

# Lessons from US Weather Modification Law for Geoengineering: From rainmakers to...



...climate gods!



# Weather v. Climate

- Temperature
- Sunshine
- Precipitation
- Cloud Cover
- Wind
- Floods
- Storms

# Definition

Geoengineering the “large-scale engineering of our environment in order to combat or counteract the effects of changes in atmospheric chemistry” - National Academy of Sciences

# Technologies

- Solar Radiation Management
  - Mesosphere-Thermosphere
    - Solar Orbit mirror/sunshade
    - Geo-orbit solar umbrella
  - Stratospheric aerosols
    - Volcano - induce activity
    - Artificial volcano - carbon tube chimney
    - Plane/Balloon/Gun dispersion
  - Troposphere
    - Increase cloud coverage and albedo - Boats/Floats
    - High Altitude Blimp
    - Cloud dispersion over caps
  - Increase surface albedo
    - Land
      - Human settlement - white/green roof
      - White rock
      - Reflective crops
    - Ocean
      - Sea foam
      - Cloud dispersal over ice caps

# Technologies

- Carbon Dioxide Management
  - Indirect - Encouraging and promoting naturally occurring phenomenon
    - Afforestation/Reforestation/Greening deserts
    - Biochar - charcoal by pyrolysis(decomposition/burning in zero oxygen ) of biomass
    - Phosphorus runoff - sea shelf/costal sediments
    - Ocean fertilization
      - Iron – phytoplankton or algae blooms
      - Carbonate - increase alkalinity of oceans, absorb more CO2
  - Direct - Targets the removal of CO2 and other GHGs by direct means
    - Artificial trees/Air capture
    - Storage
      - Geological
      - Pump deep sea
      - Ice
      - Biochar
      - Space elevator/pump
    - Expulsion - Aurora Borealis, HAARP
- Temperature Management
  - Downwelling - sea ice
  - Upwelling - pull up cold deep sea water

# US Case Law

- *Slutsky v. City of New York* (New York 1950)
  - “Apart from the legal defects in plaintiffs' suit (since they clearly have no vested property rights in the clouds or moisture therein), the factual situation fails to demonstrate any possible irreparable injury to plaintiffs.” 97 N.Y.S.2d at 239.
  - Balancing test
- *Samples v. Irving P. Krick, Inc* (Oklahoma 1954)
  - First jury trial, but found for the defendant.
- *Auvil Orchard Company v. Weather Modification, Inc* (Washington 1956)
  - Temporary injunction for hail suppression, no permanent injunction for lack of causation.

# US Case Law

- *Southwest Weather Research, Inc. v. Duncan* (Texas 1958)
  - “... the landowner is entitled to such precipitation as Nature deigns to bestow. We believe that the landowner is entitled, therefore and thereby, to such rainfall as may come from clouds over his own property that Nature, in her caprice, may provide. It follows, therefore, that this enjoyment of[,] or entitlement to[,] the benefits of Nature should be protected by the courts if interfered with improperly and unlawfully. .... We do not mean to say or imply at this time[,] or under conditions present in this particular case[,] that the landowner has a right to prevent or control weather modification over land not his own.”  
319 S.W.2d at 945.



# US Case Law

- *Summerville v. North Platte Valley Weather Control District* (Nebraska 1960)
  - Constitutionality of statutes
- *Adams v. California* (1964)
  - Settlement with cloud seeders
- *Pennsylvania Natural Weather Association v. Blue Ridge Weather Modification Association* (1968)
  - “does a landowner have a right to weather unmodified anywhere?” 44 Pa. D. & C. at 752, 1968 WL 6708 at \*2

# US Case Law

- *Montana Wilderness Association v. Hodel* (1974)
  - “protect the natural” condition of the wilderness
- *Lunsford v. U.S.* (South Dakota 1977)
  - Certified class action status
- *Saba v. Counties of Barnes ... and Weather Modification, Inc* (North Dakota 1981)
  - Class action status denied

# US Case Law

- *First English Evangelical Lutheran Church of Glendale v. County of Los Angeles* (California 1987)
  - Defendant granted motion for nonsuit after the close of plaintiff's evidence on liability.

# Climate Ownership?

- *Ad coelum*
- *US v. Causby* (1946)
- Solar
  - *Prah v. Maretti* (Wisconsin 1982)
    - “Access to sunlight has taken on new significance in recent years...as a source of energy.”
- Wind
  - *Contra Costa v. Vaquero Farms* (California 1997)
    - Not compensated for wind rights in condemnation
  - *Romero v. Birnell* (New Mexico 2009)
    - Wind inchoate interest and does not become vested until possession
- Geothermal
  - *US v. Union Oil* (California 1977)
    - Subject to mineral reservation
- Water?
  - Wild Ducks
  - Rivers

# Tort Liability

- Strict liability
  - Abnormally dangerous or ultrahazardous
    - North Dakota, Texas, Wisconsin
- Negligence per se
  - Licensing requirements
    - Colorado, Wisconsin
- Negligence

# Tort Liability

- **Trespass** – intent, negligence, or abnormally dangerous
  - Seed material
    - Colorado, North Dakota, Utah, Wisconsin
  - Cloud
    - *Red Lake Hunting & Fishing Club v. Burleson* (1949)
- **Private nuisance** - nontrespassory invasion of another's interest in the private use and enjoyment of land
  - Colorado, Utah

# Proof of Causation

- Scientific knowledge
- Jury understanding
- Expert bias

# Conclusions

- Balancing
- Natural or artificial methods
- Private or public participation
- National and international regulation