

SIO15: NATURAL DISASTERS

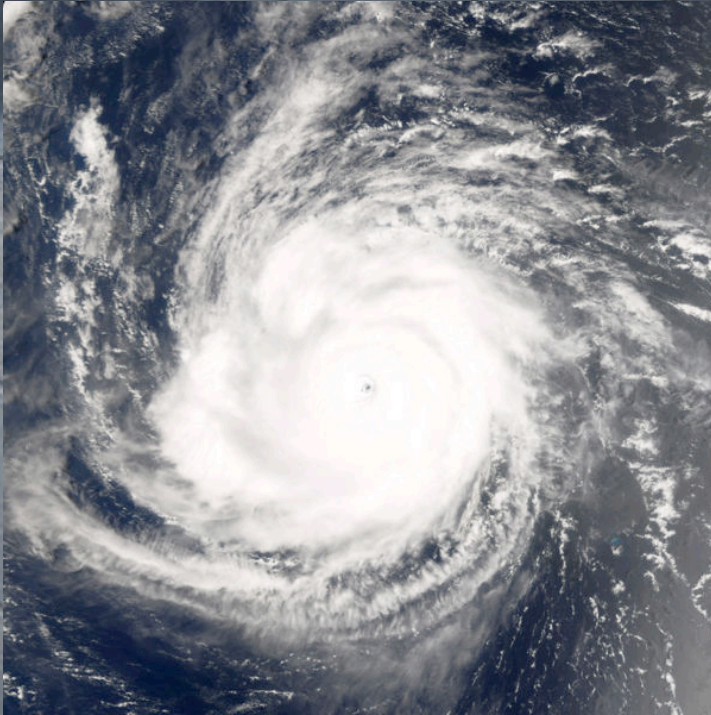
Lecture 1: Introduction to Natural Disasters

Some Case Examples

Two Category 5 Monster Hurricanes

Hurricane/Typhoon Ioke Aug/Sep 2006

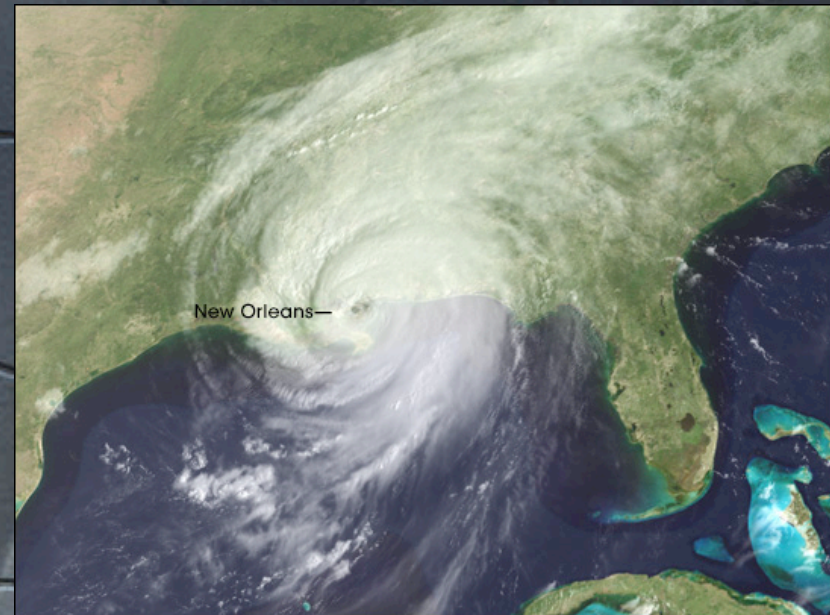
Source: en.wikipedia.org



- not covered in press
- brushed a small island
- no lives lost
- minor damage
- forgotten

Hurricane Katrina Aug 29, 2005

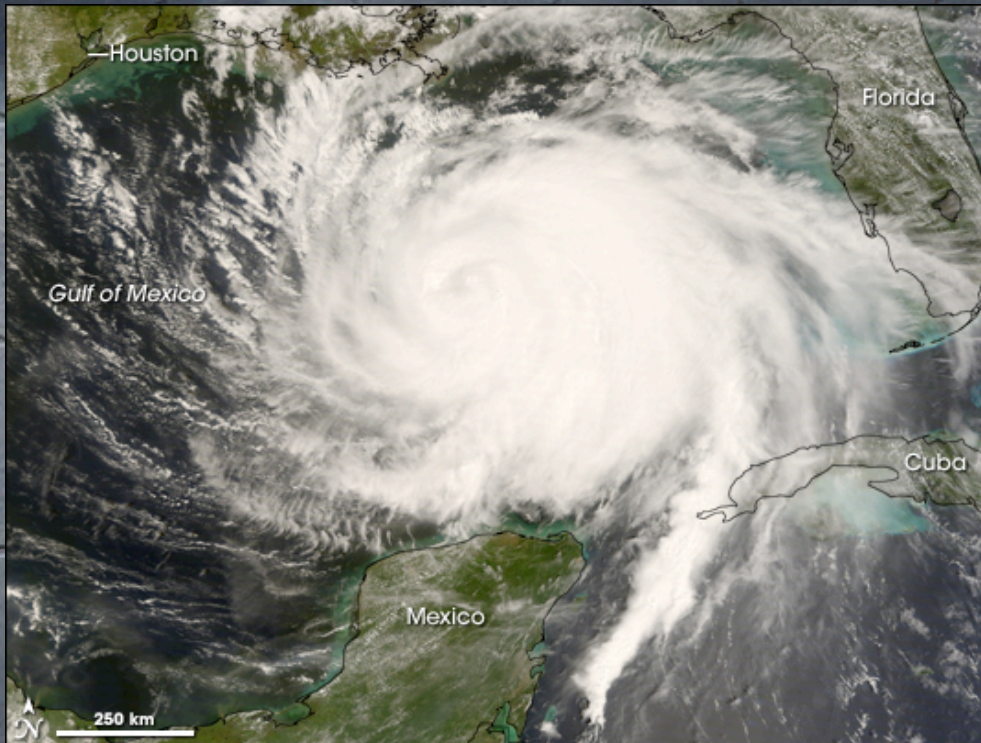
Source: earthobservatory.nasa.gov



- well-covered in press
- landfall in well-populated area
- losses of lives
- extensive damage
- changed society

Why Study Natural Disasters?

Hurricane Ike, Sep 11 2008



Source: NASA Earth Observatory

164 fatalities
Deadliest in U.S. in 2008
Landfall in Galveston, TX
3rd-costliest hurricane in U.S.
(because it damaged oil infrastructure!!)

- **Galveston built on low-lying sand bar**
- **vulnerable to even small storm surges**
- **location of deadliest natural disasters in U.S. history (1900 hurricane killed 6000 people)**

- **no satellites and no reliable forecast in 1900!**
- **with budget cuts, even modern forecast system may suffer**

Two Most Notorious Types of Disasters

September 2009
LA-area fire



Started Aug 30, still smoldering Sep 30
“probably not out before first rain”
2 fatalities
251 square-miles burned
> 75 homes destroyed
> \$60 Mio fire fighting costs

September 22, 2009
Georgia/Alabama floods



Photos:
Associated Press

15-20in in 72h in Atlanta
after 2-year “epic” drought
9 fatalities
> \$250 Mio damage

Some of this Year's Disasters

January 2010
Mw=7.1 Haiti EQ



Source: wikipedia.org

- 230,000 fatalities
- 300,000 injuries
- 1,000,000 homeless
- \$3.1 Billion humanitarian help

**this EQ was smaller than the local
Mw=7.2 2010 Easter quake!**

August 2010
Pakistan Flood



Source: New York
Times

- 21 Mio injured or homeless
(2004 Sumatra EQ+2005 Kashmir EQ
+ 2010 Haiti EQ)
- Total economic impact \$43 Billion
- Relief efforts initially sluggish (~\$1 Billion)

A Moderate but Lethal EQ

Bam, Iran Dec 26, 2003; 5:26 local time

**Bam citadel:
“world’s largest adobe structure”**



Photo: <http://en.wikipedia.org>

**Population
before: 78,400
after: 10%
41,000 fatalities
(corrected to 26,500)
Destruction
70% of modern city
+ Bam citadel**

**EQ magnitude:
Richter 6.6**

this EQ was relatively small!!

Heat Wave in Europe 2003

104°F in
many places

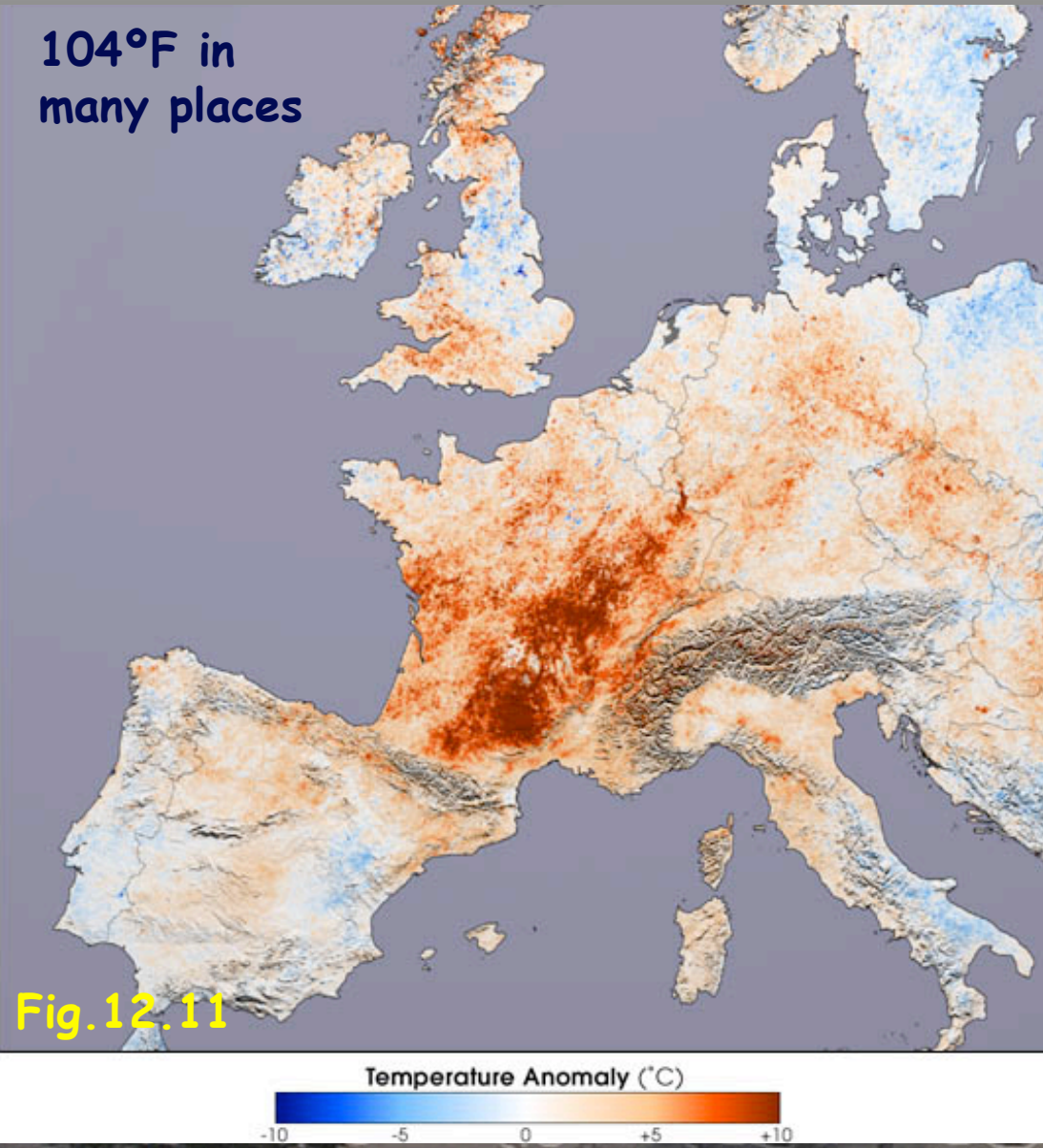


Fig.12.11

“hottest summer in 500 years”
(last record heat: 1757)

“London hotter than Cairo”

“WWII vessel in Danube”

“record wine!”

Fatalities

35,000

France: 14,000

Germany: 7,000

Spain: 4230

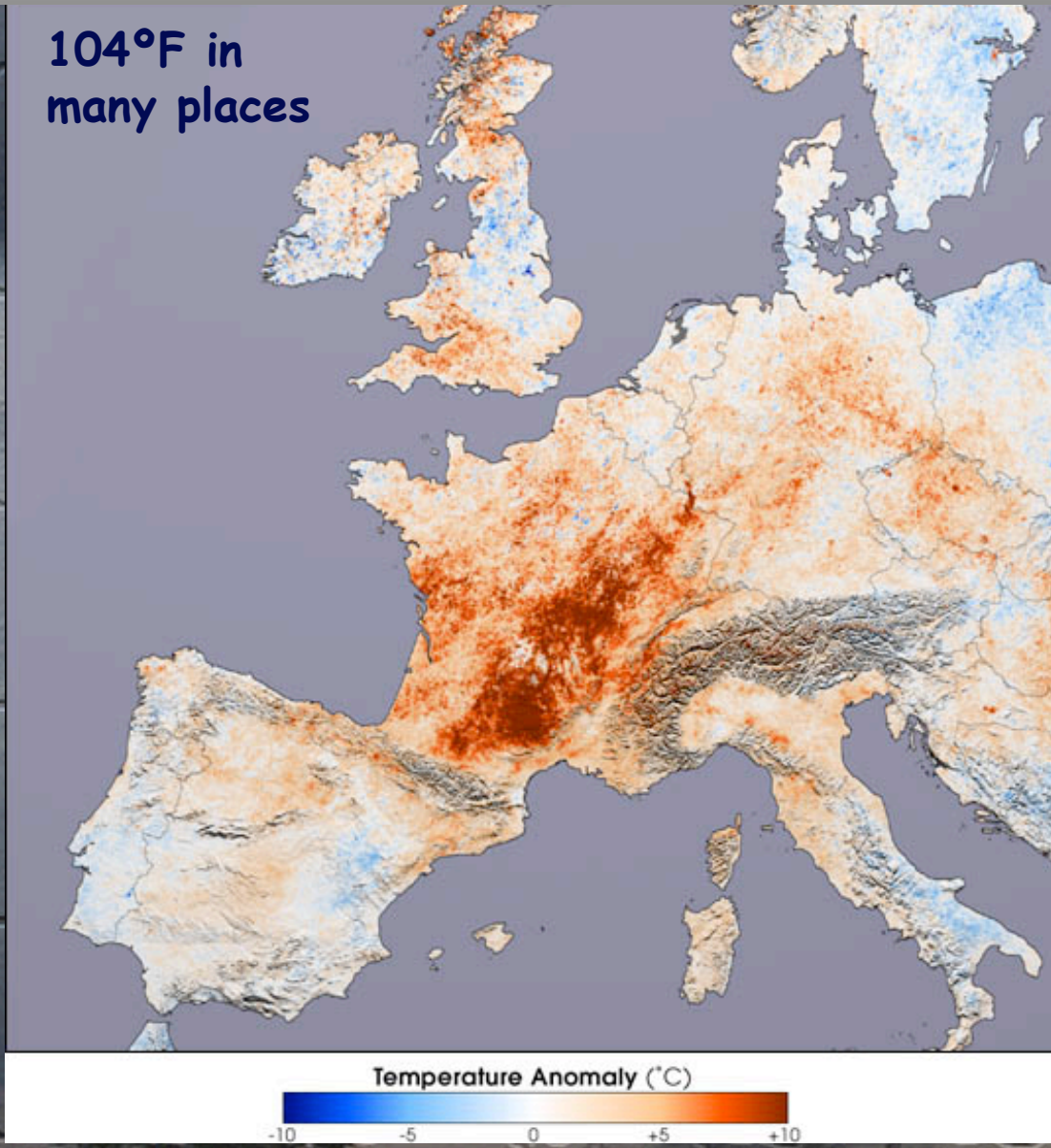
Italy: 4175

UK: 2045

Table 12.4/5th 1.3

Heat Wave in Europe 2003

104°F in
many places

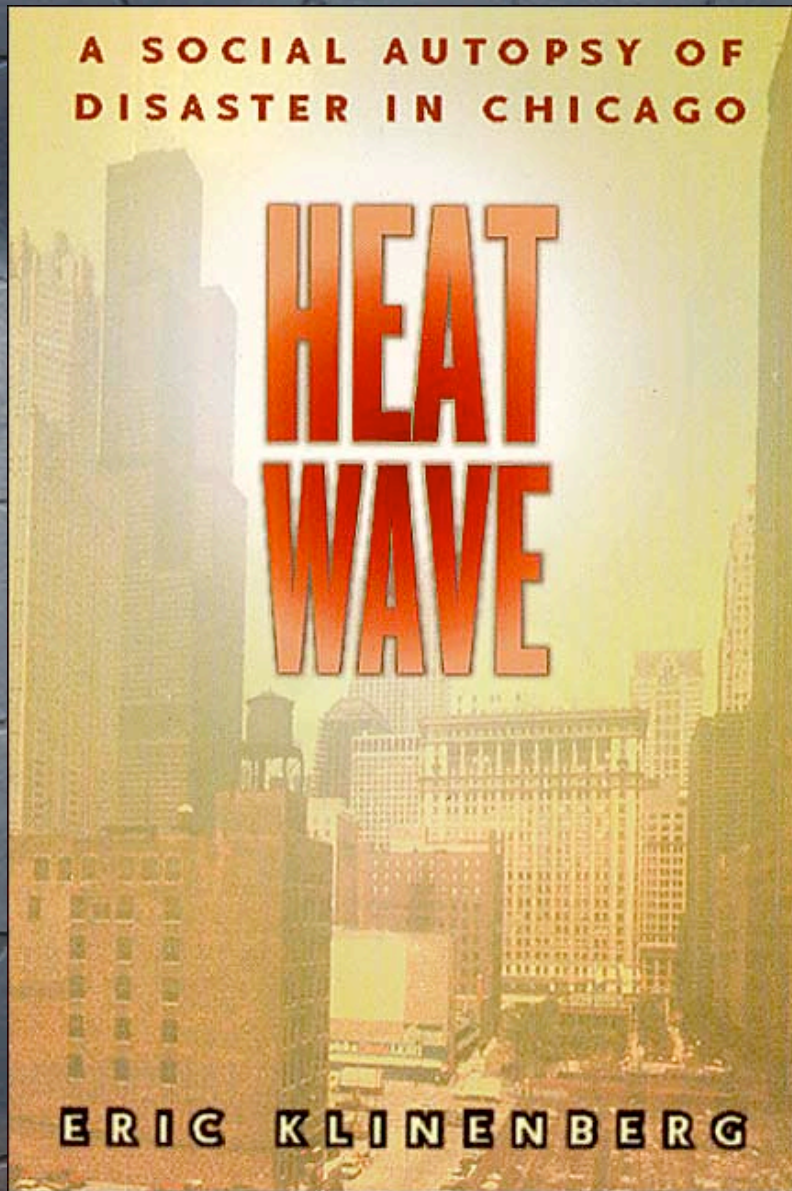


Consequences

- * Forest fires in France, Spain, Portugal
- * Low ground water table
- * Low rivers, lakes, dams
-> red. transportation, power generation
- * 10% loss in wheat

“Human impact on Global warming doubles likelihood of such events”

The 1995 Chicago Heat Wave



- 1000 fatalities
- elderlies, poor, blacks
- lack of preparedness
- overwhelmed emergency facilities
- urban heat island
- temperature inversion
- power failures
- poor had no A/C

high crime rate

-> people afraid of opening windows
(added to problem)

less fatalities in 1940s when people
were not afraid to open windows,
sleep outdoor

Droughts: E.g. Dust Bowl in 1930ies

- Massive dust storms
- Aggressive Agriculture
- devastating Soil Erosion (soil was blown across Atlantic ocean)

it takes 30 years to grow
1inch of topsoil!



Fig.11.10

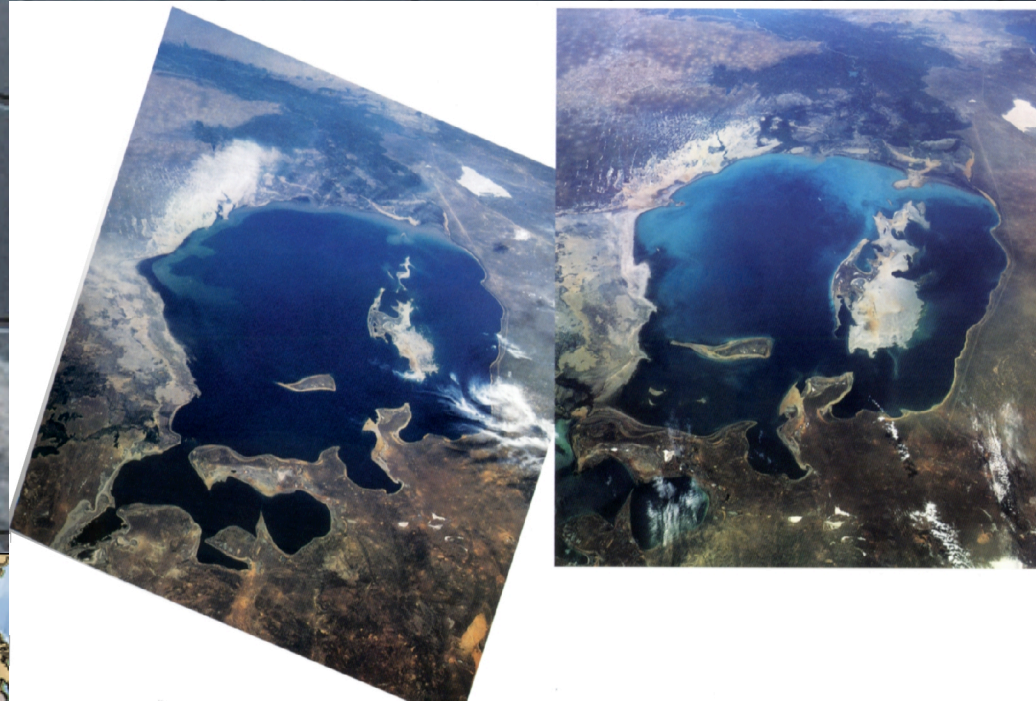
Desertification

The Disappearance of the Aral Sea

- diversion of water supply
- exposure of toxins and airborne transport to far places

1985

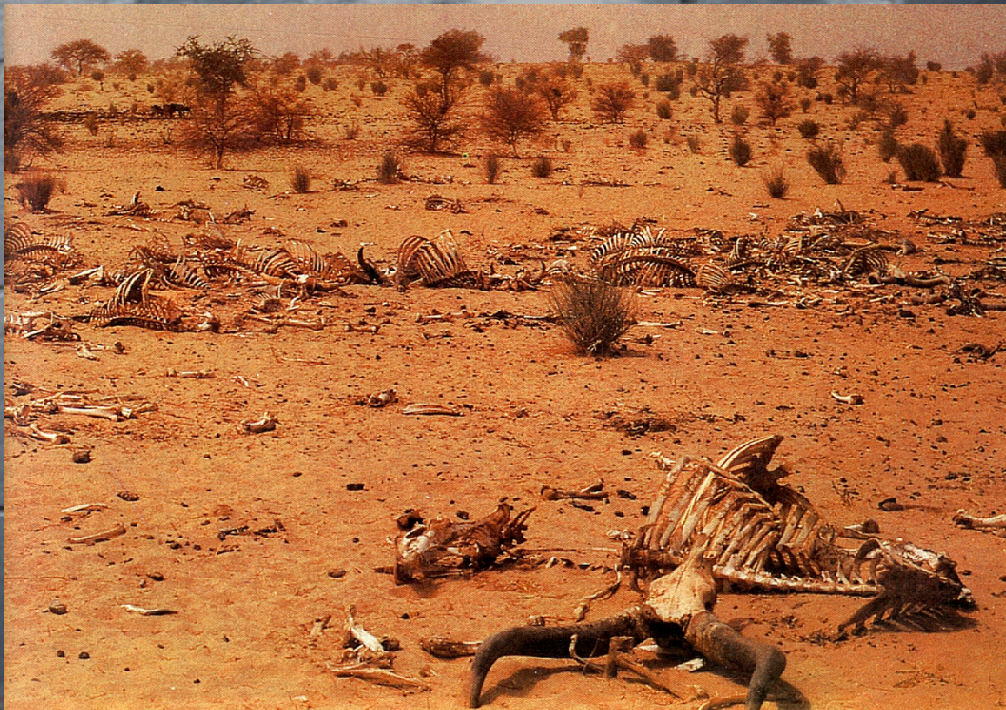
1992



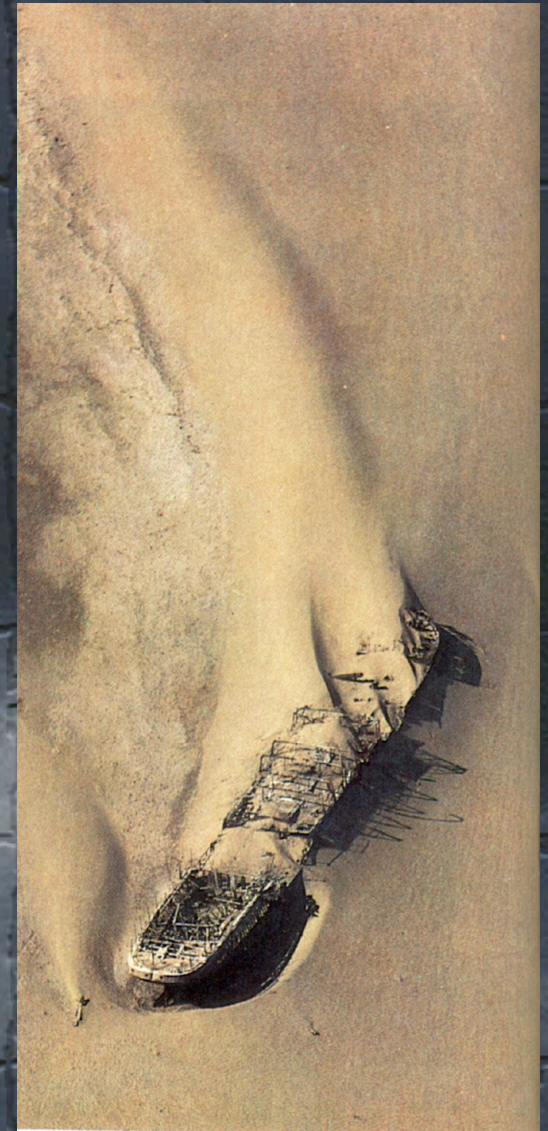
Desertification

deserts are currently expanding due to

- overpopulation
- overgrazing
- careless agriculture
- diversion of water supply



Sahel



Namib

Glacial Melting and Sea Level Changes



- if current ice sheets melted
-> 70 m sea level rise

Source: "The Earth" by S. Marshak

Glacial Advance and Retreat



- most mountain glaciers are retreating!
- loss of fresh water!!
- all ice sheets reducing

1930

2001



from "Rhone-Glacier and its Ice Grotto" M. Carlen & Fotohaus Geiger