



Reductive vs. Ecological Reasoning

Towards
attunement
with Nature



Ways of Relating to Nature

◎ *What mental model is best?*

- 1. Submission – Give in, Give up
- 2. Control – Master, dominate, subdue (Modern)
- 3. Ignore – Post-material World
- 4. Attunement
 - Metaphor –tuning musical instrument
 - What does metaphor imply?
 - What sort of thinking is required?

Ecological/Systemic Thinking

◎ Ecological thinking

- Deeper: Evolutionary /Historical Perspective
- Ethical: Seek scientific and moral truth
- Complex: See connections, interdependencies
- Emergent: Processes creating realities

◎ Problem Solving Examples

- #1: New Orleans Flooding
- #2: Obesity Epidemic
- #3: Agricultural Practices (Wes Jackson)

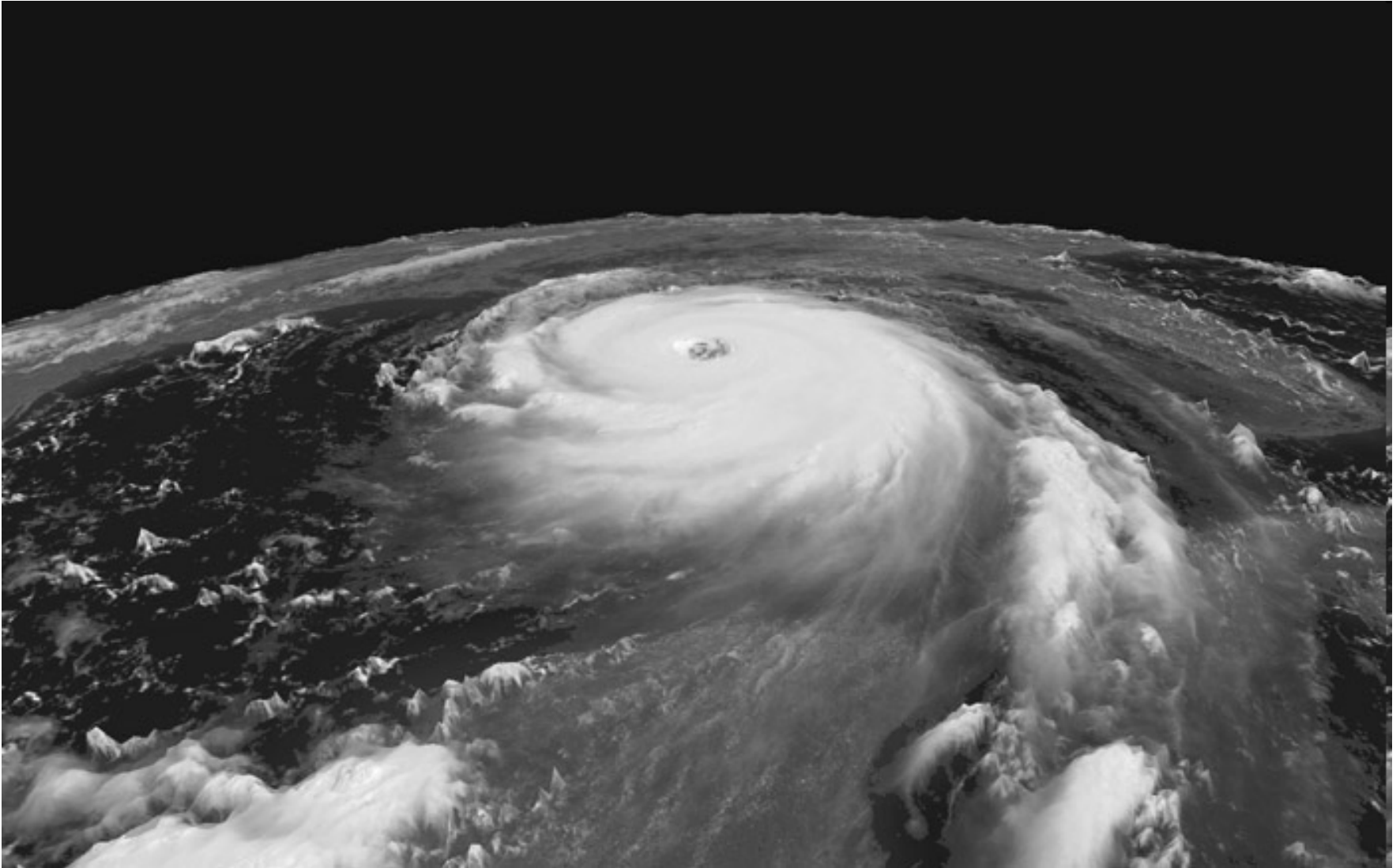
Two Types of Thinking

	<u>Reductive</u>	<u>Ecological</u>
Goal	Get right answer	Ask right questions
Mental Model of Phenomena	Simple – Linear	Complex – Feedback
Guiding Metaphor	Constructed Machine (Mechanistic)	Adapted Organism (Holistic)
Focus	Isolated Parts	Emergent Wholes
Strategy	Fix Parts	Fix Relationships
Concerns	Narrow, technical	Multiple, competing

Example #1: Flooding

- ◎ Q: What caused the catastrophe in New Orleans in 2005?
 - Reductive answer?
 - Ecological answer?

Hurricane Katrina

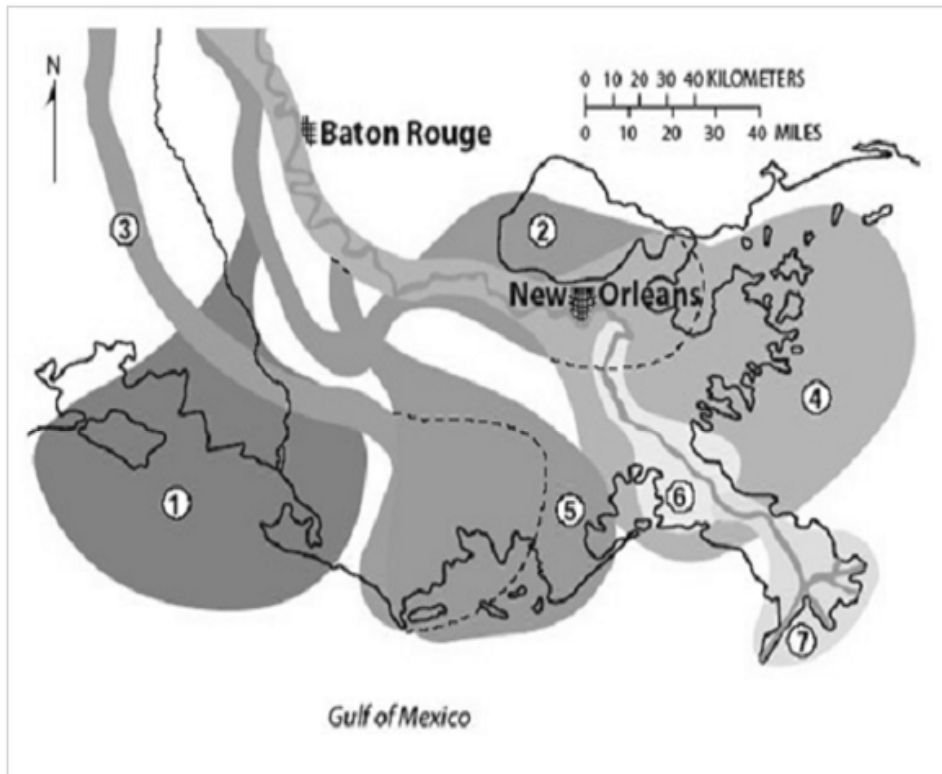


Storm Surge





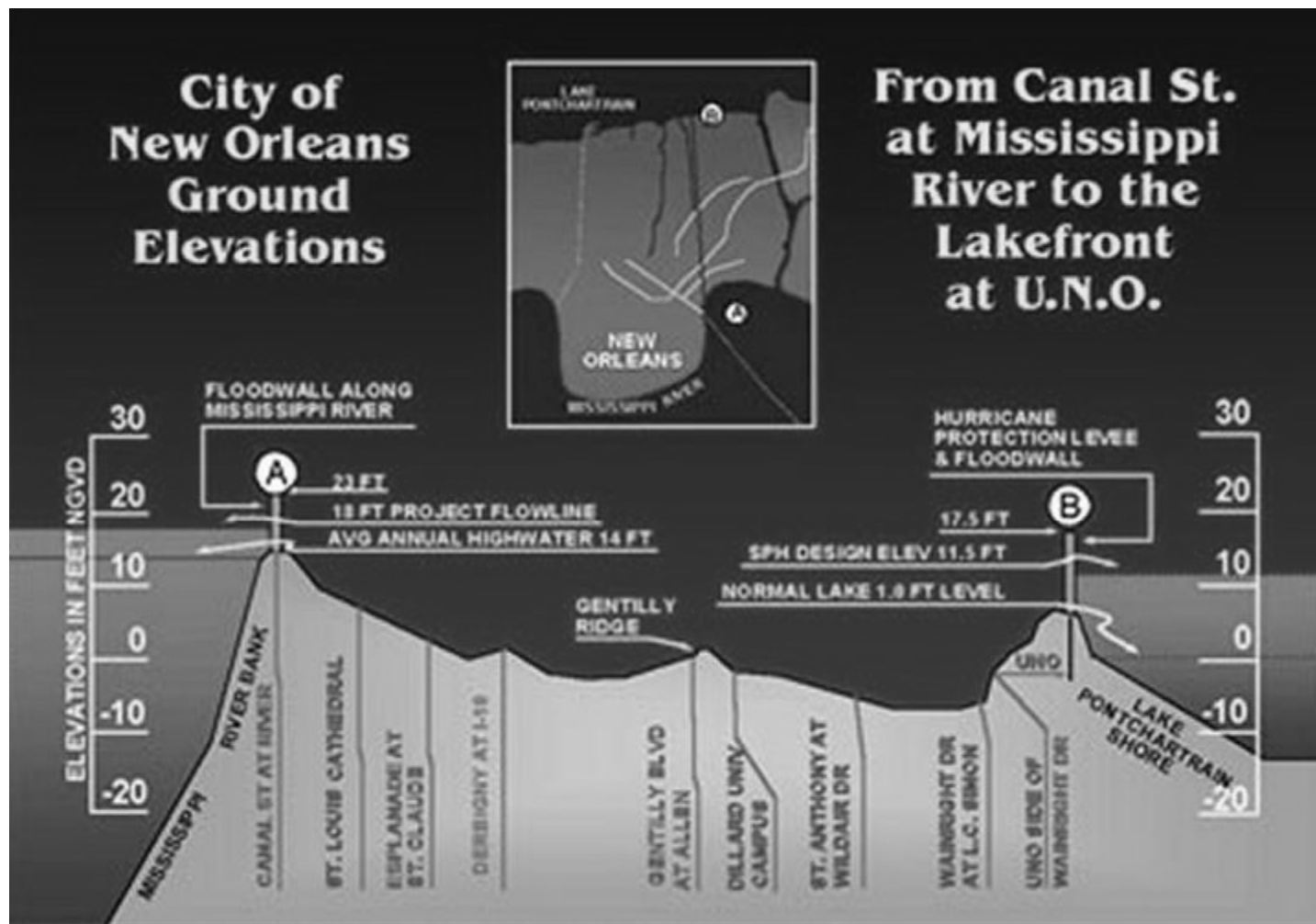
Place as Systemic Process



Louisiana built by silt.

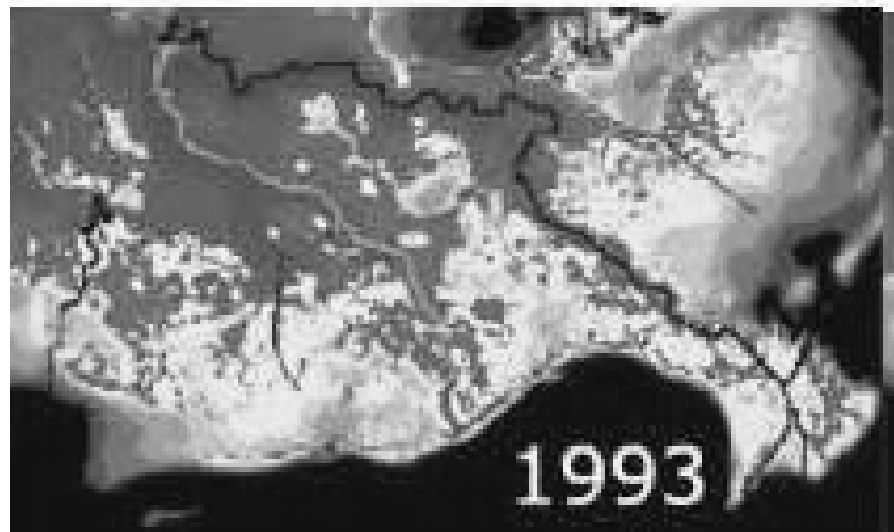
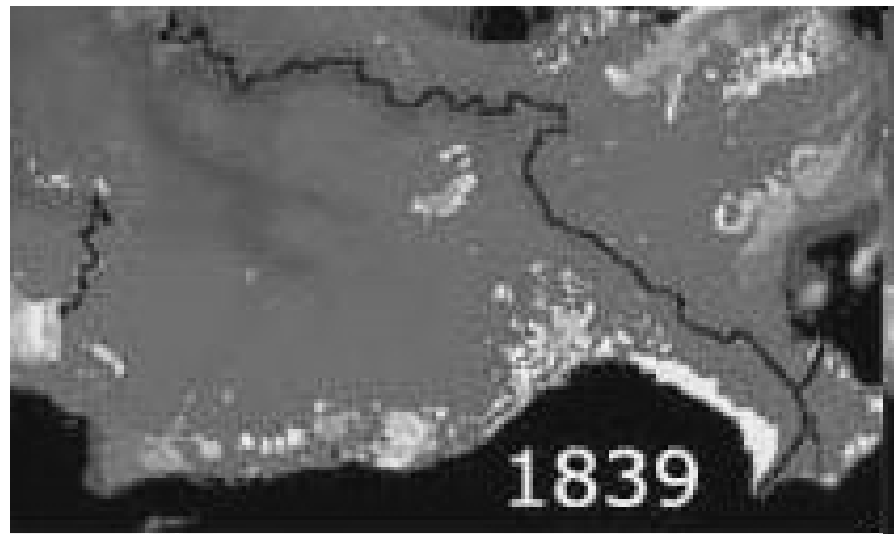
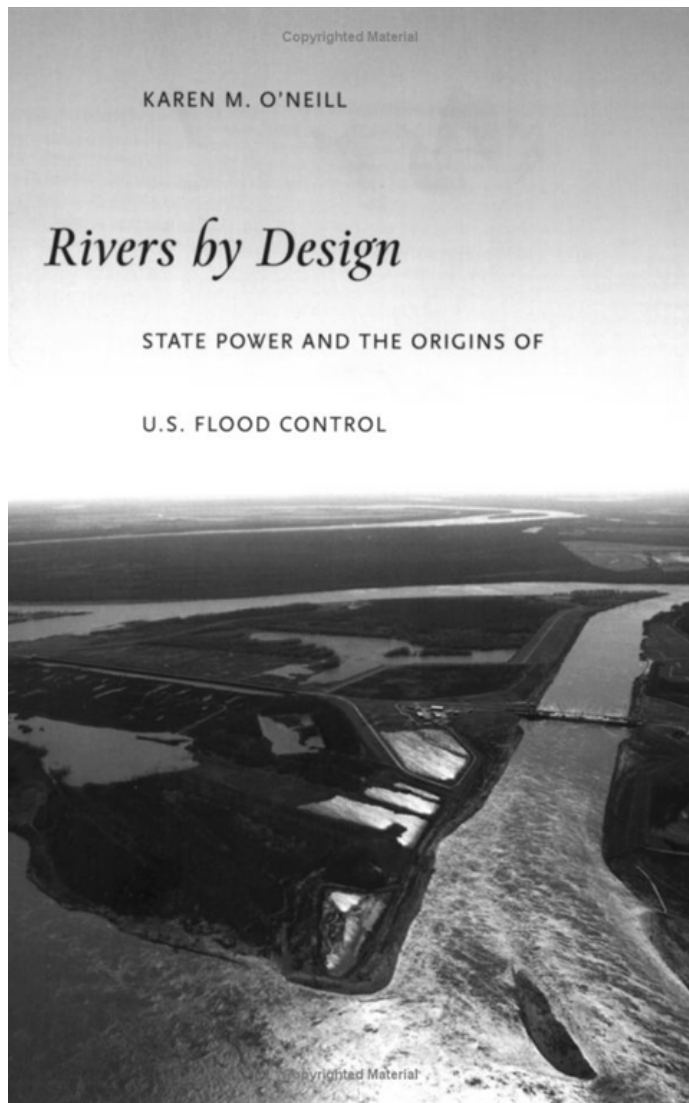
City of New Orleans Ground Elevations

From Canal St. at Mississippi River to the Lakefront at U.N.O.



*Sewerage and Water Board of New Orleans/
US Army Corps of Engineers New Orleans District*

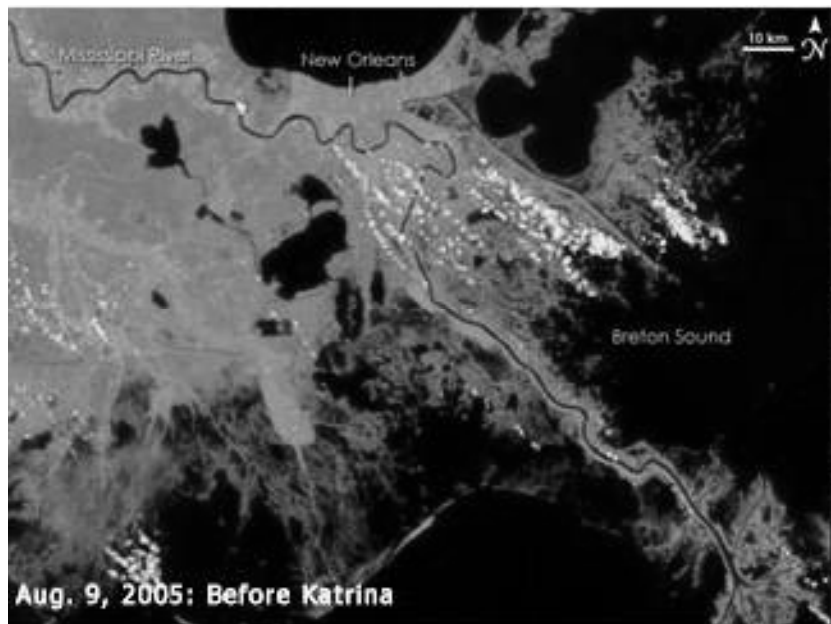
Consequences of “Prevention”

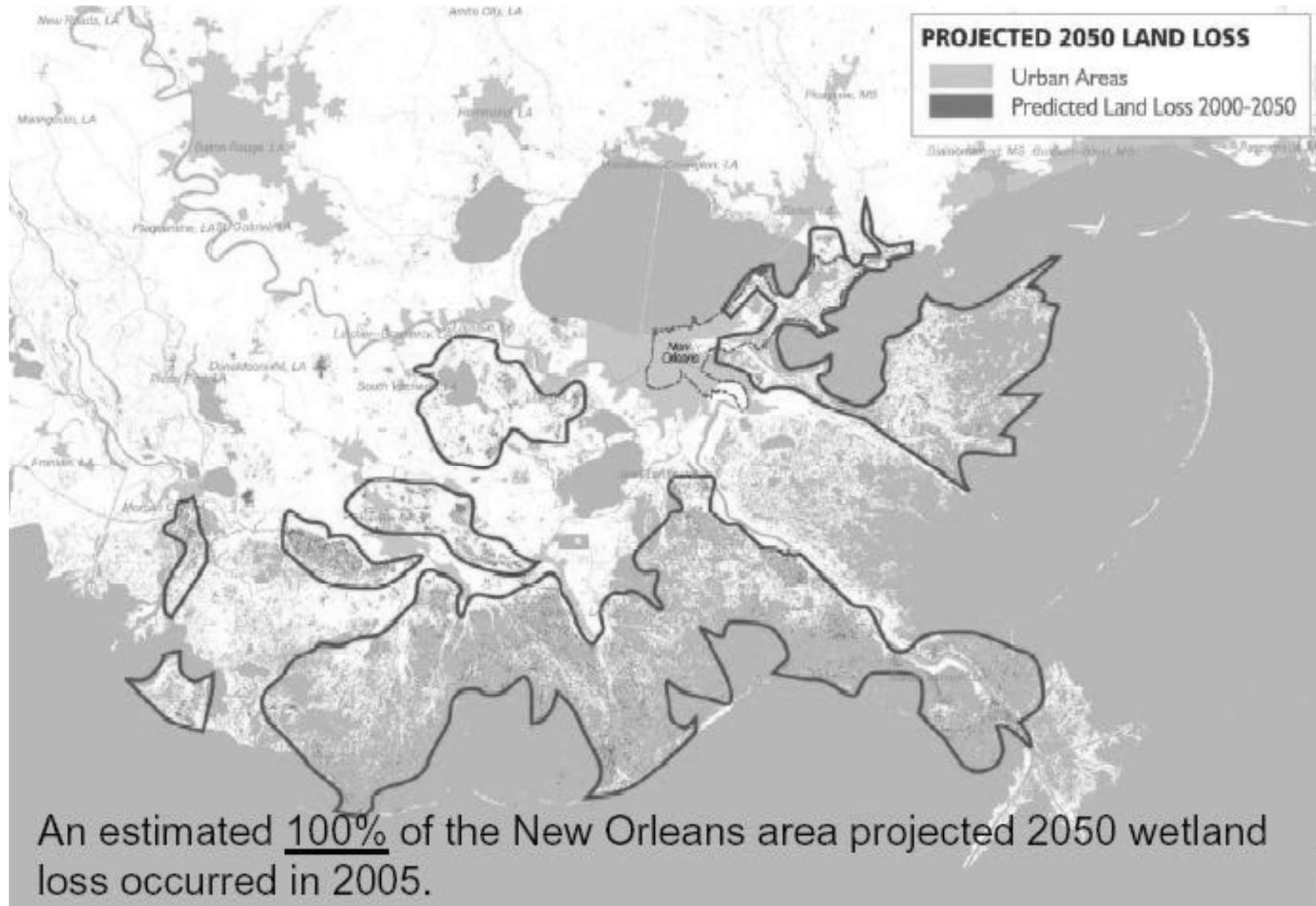


Protective Wetlands



Pre-post Katrina

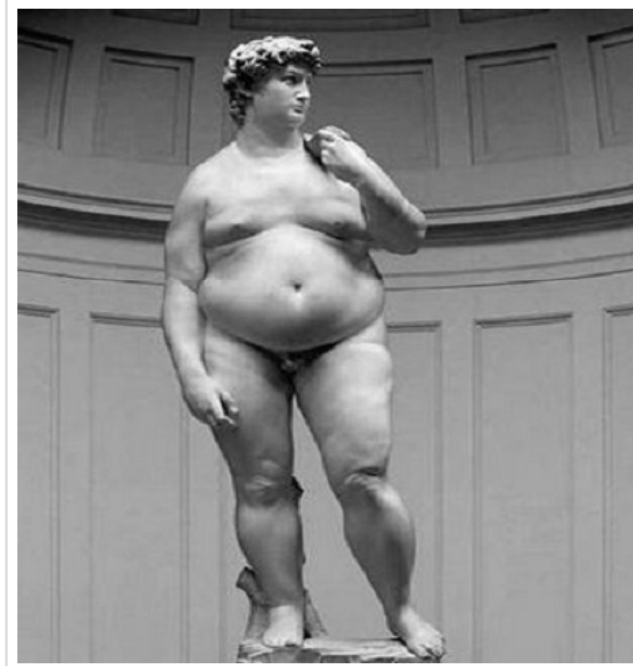




Example #3: Obesity Epidemic

- What causes obesity?
 - Reductive answer?
 - Ecological answer?
- What patterns emerge?
Can we blame diminished will power?

© [zz_obesity_trends_2007.ppt](#)

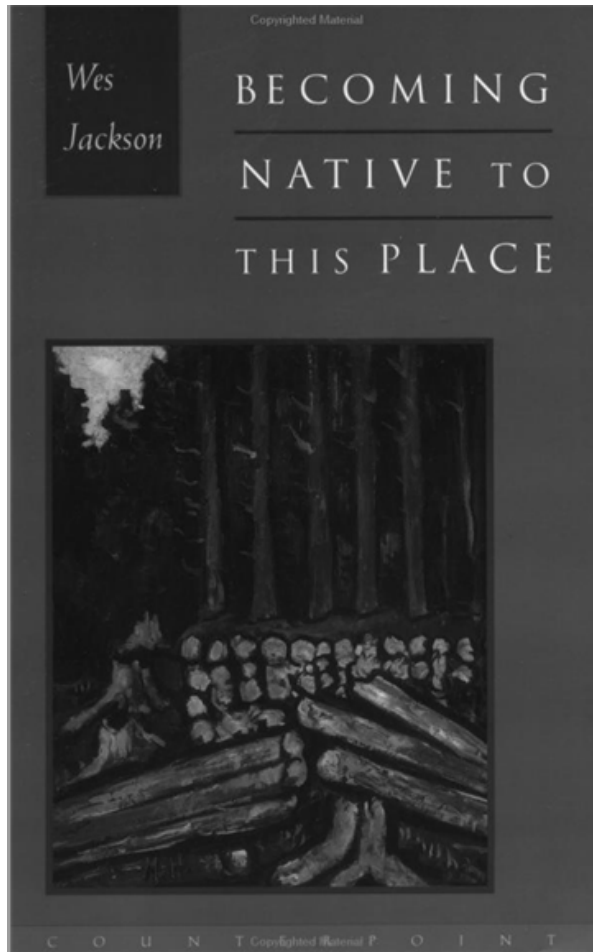


Michelangelo's famous statue, David, returns to Italy this week after a successful 12 week, 20 city, US tour.

What infrastructures of consumption produce obesity?



Example #3: Agriculture

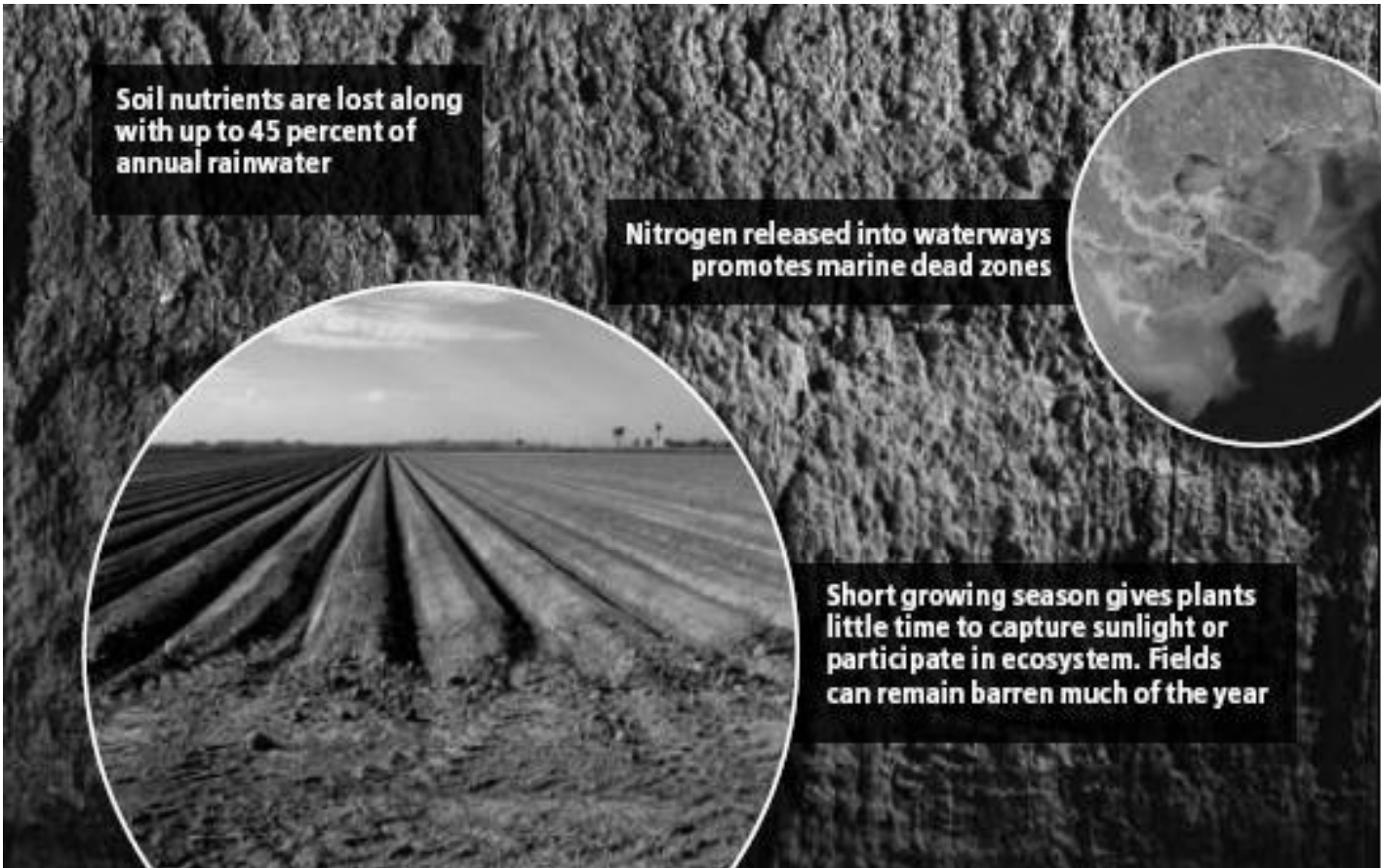


Annual, Monoculture – Soybeans




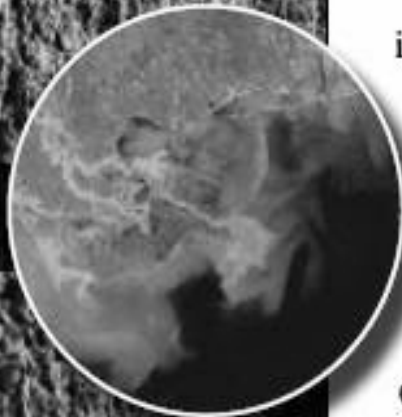
Annual, Monoculture – Wheat





Soil nutrients are lost along with up to 45 percent of annual rainwater

Nitrogen released into waterways promotes marine dead zones



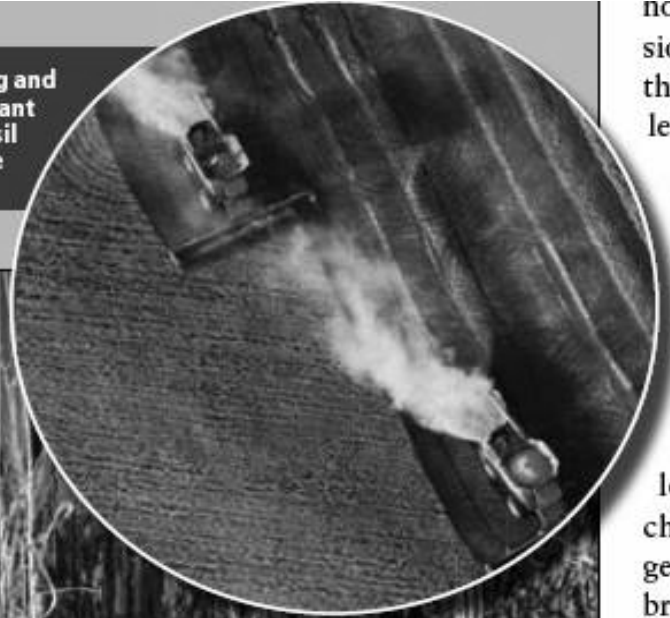
Short growing season gives plants little time to capture sunlight or participate in ecosystem. Fields can remain barren much of the year

JIM RICHARDSON (soil cross section); THE LAND INSTITUTE (insets on opposite page); JIM RICHARDSON (farm machinery); SEANIFS PROJECT (NASA/GSFC) AND GEOTE (dead zone); KEN CEDENO (tilled land); JACK DYKINGA (USDA/ARS) (erosion)

Another valuable tool for improving trace element nutrition is marker-assisted selection (MAS), which uses DNA markers to identify desirable traits in crops. "The use of MAS crosses as a breeding tool without having to wait for plants to grow to maturity is a significant advance," says "Cereals," by Salmeron; Science 2004]. At present, the only commercial plant breeding program in Washington State is for wheat, although it is only one of the crops already determined to be important for the state. *elongatum* wheat is an important perennial crop that reproduces sexually.

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Multiple passes of machinery in spring and fall to plow seedbeds, fertilize soil, plant seeds and apply herbicides use fossil fuels and generate carbon dioxide



ANNUAL



Small roots provide less access to water and nutrients and sequester little carbon

Topsoil and applied chemicals run off into waterways, increasing silt and polluting drinking water

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Perennial

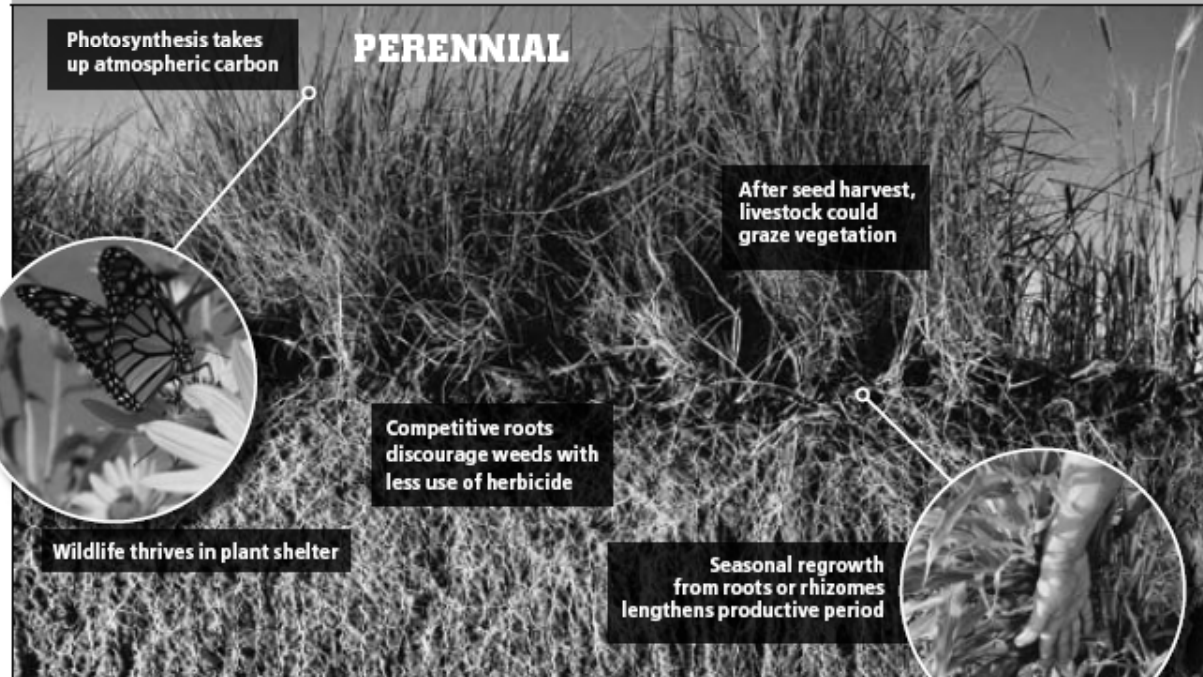


Experimental perennial wheat

[BENEFITS]

SUSTAINABLE FARMING: NEW VS. NOW

The potential advantages of future perennial crop plants are visible today by comparing perennial wheatgrass (*below left*) growing alongside domesticated annual wheat (*below right*). Although a perennial wheat could one day yield grains similar to those of the annual crop, it might live for many years and look much more like its wheatgrass relative belowground. Perennial crops would transform the process of farming and its environmental effects by using resources more effectively, thereby being less dependent on human inputs and more productive for a longer time. Perennials also anchor and support the ecosystem that nourishes them, whereas short-lived and short-rooted annuals allow water, soil and nutrients to be lost.



CARBON FACTOR

Global warming potential—greenhouse gases released into the atmosphere by crop production inputs, minus carbon

SOIL CARBON SEQUESTERED
(kilograms per hectare per year)

Annual crops 0 to 450

Perennial crops 320 to 1,100

GLOBAL WARMING POTENTIAL
(kilograms of CO₂ equivalent per hectare per year)

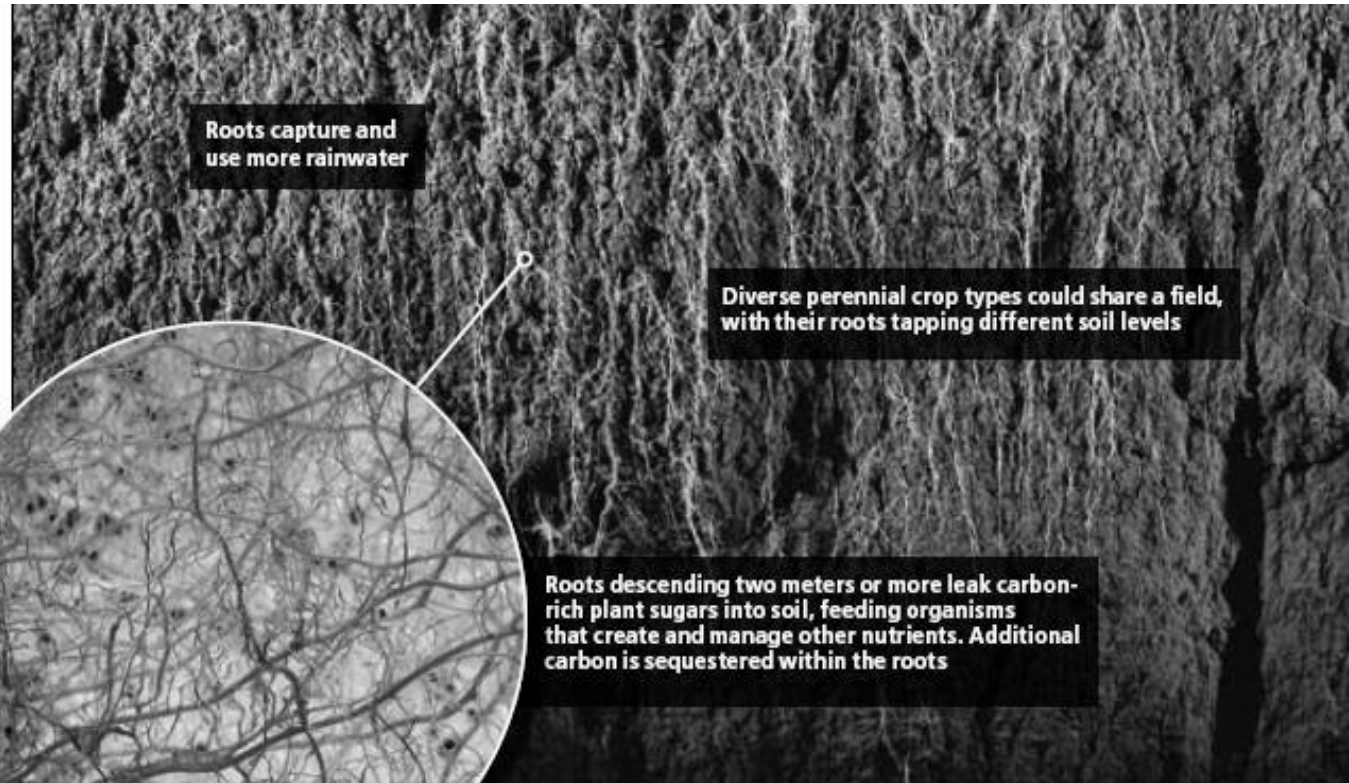
Annual crops 140 to 1,140

Perennial crops -1,050 to -200

ESTIMATED IMPACT ON YIELD OF 3° C TO 8° C TEMPERATURE INCREASE
(megagrams per hectare)

Annual crops -1.5 to -0.5

Perennial crops +5



[THE NEXT STEP]

CREATING A NEW CROP

To develop high-yield perennial crop plants, scientists and breeders can either domesticate a wild perennial plant to improve its traits or hybridize an annual crop plant with a wild perennial relative to blend their best qualities. Each method requires time- and labor-intensive plant crossbreeding and analysis. Native Americans spent thousands of years

domesticating the small-seeded wild annual sunflower (*a*) into the modern annual crop plant (*b*) by selecting and cultivating plants with desirable traits, such as large seeds and yields. Efforts are currently under way to directly domesticate wild perennial sunflower species (*c*) and also to produce hybrids of the modern annual and wild perennials (*d*).



Jackson's Land Institute



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- **Purpose:** develop agricultural system with ecological stability of prairie and grain yield of annual crops.



Mission Statement

When people, land, and community are as one,
all three members prosper;
when they relate not as members
but as competing interests,
all three are exploited.
By consulting Nature as the source
and measure of that membership,
The Land Institute seeks to develop an agriculture
that will save soil from being lost or poisoned
while promoting a community life at once
prosperous and enduring.

Eco Psyc

Key principles for Jackson

- Uncover culturally ingrained, hidden assumptions
- Mimic vs. Control
 - Abandon quest for control/certainty
 - Rethink assumptions of Descartes and Bacon
- Dialog vs. Domination
 - Conversation vs. Smart Resource Mgmt

Exercise – Imagining Attunement

- ◉ Domains of Human-Nature Relationships:
 - Agriculture / Food
 - Transportation
 - Energy Production
 - Trash
 - Exercise
 - Dwelling/housing
 - Social relationships
- ◉ Identify for each :
 - 1. Historic conditions
 - 2. Changes, technological and psychological
 - 3. Attunement path