My concern is with understanding how CX affects society and how society affects climate. I'll discuss this with you by using examples.

Note: This was before I used PowerPoint and overheads. I just lectured like in the "olden times"! —Mickey 5/13/12
PART I: Post WW II Views of CX

INCREASING DEMANDS FOR FOOD

Because of:
- increasing populations
- affluence

As people’s wealth increases, they go from grains to meats.

Per capita food production to 1972 increased.

LATE 1960’s FOOD GLUT

US → Land Bank
Battleship Storage

Canada → LIFT Pgm (Prairies)
50% land reduction

IT APPEARED: TECHNOLOGY WAS A BUFFER TO

HYVs (Green Revolution) (CX variability)

The SAME was said for the Oceans

Oceans viewed as endless CORNUCOPIA

~ 60 MMT of food from SEA

They said we could take out 1 Billion Tons!!
Then came **1972** - **YR of CX Anomalies**

**What happened?**

**Droughts around the globe**
- Sub-Saharan Africa
- East Africa
- Australia
- Indonesia
- Brazil
- India
- China
- USSR

**Food Shortages**

- Food production per capita dropped in 1972 (1st time since WWII)
- Fish catches also dropped in 1972 (1st time since WWII)

- Soviets came to us (unaffected by drought) to buy grain at high prices

- Came to be known as **GREAT GRAIN ROBBERY**

- Less food for 3rd world countries
Food shortages sparked:
- UN Conf. on Food (1974)
- UN Conf. on CX (1974)

Butz (Sec. Ag. said food NOW IMPT FOR FOR POLICY

US farmers planted grains
Took out shelterbelts due to high price for grain

NEW VIEW OF CX

WE DON'T UNDERSTAND IT/CAN'T CONTROL IT.
- CX VARIABLE - IMPT
- Technology NO BUFFER
- CX CHANGE NOW IMPT.
DEBATE DEVELOPED

IS CX CHANGING?

• A • CX getting COOLER
    ICE AGE COMING

• B • CX getting WARMER

• C • NO CHANGE IN CX

Each supported had own evidence

Selective ATTENTION to support his point

FOR EXAMPLE:

CX COOLING
  - More sea ice moving south
  - Potato growing season
  - Fish off Iceland SST 2.7°F cooler
  - Hay production
  - Armadillo moving south

ICE AGE DUE
Last 60 yrs warmest in 100,000 years.
Global Warming + No Change

- CO$_2$ increases in mid latitudes
- Trace gases (methane + NO$_x$) increase; measurements show increase (after 1970)

- Stable
- CX variability not unusual

Now I'd like to focus on:

- 3 problems related to CX

We will hear of these problems more often in the future.

1. Famines + droughts in Africa

2. The Carbon Dioxide Problem (Warmer Earth)

3. The El Nino Phenomenon

* Say at outset - still uncertainties around these problems.
AFRICAN Drought + Famines

Droughts are part of Africa's food probs

But it is often overlooked by development specialists

TIME MAGAZINE (JAN 84) good example

Africa's woes cited as
1) coups
2) corruption
3) conflict

But they forgot drought

Drought seen as transient phenomenon
at comes + goes

But it's part of CX not apart from it!

AFRICA IN MIDST OF POLIT/ECON TURMOIL

_PROBS @ DEVELOPMENT

YET, droughts since 1968 a 3rd of INDEF

With better rains these people can subsist

or feed themselves (even if no surplus for market)

Drought by itself seldom kills people

In 1982-84 there were 31 droughts but 5 famines

Ethiopia, Angola, Moz, Chad, Sudan
Although drought occurs for year 2, its impacts go on for years. Example: Gov't imports food in drought, pays for years for it.

In future, we'll hear more of drought in Africa, not less.

- People more into margins
  - Pulled there (wet weather)
  - Pushed there (gov't cash crops schemes)

$\text{CO}_2$ - Uncertainties still exist. e.g., cloud response to warming.

There's consensus growing about $\text{CO}_2$-induced atmospheric warming.

Now about 345 ppm of $\text{CO}_2$ up about 1 ppm/yr.

Comes from burning of fossil fuels.
- Coal, gas, oil
- Deforestation (trees store carbon)

2/3 of it stays in atmosphere.
CO₂ a trace constituent of ATMOS.
CO₂ traps longwave radiation (LIKE Greenhouse).

Since industrial Revol CO₂ ↑ ~ 25%

Other Trace gases also add to Greenhouse EFFECT

1.5 → 3.5°C Centigrade INCREASE

What does it mean?

SCMs show increase in global temps.

- Shifting of Rainfall patterns

  • Shifting of Chances for Droughts
    Drought frequency can increase
  • Rising Sea level (15-25 cm. since 1900)

NO regional IMPACTS (Now) KNOWN

Some winners, some losers
But—we don’t know who!

But US Great Plains appears to dry out
more dry, more droughts

DOUBLE PROBLEM — Ogallala already a problem in mid 20th Century — 2 problems more
EL NINO

- Warm water off Peru comes every 8-11 years.

Last 3 Big ones:
- 1957-58
- 1972-73
- 1982-83

1982-83 The Biggest in a 100 years

1st of interest because of Peru's fisheries - used as fishmeal for poultry

Now of interest because of linkages with other CX anomalies around globe.
(TELECONNECTIONS)

EL Nino now linked to droughts in Australia, Indonesia, Brazil, SE Africa, India, China, US weather.
El Nino blamed for Coastal Storms (CALIF)

- Floods in South Central US
- Mild winters in N.E. & Canada
- Loss of salmon fisheries
- Snakebites in Montana
- Plague outbreak in N. Mexico
- Broken Bades in CALIF
  (Surfers)

The IMPT thing about El Nino

Hope for Forecasting
Seasonal WX,
Months in Advance!!

YOU'LL HEAR MORE OF THESE
CX PROBS AND OTHERS.
Such as the OZONE PROBLEM.
FLORIDA CITRUS
Conclusion:

CX affects us in many ways. Some are obvious:
- Drought/Floods
Some are subtle:
- Teleconnections
- Constraining eco. development
Some are clear:
- El Nino + Floods in Peru
Some are not so clear:
- Drought and famine in Africa
- Freezes and Brazil's O.Juice takeover. But you can be sure CX is impr.

It's impr. to separate CX impacts from impacts of human decisions.

Only by separating these, can we match solutions with correct problem.