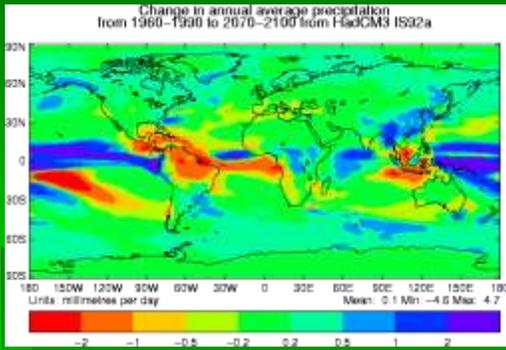
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**Predicted precipitation changes: Hadley Center model**



Source: UKMO Hadley Center [<http://www.met-office.gov.uk/research/hadleycentre/>]

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**Can you design and build your own healthy sustainable city?**

- Here's some city designs and factors to consider before you get started on your project!

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**How would you define Sustainable Development?**

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## What is my ecological footprint?

- Find out how much you impact upon the environment and complete the footprint quiz:

[www.myfootprint.org](http://www.myfootprint.org)

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## Which quote best describes sustainable development and why? Put the statements in order of preference

1. "The earth provides enough to satisfy everyone's needs, but not for everyone's greed." **Mahatma Gandhi**
2. "The Earth belongs to everyone, not part of it to certain people but all of it to everyone, to be enjoyed and cared for." **Michael Foreham**
3. "The interconnectedness of life is both a blessing and a curse; possibilities are boundless and consequences endless. Every value judgement we make ripples into a life somewhere." **Paula Owens**

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### Subtitle: Sustainability



Human needs

balance

Environmental needs

**Sustainability** is the best possible balance between human and natural needs. For now and the future.

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## Concepts of Sustainable Development

- Understanding how people, the environment & the economy are linked at all levels
- Recognising the importance of taking individual responsibility to ensure the world is a better place
- Understand our basic needs & the needs of future generations
- Respect & value human diversity
- Understand that resources are finite and that this has implications for people's lifestyles

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## How to be Sustainable

- How could you make your home more sustainable?
- How could you make the school more sustainable?
- How could you make Sheffield more sustainable?

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## Ideas for Sustainability

1. **Home**
  - Save resources e.g. paper, electricity, water
  - Reduce waste
  - Reuse & recycle materials
2. **School**
  - Promote healthy eating
  - Use resources with less packaging
  - Travel to school on foot or bike
  - Improve the school's open spaces
3. **Sheffield**
  - Make Fair Trade products available
  - Cycle lanes
  - Improve the bus services
  - Regular recycling collections for various materials

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### A sustainable city?

Smoke free factory

Lots of housing

Place of worship

Grass and open space

Modern workplace with lots of jobs

Wind mill for environmentally friendly energy

Solar power for environmentally friendly energy

Bikes instead of cars

Image that showed a sketch of a 'sustainable city' has been removed for copyright reasons. See the original at <http://www.tec.org/REP/Programs/SustainableCities/>

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## Sustainable Development

- Your first task is to design a house for sustainable living
- You need to think about the following:
  1. Saving water
  2. Saving energy
  3. Recycling waste material
- You need to produce a sketch of your house design with detailed annotations of the sustainable features
- You also need to include a description of your house with explanations as to why it is sustainable

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## Level Descriptors Sustainable House Design

**Level 3**

- Know the concept of sustainable development and recognise features which make a place sustainable

**Level 4**

- Know and understand the concept of sustainability. Utilises skills to act upon this understanding and incorporate sustainable features into a home

**Level 5**

- Know and understand the key concepts of sustainability and recognise that people, the environment and the economy are linked at all levels from local to global. Utilises skills effectively to act upon their understanding and produce a sustainable home

**Level 6**

- Have sound knowledge of sustainability and can apply the concept to lifestyles in the UK. Understand the social, economic and environmental impacts of sustainable development. Includes geographical terminology. Has an understanding of people's basic needs and the implications for the needs of future generations

**Level 7**

- Pupils have excellent knowledge of sustainable development and can apply the concept confidently to UK living. Uses geographical terminology in their work. Explores the values and attitudes of different groups of people and how sustainable development may affect them. They understand that resources are finite and this has implications for the future

**Level 8**

- Pupils make excellent decisions with reference to their sustainable home. Use geographical terms throughout. Explores the values and attitudes of different groups of people and suggests how the development may affect them. Pupils refer to the global consequences of their development. Evaluate the feasibility of their work. Think about how their development project may impact on other countries and what the global consequences will be

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## Now, design and build a city!

- Following are some classical designs of cities to give you some inspiration...

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### Europe versus U.S. Cities: Sprawl



European cities, including this hypothetical U.K. example, tend to restrict suburban development, thereby concentrating new development in and around existing concentrations. This leaves large rings of open space, so-called greenbelts.

What are the social costs of sprawl?

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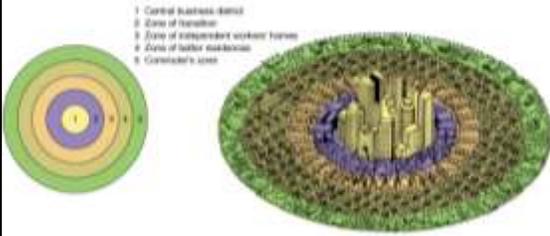
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### Modeling Cities: concentric zone model



- 1 CBD - businesses, highest land value
- 2 Transition Zone - poorest people, blue collar used to live here
- 3 Independent Workers - apartments, blue collar workers (walk to work)
- 4 White Collar Homes - horse and buggy, streetcars
- 5 Commuters - no daily contact (lettuce farmers); later trains allow many

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- high/multi-storey buildings.
- expensive land values
- shops are department stores (comparison shops) or specialist shops, like jewellers
- bus and railway stations (transport centres)
- The CBD is easily identified by the following features:**
- cultural/historical buildings, museums and castles
- Most accessible, major transport links
- Few people live there.
- multi-storey car parks
- offices, finance, banks, administration, town hall (business sector)

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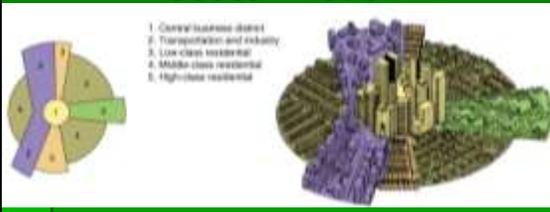
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### Modeling Cities: sector model



1. Central business district
2. Transportation and mobility
3. Low class residential
4. Middle class residential
5. High class residential

Stresses the importance of transportation corridors. Sees growth of various urban activities as expanding along roads, rivers, or train routes.

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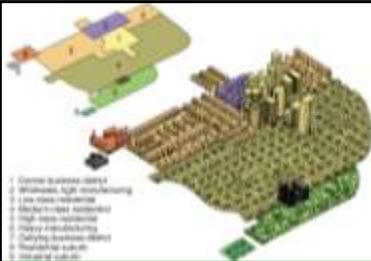
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\* The reality is that none of these models, created between the World Wars, adequately describes U.S. cities. Taken together, though, they are useful.

Stresses the importance of multiple nodes of activity, not a single CBD. Ports, airports, universities attract certain uses while repelling others.

### Modeling Cities: multiple-nuclei

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## Changes in Cities in the U.S.

U.S. population has been moving out of the city centers to the suburbs: suburbanization and counterurbanization

### Developed Countries:

#### suburbanization

- wealthy move to suburbs
- automobiles and roads; 'American Dream'
- better services

#### counterurbanization

- idyllic settings
- cost of land for retirement
- slow pace, yet high tech connections to services and markets



U.S. intraregional migration during 1990s.

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## Reasons for Suburban Growth

- 1. Better public transport and increased car ownership meant people could separate work from where they live.
- 2. Building societies provided mortgages making it easier to buy homes
- 3. People were better off and looking for a better living environment.

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## For more on Urban Sprawl and Suburbanization...

- Complete the National Geographic lesson "Sprawl: The National and Local Situation" at the website <http://www.nationalgeographic.com/xpeditors/lessons/12/g912/sprawlnational.html>

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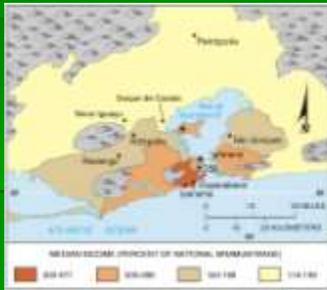
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## Changes in Cities in LDCs

Populations of cities in the less developed world have been **surging**: urbanization, migration, natural increase

### Urbanization in LDCs:

- driven by changes in economy
- the poor live in the suburbs, rich live in CBD
- cities struggle to provide jobs and housing
- services overtaxed
- squatter settlements common
- crime on the rise



Rio De Janeiro, Brazil

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## Introductory Activities: Build a Sustainable City

- Directions: Complete the following in order:
  - 1) Read the article “Urbanization and Global Change.”
  - 2) National Geographic’s lesson “Planning for a City’s Future” at this website:  
<http://www.nationalgeographic.com/xpeditions/lessons/18/q912/planning.html>
  - 3) Complete the worksheet “Urban Geography.” This is an interactive online webquest. Go to the following website to get started:  
[http://www.mrdgeography.com/Urban%20Geo/Urban\\_Geo.swf](http://www.mrdgeography.com/Urban%20Geo/Urban_Geo.swf)

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## Plan and Design a “Healthy” City in Colorado: Urban Planning and Sustainable Development Webquest

- **I. Introduction:** To prepare for building your city, you are first responsible for researching issues relating to urban planning and sustainable development. The purpose of this webquest is to collect information on the issues, meet with your group, and decide how you will build your city based on your research, previous classwork on urbanization and sustainable development, and your own creative minds.
- Today in class (and finishing up tonight for homework) you must collect information on the AT LEAST the following issues relating to development:
  - Water
  - Energy
  - land use
  - waste
  - transportation
- As you conduct your research, you are free to collect information on any other topics that you feel will be relevant to your city-building experience.
- **II. Task Overview:** For each of the issues stated above, you are to answer the following questions. It is important that you take notes in as much detail as possible as you will need to incorporate this information into a final written report on your project. Please write down any websites from which you take information, as you will need to cite them in your final report.
- PLEASE COMPLETE ALL OF THE QUESTIONS AS DIRECTED ON THE WORKSHEET

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**Final Project!****DESIGN YOUR OWN SUSTAINABLE CITY!**

**DIRECTIONS:** Based on the research that your group collected during the week, design and build your own sustainable city, using Google Sketch Up. Google Sketch Up can be downloaded for free at <http://sketchup.google.com>. Once installed, you can create a 3D scene using your city's exact location from Google Earth and place your city on top of it. This file size type is a 2-d page accompanying report (2-2 pages) that double-spaced, one inch margin)

**Requirements for your Google Sketch Up Design:**

- 1) **Location:** Identify the absolute location of your city in Colorado, using lines of longitude and latitude from Google Earth. Explain the advantages/disadvantages of making this location. Depict Google Earth landscape to be placed underneath your city. 10 points
- 2) **Infrastructure:** Label clearly major human and physical features of the city and surrounding area. Divide our city into districts, such as the downtown district, residential district, suburban district and agricultural district. 10 points
  - a. **Infrastructure:** so to make your city spatially accurate in terms of the location of major political and social features.
  - b. **Infrastructure:** Identify the surrounding physical features or topography (i.e. mountains, rivers, geothermal springs, etc.). You should label several physical features of your Colorado location in your Google Sketch Up design.
- 3) **Sustainability:** Show human interaction with the environment by depicting land use/cover data, as a product of population. Explain how these interactions might impact the environment and what you will do to solve pollution problems. **Minimum:** Create to include 10 points
  - a. **Water management and disposal.**
  - b. **Energy use**
  - c. **Waste use**
  - d. **Transportation**
  - e. **Land use**
  - f. **You should also consider population growth and its effect on the environment. How do you limit the size of your city?**
- 4) **Sustainability:** Demonstrate and explain how your city will generate "GDP" you may use tourism or other types of businesses to boost the economic prosperity of your city." 10 points
- 5) **Sustainability:** Your response to the above human questions listed in requirements will also should be explained in a 2-2 page report. Make sure to make reference in your report to specific items on your city design or model. 10 points
- 6) **Sustainability:** Present your Google Sketch Up design and your report in front of the class! 10 points

**DUE DATE:**

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