

Before the Flood - movie notes

2016 documentary - featuring Leonardo DiCaprio (who is one of the producers).
Leonardo DiCaprio named by United Nations - Messenger of Peace for Climate Change - 2014

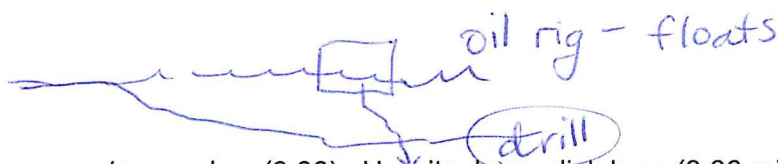
Background

\$\$ - Most of USA economy is based on fossil fuels

- Oil → supports powers most of transportation sector → *planes, trains, cars*
- Coal / Natural Gas → powers most electricity → *Canada has hydroelectric + nuclear*
- Now, as we run out of fossil fuels, we are mining riskier sources
 - mountaintop removal (coal), *taken completely off*
 - fracking (n.gas), Click here (2 min. video) and facts about click here (Ted Ed - 6 min)

Draw a diagram.

- offshore drilling (oil), Click here (2 min) and here (3 min) risks click here (6 min)

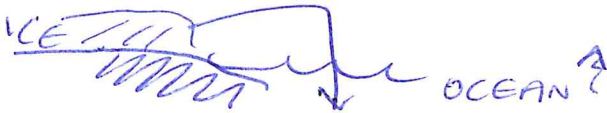


** If you drill, you will eventually spill.*

- tar sands (9:00) How its done click here (3:30 min)
** negative impacts of wildlife, native communities, landscape

Climate Change

- Burning fossil fuels releases carbon dioxide (CO₂)
- Ice caps melt → seas rise

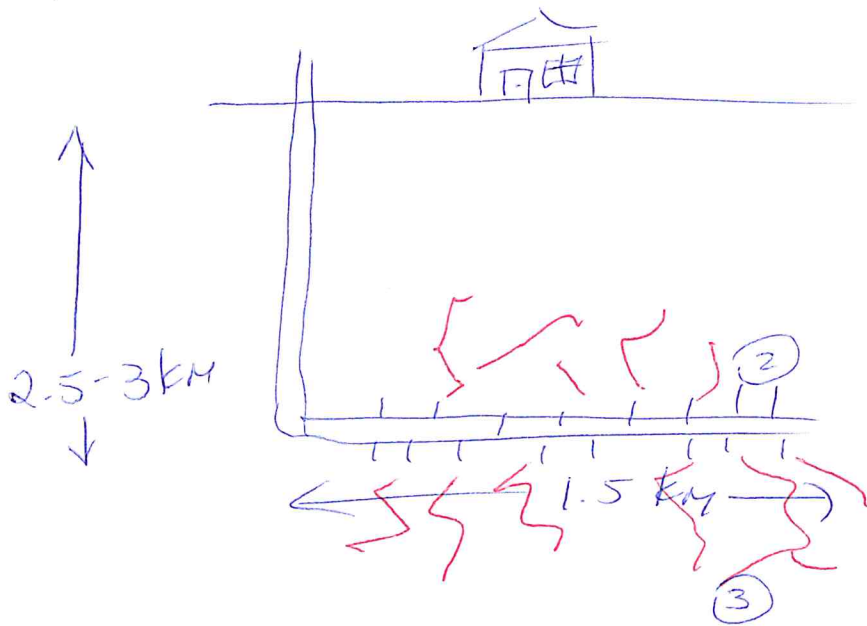


- more extreme weather (droughts, wildfires, floods, heatwaves, strong hurricanes)
- (13:51) → Baffin Island - suggest no sea ice by 2040 in Arctic. Ice caps is like the world's air conditioning.
- (16:53) - Clinton - why people don't believe - takes a long time for climate to change
 - abstract idea
- Greenland - climatologist - 30 feet ice depth melted in 5 years
- Rising sea levels will affect Florida - parts underwater during high tide.

Push Back

- Governor of Florida- banned the use of the words 'climate change'.

Fracking = hydraulic fracturing
(water)



- ① drill 4-4.5 km
- ② Puncture small holes in earth
- ③ Pump in water under high pressure

This causes fracturing of rock

Risks - toxins in drinking water
- earthquakes

④ Little bits of oil + natural gas are freed from rock + are carried with water to surface.

Tar Sands = Oil sands

- large deposit in Northern Alberta

- oil + sand mixture. Thick
heat it up with water to pull
out oil.

risks/negatives → produces CO_2 to mine
→ waste water is toxic
→ land damaged +
ecosystems destroyed.

Carbon Cycle

- there is a finite amount of carbon in our world.



* atmospheric CO₂ causes global warming

Carbon sinks → remove atmospheric CO₂

*

↳ oceans + forests large + remove a lot of CO₂

↳ need to protect



CO₂

- Current senator of Florida - Rubio says, "Ocean is neither republican or democrat - it just rises".
- Trump - "It's supposed to be 70 degrees today and its freezing. Speaking of global warming, where is it? We need some global warming!" (23:00)

Denier = *Someone who denies that climate change is real.*

- Dr. Michael E. Mann - Prof. Atmospheric Science - Penn State U.
Published a paper on climate change in 2001. Ended up earning Nobel Prize with Al Gore (2007)

97% climate scientists agree with climate change & link to burning fossil fuels

But fighting **misinformation campaign.**

- Mann has been attacked by congressmen - received death threats
- Those opposed to climate change only need to sow doubt (burden of truth)
- **Koch brothers** - own one of largest privately owned fossil fuel businesses in the world. *Don't want to believe. Deny. To believe would cost \$*

→ support a think tank that disputes climate change → Americans for Prosperity
Koch brothers are protecting their wealth

→ Also lobbying politicians James Inhofe - chair on senate environment committee (denier) (25:56)

"Climate change is the greatest hoax perpetrated on the American people.....There are some people that are so arrogant to think that they are so powerful that they can change the climate. Man can't change the climate." Receives 1.8 million \$\$ from fossil fuels.

Give \$ to support

There are fossil fuels denier politicians that block any climate change bills (laws)

China - now #1 polluter (29:00)

Massive industrialization

"Made in china"

- Beijing area - same coal consumption as United States
- Citizens concerned about health (school closures due to air quality - wearing masks).
Air hurts your throat - see smog
- People pushed for change because their everyday life is affected - rallies and mass demonstrations - empower people with information about factories violating their emission quotas. → caused government's focus. Now prioritizing wind / solar
- "If China can do this, I think the rest of the world can." (33:00)
- Still heavily use fossil fuels but seem to be changing.

India - World's 3rd largest emitter of pollution

- Sunita Narain - centre for science and environment - Delhi
- 300 million without power (entire population of USA)
 - Many use cow dung cakes for energy

- 30% of households do not have access to electricity. Needs to be affordable. India has lots of coal and it is cheap. *Poor of country don't have electricity*
- "Why do they [India] have to make the mistakes the Americans made."
Well, if it's so easy why doesn't the States do it.
"What is the US doing that the rest of the world can learn from? You are a fossil-addicted country." (US is biggest emitter of greenhouse gases)

Example of climate change: ½ year's rainfall in 5 hours. Destroyed crops.

"Need countries to believe climate change is real and urgent. It is not a figment of imagination. (39:00)

- Over 1 billion people in world without electricity.

Small Island Nations- south Pacific Ocean

Kiribati (Pacific Ocean Islands) - islands will be underwater. Bought a piece of land in Fiji and people are encouraged to migrate.

Palau (Pacific Ocean Islands) - island nations will feel the worst of it. They are not the cause.

Oceans

Jeremy Jackson (marine ecologist)

- 1 billion people depend on fish from coral reefs for their fish / protein - *their food*
- Reefs are dying → will cause starvation
- 50% of all coral has been lost in past 30 years (45:00)
- Oceans absorb CO₂ - stabilize climate but it can't keep up with CO₂ emissions.

Lindsey Allen (executive director of Rainforest Action Network) (46:00)

- Forests absorb CO₂ as well. - we release when we burn ⇒ *forests are a huge carbon sink.*

Indonesia (46:30) Farwiza Farhan Chairperson Yayasan Haka

- 3 big tropical forests left - Amazon, Congo Basin, Indonesia rainforest
- Fires intentionally set to grow palm oil plantations (cheap) to go into our processed foods. Cheapest vegetable oil there is. (in cosmetics, processed foods, cooking oils, detergents etc.)
- Palm oil makes huge profits. Burning down rainforest for this.
**double hit - reduce trees (which take CO₂ out of atmosphere and burn trees which releases CO₂). Palm oil plantations have taken over 80% forests of Indonesia.
"Indonesia is one of the most corrupt countries in the world. Companies bribe government officials to issue a permit for them to start burning the land."
"2015 fires emitted more carbon daily than entire U.S. economy."

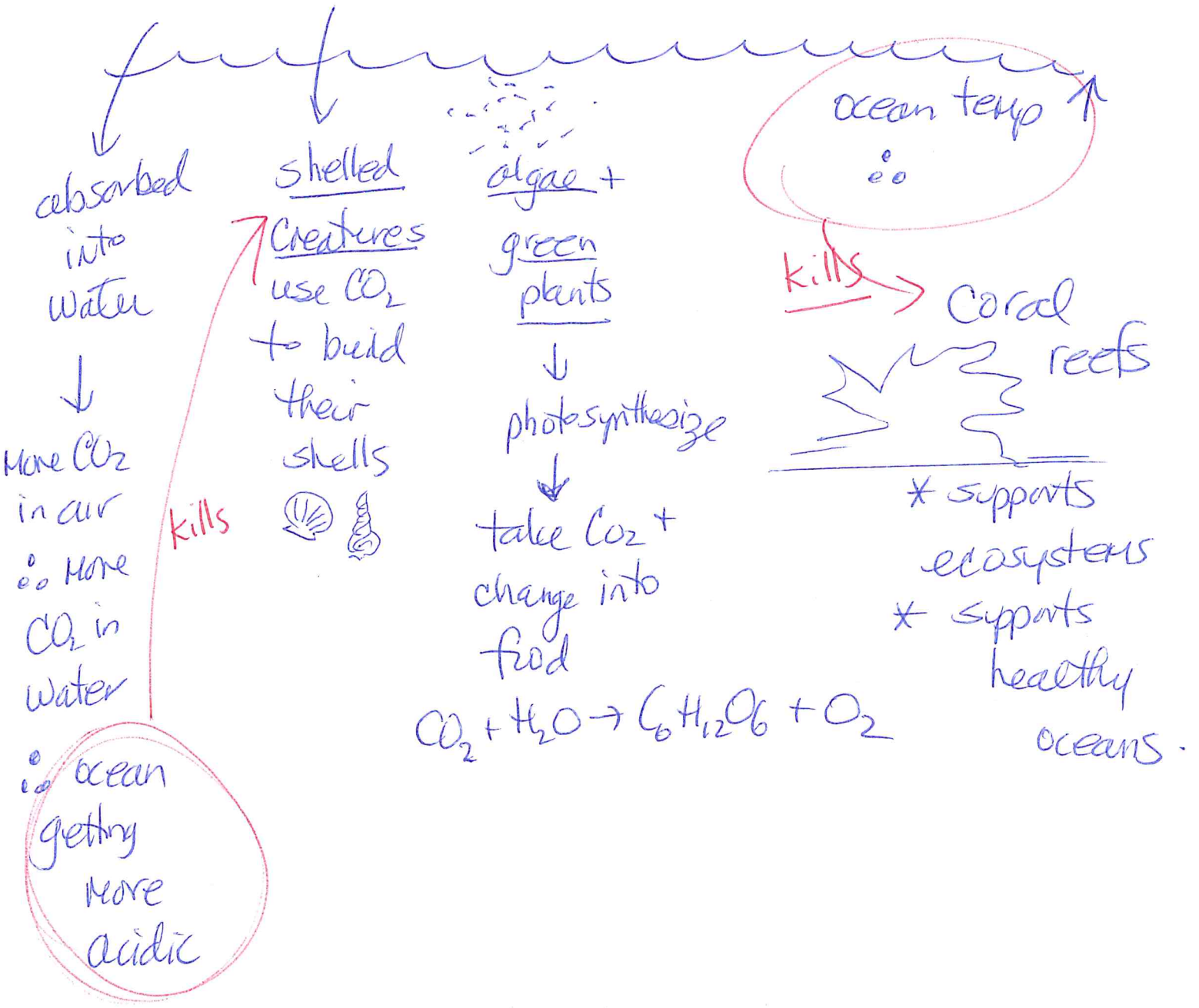
The reason people are chopping down the forest to plant palm oil trees is because people keep buying the stuff. People have to realize that what they do in the

CO₂ + Oceans

Oceans = "Carbon sink"

ie: takes CO₂ out of atmosphere.

CO₂ CO₂ CO₂ CO₂



supermarket and the decisions they make in their daily lives are affecting the world's ecosystem. (50:35).

What can I do? (51:14)

- Change your diet. Gidon Eshel, research professor, environmental physics, Bard College
- Beef farms one of big reasons for taking down tropical forests
47% of USA land = food production
1% of that is for fruit, vegetables, nuts

70% of that is for cattle feed → cows produce methane (CH₄ = 23 CO₂)
Suggests that 10-12% of US carbon emissions due to production of beef

Eating poultry means less land needed for feed and less CO₂

Eating vegetarian even less

Energy - powering our electrical grid and cars

- fossil fuel industry has the most money of any sector

Elon Musk - CEO SpaceX and Tesla https://www.tesla.com/en_CA/gigafactory

- Gigafactory - large solar construction in Nevada, USA
- Power remote places without long transmission wires
- 100 Gigafactories could power the whole world. 1 Gigafactory when complete will have largest footprint of any building in the world (15 million sq. feet)
- Need large corporations to build these too and governments can make laws/rules to favour sustainable energy.

"Unless there is a price put on carbon (Musk), we will never be able to make the transition we need (DiCaprio)." "And the only way to do that is with a carbon tax (Musk)."

Ontario Premier Ford - cancelled Ontario's carbon tax laws

<https://www.theguardian.com/world/2018/jul/03/doug-ford-scrap-carbon-tax-plan-and-sets-up-climate-fight-with-trudeau>

Gregory Mankiw - professor of Economics, Harvard University

Carbon tax - is a tax on any kind of industry that puts carbon into the atmosphere. This will raise the price of these products which means people will buy/consume less of them.

Be socially aware is hard for people to do.

Increasing tax helped people buy less cigarettes.

Opinion → In order for government to change laws about fossil fuels, people need to want it. Polls tell politicians what people want and which issues to support in order to keep them in power.

ie: Obama campaigned against gay marriage but changed his mind in office when it was clear that a majority of American people were supportive of gay marriage.

Politicians are elected to do the people's will.

Voters can effect change!

Paris Climate Summit (2015) → 195 countries

→ goal to keep global warming below 2°F, specifically to keep to 1.5°F

→ no enforcements - just trust

Real Concerns

-climate refugees = large numbers of people moving due to climate changes

- riots over access to fresh water (wars eventually?) [Click here](#) for article about Mexican water riots

Johan Rockstrom - professor Environmental Science, Stockholm University

Predicts 4°F warmer by end of century. We are approaching 1°F

2°F . coral reefs collapse. 3°F makes areas uninhabitable 4°F cannot feed humanity.

Tipping points → Can't reverse. (Negative) Feedback loops kick in.

For example - Greenland's ice is changing from white (reflect heat away from earth) to dark (absorb heat). More heat absorbed = darker ice/water = more heat absorbed etc. etc.

Negative Feedback Loops:

Denmark - produces 100% of its energy needs by wind some days.

Sweden - uprising from citizens so that the president announced (2015) they are going to be the first fossil-free nation.

Influential People

Barack Obama (1:12:14)

- Paris Agreement lays out steps all countries need to do.
- Targets are not good enough but Obama hopeful about future
- Obama **most concerned about climate refugees in the future** - security issues as large numbers of people move & riot
- **Suggests we keep pushing for positive change and keep educating people (voters) to solve problem.**

Dr. Piers Sellers, Astronaut, Nasa (1:17:00)

- Fragile film of atmosphere around our earth.
- Hopeful that humans can affect positive change. Believes once people fully understand, they will do what is needed.

Pope Francis

Vatican - Encyclical Letter on the environment

"It is going to ruin. And that will harm everyone." "Our common home has fallen into serious disrepair."

Calls for immediate action to stop global warming

What we can control - Leonardo DiCaprio (1:27:00)


- **What we consume (buy, eat, get power)**
Avoid palm oil Eat less beef Eat a little more vegetarian
- **How we get involved**
Are there any interest groups you can join?
- **How we use our vote to tell our leaders about what we know about climate change.**
Issues of importance: end fossil fuel subsidies, invest in renewables, leave fossil fuels in ground, support a carbon tax.

It's Up to All of us.

• Carpool • walk/ride bike • plant trees
• Keep house a little cooler (winter) or little warmer (summer)

→ Understand how these habits produce less fossil fuels.

Earth's Spheres & Climate

Atmosphere = gases around Earth  thin layer
↳ too much Greenhouse Gas (CO_2 etc.) warms Earth

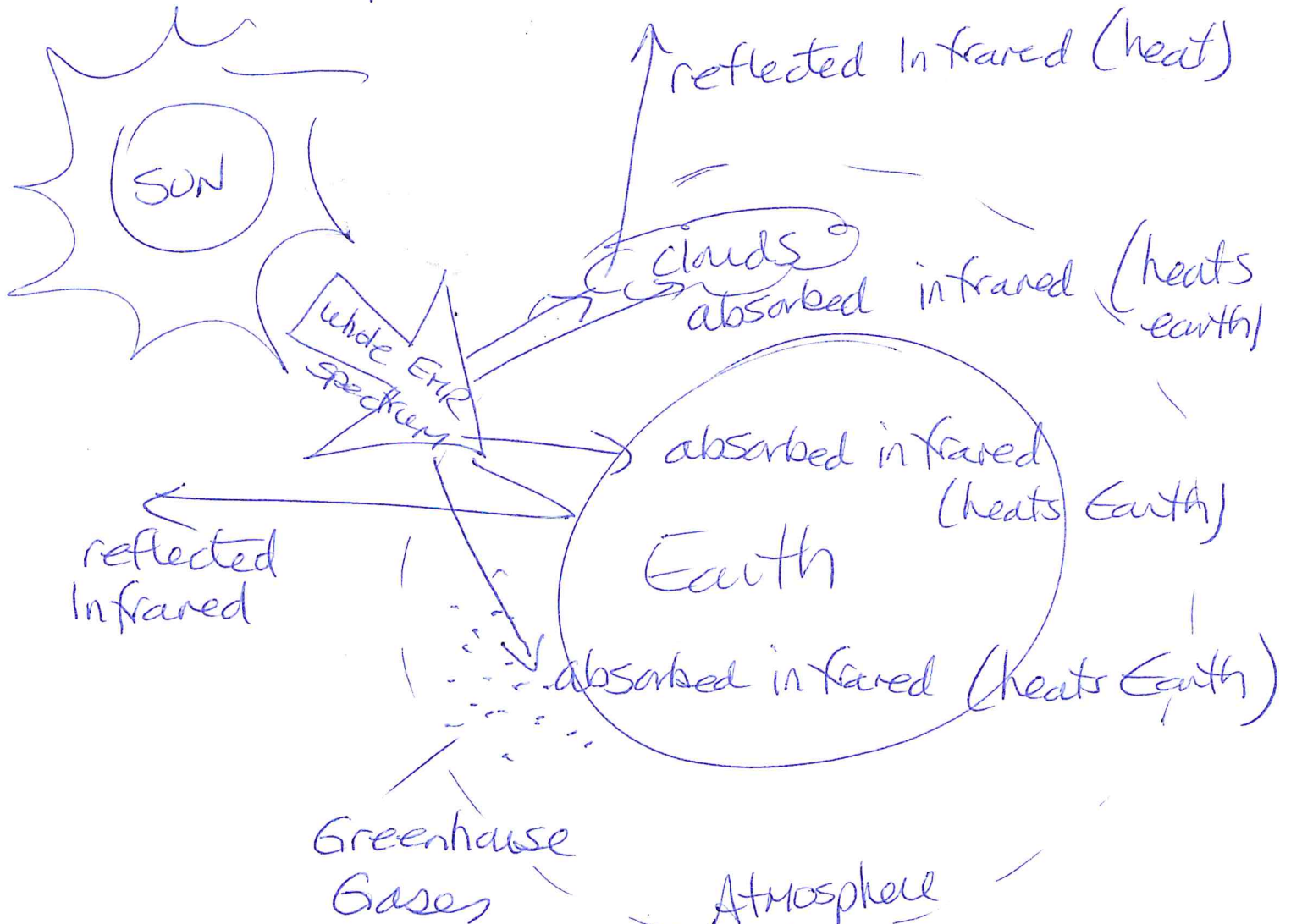
Hydrosphere = liquids on Earth \Rightarrow oceans + fresh water
↳ oceans are a huge carbon sink 😊
↓
 CO_2 taken out of atmosphere — shelled creatures
green plants

Lithosphere = rocky, solid parts of Earth
↳ we mine them and then burn them $\rightarrow \text{CO}_2$ in air

Biosphere = living parts of Earth
↳ forests are a carbon sink 😊
↳ CO_2 (air) \rightarrow sugar (food) *photosynthesis
↳ green plants in ocean also photosynthesize

Earth's Energy Balance/Budget

infrared = heat



Atmosphere

↳ blocks

gamma + X-rays
from reaching
Earth.

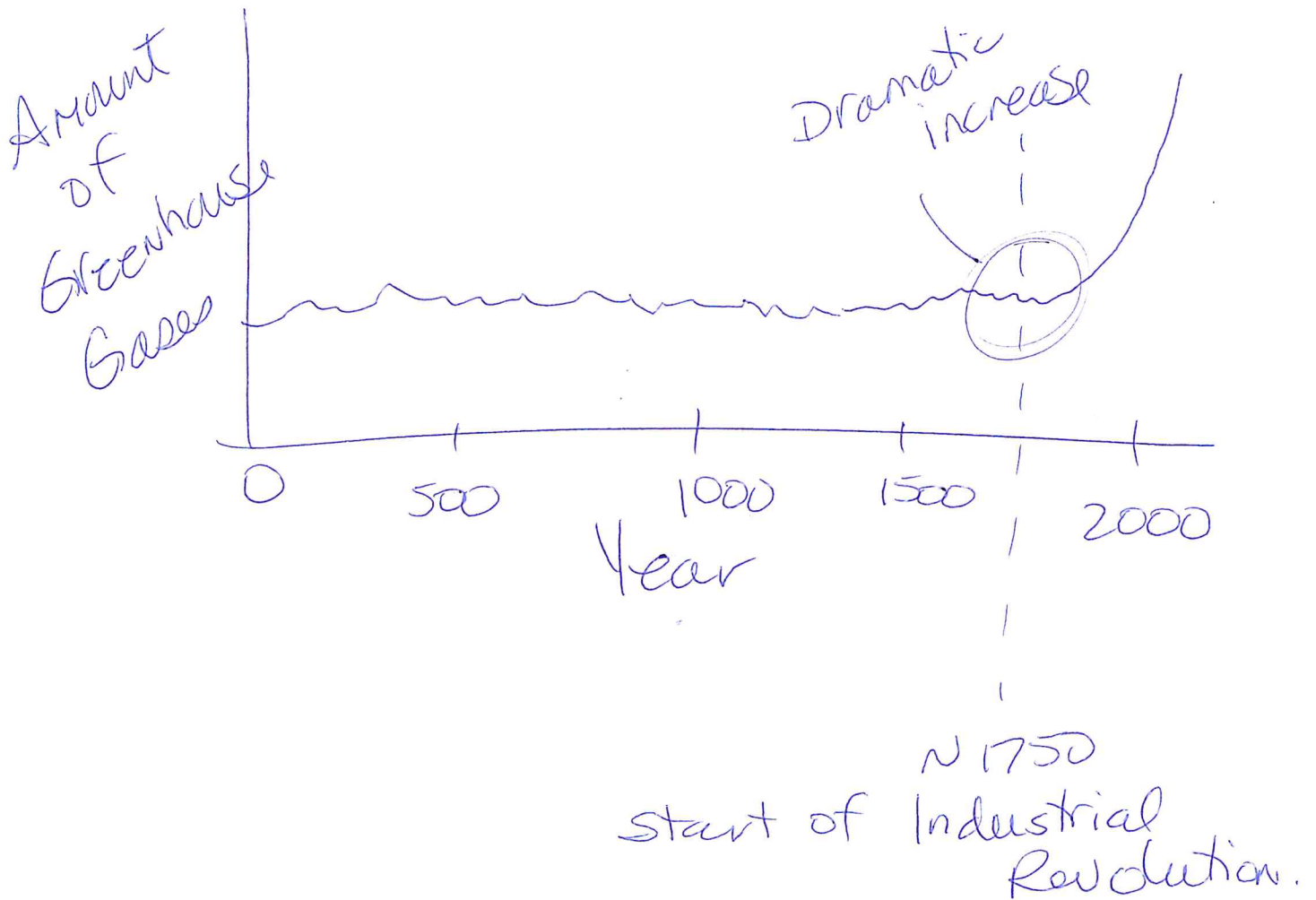
Also blocks a lot of
UV but not all.

(That's what gives us
a sunburn)

Sources of Greenhouse Gases

Gas	CO ₂ equivalent	Natural Source (B.G)	Anthropogenic Source
CO ₂ carbon dioxide * 405 ppm 2017 - climate.gov	1 CO ₂ = 1 CO ₂	<ul style="list-style-type: none"> • natural forest fires • volcanoes 	<ul style="list-style-type: none"> • burning fossil fuels
CH ₄ methane	1 CH ₄ = 23 CO ₂	<ul style="list-style-type: none"> • plant decomposition (rot) • swamps • animal digestion 	<ul style="list-style-type: none"> • agricultural activities (beef farming) • sewage treatment • mining fossil fuels releases from ground
N ₂ O nitrous oxide	1 N ₂ O = 300 CO ₂	<ul style="list-style-type: none"> • bacteria in soil 	<ul style="list-style-type: none"> • managing livestock + their feed • nitrogen fertilizers farming
H ₂ O water vapour	(N/A)	<ul style="list-style-type: none"> • evaporation 	(N/A)

Greenhouse Gases Over Time



As humans discovered engines & motors & how burning fossil fuels helped build cars/trains/factories, greenhouse gases rose dramatically & continue to do so. Also since 1750, global temperature has risen. ∴ Humans are affecting global climate.