I. Where Are We?

A. World Scientists Warning to Humanity, over 1500 Nobel Prize winners and members of national science academies, ". . . the present rate of assault on the environment cannot continue without vast human misery and a planet so irretrievably mutilated that it will not be able to sustain life as we know it.

B. Worldwatch Institute "not one life-support system upon which the biosphere depends for its existence that is not threatened and getting worse"

C. UN (this week) only urgent system-wide transformation can prevent climate disaster.

II. Life-support Systems

A. Land aka the soil, or earth, living not dead.

1. land degradation

a. 70% of land degraded affecting 3.2 billion people, could be 90% by 2050

b. 24 billion tons of arable soil being lost per year

c. drylands: 40% of land, two billions people

d. desertification: irreversible transformation .

e. land degradation releases large amounts of CO2

2. Causes: monocrop farming, erosion, deforestation, pollution, sprawl, drought, overgrazing, farming marginal land, global warming

B. Water/fresh and salt water ecosystems

1. Fresh water ecosystems

a. aquifers, lakes, rivers drying up: 1/2 aquifers below sustainability

b. glaciers are melting more rapidly

c. pollution of lakes, streams, rivers

d. species extinction

2. Salt water ecosystems

a. bleaching of coral reefs

b. increasing ocean temperature and acidification

c. dead zones (over 700)

d. pollution

e. species extinction

3. Wetlands: 35% since 1970 lost and increasing rate 3x

4. Access to fresh water

a. 3 billion live in areas classified as high water shortage,

b. 2.4 billion lack adequate sanitation, untreated waste water,

c. 1.4 billion limited or no access to fresh water

d. municipal water system and wells are polluted

5. Causes: chemical pollution, drought, oil drilling, fracking, mining, industrial pollution, sprawl, irrigation practices, factory farming, global warming

C. Forests

1. 2001-2021 loss one half the size of China

2. Tropical forests lost 2021: 11 million hectare of tree cover, and 3.5 million hectare primary tropical rain forest, Brazil 1.5 hectare million

3. Species extinction both animal and plant, 80% of species in indigenous lands, primarily in forests

4. Loss of indigenous cultures, forced removal of peoples

5. Causes: logging, cattle grazing, farming, palm plantations, soybean farming, paper mills, mining, sprawl, infrastructure for export

D. Air

1. 99% of global population breathe air that exceeds WHO guidelines and contains high levels of

Pollutants.

2. globally: air pollution attributed to 11.65% of deaths

3. U.S. 40% live in area that exceeds health levels +2.1 million from 2020

4. U.S. 60,200 deaths

5. causes: autos, trucks, coal, oil, and gas power plants and incinerators, industrial plants and incinerators, construction, fires, **lack of regulation**, global warming

<https://www.who.int/teams/environment-climate-change-and-health/air-quality-and-health/health-impacts/climate-impacts-of-air-pollution>

III. Types of Pollution

A. Chemical Pollution

1. 2.3 billion tons of chemicals into biosphere 2017

2. Toxic forever chemicals in 80% of U.S. waterways, 200 million people drinking water from contaminated private and public wells

3. 350,000 chemicals registered for use, 80% no info concerning effects on environment,

animals or humans

B. Chemical and Toxic Waste; Superfund Sites

1. U.S.1250 EPA super fund to clean up most toxic sites, 10% cleaned up correctly

2. U.S there are really another 10,000 more, total cleanup cost will be $100 billion

3. Global chemical pollution

a.US corps sells toxic chemicals to third world,

b. 40% of pesticides sold as exports,

c. Pay the poor to take our toxic waste ("third world is under polluted"), who the world system has made poor, 2 million tons

d. chemical production overseas, poorer countries

4. Environmental Racism

5. Corporate Crime

C. Military

1. DOD generates more than 500,000 tons of toxins, more than top 5 chemical companies combined

2. 17,482 sites on 1855 military bases are in non-compliance with federal environmental laws.,

3.97 bases on the EPA superfund list, top 10 weapons contractors named 133x in Superfund sites

4. "sacrifice zones" Nevada Site 51, the Fiji Island

5. Red Hill

G. Nuclear Waste

1. 442 nuclear power reactors worldwide, 96 in U.S

2. 250,000 metric tons of irradiated fuel, 90 thousand tons in U.S and hundreds of

thousands of tons of low level waste

3. millions of gallons of high level liquid waste in aging tanks

4. Corporate crime: GE and Hanford, Washington

G. Solid Waste

1. each year -- 13 billion tons of solid waste (50 tons) per person, 10 million computers, 220 million tires, and 16 billion disposable diapers (2 % of solid waste). Not currently biodegradable, 3 million tons of untreated feces and urines end up in landfills .

2. also, companies dump illegally in landfills, toxic and hazardous waste, which seeps into groundwater.

3. plastic waste: 51 million tons, 5% recycled

H. Species Extinction

1. 1000x normal rate

2. long term study of animals: 5230 species, 32,000 populations 70% declining

3. 80% of biodiversity in indigenous lands and so are minerals we need for electric cars.

IV. Global Climate Change

A. UN World Meteorological Organization and National Ocean (this week)

1. 2021: record for greenhouse gas emissions: CO, Methane, Nitrous Oxide

2. CO2 ten straight years: fastest sustained rate

3. 2021 new record of CO2 36.44 billion tons (est 95 billion tons 2100)

4. Methane: biggest ever rise, **flaring**

5. 2.9C increase

6. ocean warming and rise continue: Arctic ocean 2to4x faster

7. Arctic warming 4x faster than earth as whole, which continues to warm

7. Tipping points, or irreversible changes

a. melting arctic permafrost and methane

b. melting Greenland, Antarctic and rising sea level

c. rainforests to deserts: can't produce enough rain

d. warming ocean, changing ocean currents, acidification

8. Ten worst climate hot spots: 18 million facing starvation

B. Intergovernmental Panel on Climate Change

1. five models

a. best chance was model 1

b. next best, how are we doing

2. IPCC: we have understated the danger we face, we have used language that would not alienate our nation-state partners

C. International Treaties vs Subsidizing fossil fuel industry

1. IMF:

a. everyday global subsidies to carbon industry $11 million

b. 2020 $5.9 trillion, 2025 projected $6.4 trillion,

2. Central banks (U.S., England, EU) and large multinational corporations (ADM, Cargill) funding agribusiness deforestation

3. IEA and OEC

a. 51 governments subsidize fossil fuel

b. 2021 $700 billion up from $362 billion 2020

4. World Bank President is climate denier, policy of World Bank

Is to coerce poorer countries into contracts forcing them to open

their environment to fossil fuel extraction

5. EACOP:

a. Total Energy investing $3 to $5 billion, but “decarbonizing”

b. 858 million barrels =+ 379 million tons of carbon emissions

6. U.S.

a. elimination or "clarification" of environmental regulations

b. limit funding of environmental regulatory agencies

c. EPA doesn't regulate pesticide covered seeds, even though they kill the birds, bees, insects, Pollutes water.

d. Biden more drilling leases on public land (than Trump)

e. Obama "clean coal", Biden more small nuclear plants???

f. Inflation Reduction Act

i. personal electric vehicle battery pack: 8K lithium, 14Kcobalt, 35K nickel

ii. Global demand + 400% to 600%.

iii. where are the minerals?

iv. minerals and mining

v. Carbon capture 11 large scale projects $3.4 billion, no success, uses carbon fuel, lets give them more money$2.1 billion in loans and grants. Who is supporting them politically\_ carbon industry

vi. Hydrogen Hoax

<https://www.thenewatlantis.com/publications/the-hydrogen-hoax>