KEYS

- Natural resource inputs are still essential
  - As is the exploitation of nature
- Natural resource industries are leading edge
  - & distribution networks key to location
- Industrialization creates resources
  - Dialectic of nature & economy
- Resource frontier always moving
- Resources can help or hurt development
  - It depends on social relations
Natural Resources & Industry

I. Resource Inputs
II. Resource Supply
III. Geographic Dynamics
IV. Resources & Development
I. Resource Inputs

A. • Natural Resources

B. Throughput

C. Nature’s Surplus
Labor & Nature

- Work on materials
- Work in fields
- With with water
- Powered by energy

+ natural processes
  - Invisible helpmates
Materials

- **Sources**
  - Minerals
  - Stone, gravel, lime, clay
  - Wood
  - Gas & oil

- **Uses**
  - Industrial metals
  - Coinage & jewelry
  - Building
  - Transportation (roads)
Energy

- **Sources**
  - Oil, gas, coal, hydro, wood, nukes

- **Uses**
  - Industrial
  - Transport
  - Residential
  - Commercial

![U.S. Energy Usage, by Sector (2004)](chart.png)
Water

Sources
- Rain, snow, glaciers, seawater
- Rivers, lakes, groundwater

Uses
- Agriculture (80%)
- Industry (10%)
- Commerce (5%)
- Domestic (5%)
Biomass

- Food supply
  - Farming
  - Agro-processing

- Raw materials
  - Fibers (cotton, flax, etc)
  - Biomass for energy

- Wood
  - Silvaculture
I. Resource Inputs

A. Natural Resources

B. • Throughput

C. Nature’s Surplus
Are Resources Obsolete?

- ‘Natural resources’ passé?
  - Economists vs. geographers

- ‘Information economy’ vs. ‘resource economy’
  - But still we go to war... why?

Michael Klare, *Rising Powers, Shrinking Planet*
Material Flows

- **Volume rises as industry grows**
  - Greater mass of output = more inputs

- **Efficiency rises with industrial progress**
  - Input per unit falls
    - Efficiency up 2% per year since 1970 (developed countries)
  - Substitution/replacement
    - Tubes to chips, glass to plastic, steel to aluminum

- **Net effect**
  - Resources falling as % of national & global output
  - Total mass of resource inputs still rising
Energy Inputs

- Rises with output (again)
  - Input per unit output falls
  - But total still rising
- Why energy is recalcitrant
  - Machinery grows
  - Transport grows
    - More flow of goods
  - Electricity grows
    - Age of electronics (info, controls)
  - Waste & open systems

[Graph showing U.S. Energy Use from 1950 to 1999]
[Graph showing Energy Efficiency by Sector]
Food & Water

- **Industrial living**
  - Food & water become dirt cheap with industrial supply
  - BUT...

- **Staff of life**
  - Health & disease
  - Markers of inequality
  - Quality of life

- **Land/space intensive**
  - Production less industrial
  - More subject to climate change
I. Resource Inputs

A. Natural Resources

B. Throughput

C. Nature’s Surplus
Exploiting Nature

- More than materials, energy, biomass...
- Nature yields an economic surplus
  - Value of output exceeds cost of inputs
  - Given to capital free (extra profits)
  - Impulse to exploit (push for profit)
Labor vs. Nature in Economics

- Physiocrats
  - Agrarian theory of value
    - France & agrarian base
- Political economists
  - Labor theory of value
    - Craft tradition & 18th C humanism
- Neo-classicals
  - Utility (consumer) value
    - v. Marxian theory of exploitation
- Return of nature
  - Ecological value
    - Exploitation of nature
II. Resource Supply

A. Production

B. Location

C. Markets
Extractive industries

- Specialized resource sectors
  - Supply other industries
    - Part of social division of labor
Geography of Extraction

- Tied to physical geography
  - ‘endowments’, ‘deposits’, ‘land’
  - But only up to a point (see below)
Mining as Industry
Energy Production
Water Supply
II. Resource Supply

A. Production

B. • Location

C. Markets
Location & Resources

- Classical location theory
  - Industry locates near resources
  - E.g., Pittsburgh, Niagara

- In fact, most resources move to industry
  - Resource distribution
Distribution infrastructure
- Highways, railways, pipelines, wires, etc.

Capital intensive
- & technically sophisticated

Large firms
- ‘Natural monopoly’
Best-Served Places

- Near infrastructure
  - Pipelines, ports, rail, roads, etc.

- In most developed areas
  - Rich nations
  - Big cities
  - Industrial parks

  - another factor in agglomeration economies
Power Lines

- Creating supply
  - Distribution brought to industry
  - Too important to leave to chance…

- Politics & provision
  - E.g., Hetch Hetchy
  - E.g., Bush Jr. Administration ordered quick approval of transmission lines & pipelines across federal lands, including national parks
II. Resource Supply

A. Production

B. Location

C. Markets
Resource Exchanges

- Global ‘commodity’ exchanges
  - Oil, gold, nickel, titanium, etc.

- Commodity futures & options
Geography of Exchanges

- Major commodity exchanges
  - London Metal Exchange (LME)
  - London Petroleum Exchange
  - New York Board of Trade
  - NY Mercantile Exchange & COMEX
  - Chicago Mercantile Exchange & BOT
  - [Old SF mining exchange]

- Warehouses near exchanges
  - E.g., Nickel - day’s supply near London
Resource Bubbles

- Resource bottleneck drives up prices
  - Usually in a boom or a war
  - Panic buying hits, prices soar
  - E.g., oil in 1973, 1979
- Financial furies hit resource markets
  - Rising resource prices draw speculators
  - E.g., 2008, as hedge funds fled mortgages
Natural Resources & Industry

I. Resource Inputs
II. Resource Supply
III. Geographic Dynamics
IV. Resources & Development
III. Geographic Dynamics

A. Resource Frontier

B. Making Resources

C. Race for Resources
Search & Discovery

- Rising demand unleashes search for resources
  - Timber
  - Sugar & tobacco
  - Coal
  - Gold & silver
  - Copper
  - Uranium
  - Titanium
  - Genetic material
  - Etc.

- Technical change key
Capitalist Vanguard

- Resources as frontier of capitalism
  - Conquest & colonies
  - National territorial expansion
  - Today’s globalization

- Primitive accumulation
  - Commodification of nature
  - Enclosure of the commons
  - Dispossession of people
Shifting Frontiers

- One, two, three – hop
  - Demand triggers search
  - Local resources exploited
  - Exhaustion » relocation

- Therein lies a world’s history…
  - Europe island hops to America
  - US gold & silver strikes
  - US timber cutting
  and on and on....
III. Geographic Dynamics

A. Resource Frontier

B. Making Resources

C. Race for Resources
Supply on the Home Front

- Counterpoint to extensive frontier – intensification at home

- Europe the first center of modern mining
  - Early manufacturing era, 1450-1750
  - Industrial Revolution in Britain, 1700-1850
North America

- USA next great center of mining
  - World leader from 1850 to 1950
    - Gold Rush & western minerals
    - NE Coal & SW oil
    - Dams & aqueducts
  - Canada follows, supplying USA
Industry Creates Resource Places

- **Demand side**
  - Need for resource inputs
  - High demand » high prices » profitability

- **Supply side**
  - Investment
  - Machinery
  - Know-how
Industrial Leaders

- First modern industries
  - Smelting, metallurgy
  - Steam engine, hydraulics
  - Drilling, elevators, pumps
  - Mills as proto-factories
Moral of the Story

- Capital works both ends - supply & demand
  - Modern industry creates own resource supplies

- Endogenous character of industrialization
  - recall: industry creates places...

- But there are natural limits
  - Natural endowments uneven
  - Stocks can be exhausted
  - We foul our own nest
    (see lecture on waste)
III. Resource Dynamics

A. Making Resources

B. Resource Frontier

C. • Race for Resources
Epochs of Expansion

- Early modern era
  - Europe moves east & north
  - Europe jumps the Atlantic

- Industrial revolution era
  - Britain moves north
  - US moves west
  - Europe grabs Africa
US Global Octopus

- 20th century
  - Canada
  - Latin America
  - Africa & Asia
- Postwar empire
  - Resources for the Future
  - New multinationals
Japan’s Global Reach

- Resource poor with rapid postwar growth
- Mining & trading companies
China’s Appetite

- Massive demand
  - Iron, copper, oil, etc.
- Global search
  - Alliances of convenience
- Pulling up others
  - Asia, Africa, Latin America
Race for Africa

- Chinese investments
- US African Command
- Land purchases
- War in the Congo
New Global Players

- Head to head in Asia
  - China vs. Japan
  - China’s periphery
- New multinationals
  - South to South investments

[Map showing EEZ border claimed by Japan and China]
Natural Resources & Industry

I. Resource Inputs
II. Resource Supply
III. Geographic Dynamics
IV. • Resources & Development
IV. Resources & Development (Territory – Regional or National)

A. Resource Curse?
B. When Resources Fail
C. Dross into Gold
D. Resource Booms
A Resource Curse?

- Resource rich, economically poor
  - Jamaica, NE Brazil, Portugal
  - W. VA., Montana, NorCal

How to explain?
- Colony? (force & exploitation)
- ‘Staples’ (terms of trade)
- ‘Dependency’ (one-dimensional economy)
- ‘Dutch disease’ (inflation hurts exports)
Global Division of Labor

- Manufacturing vs. resource supplier nations
  - Primary products, staples
  - Colonial & neo-colonial
IV. Resources & Development

A. Resource Curse?
B. •When Resources Fail
C. Dross into Gold
D. Resource Booms
Failure of Prices

- Market glut
  - Too many producers
  - Intense competition

- Terms of trade
  - Manufacturing gains
  - Primary products lose
    - (even oil!)

A raw tale
The Economist industrial commodity-price index
Real terms, 1845-50=100

Source: The Economist  *Adjusted by US GDP deflator
Failure to Capitalize

- Lack of control
  - Outside owners
  - Internal *rentiers*
  - Weak state/royalties
- Outflow of rents
  - No surplus
  - No savings
  - No investment
Failure to Industrialize

- Stuck in extraction
  - No processing
  - No suppliers
  - No multiplier

- Foreign-owned industry (dependency)
  - Loss of profits & wages
  - Lack of competence
  - Lack of labor skill
IV. Resources & Development

A. Resource Curse?
B. When Resources Fail
C. •Dross into Gold
D. Resource Booms
Natural Wealth

- Rentier Riches
  - Families
    - Guggenheim, Hearst, Getty, Bush, etc.
  - Places
    - Saudi Arabia, Dubai, Venezuela, Texas, California, Australia, South Africa
Regional Success

- Local accumulation
  - Property & access
  - Banking centers
  - Reinvestment

- Industrialization
  - Processing
  - Machinery
  - Infrastructure
  - Tech. innovation
National Success

- Canada
  - Despite fears of Innis
  - Even Quebec
- Australia
  - Still booming
IV. Resources & Development

A. Resource Curse?
B. When Resources Fail
C. Dross into Gold
D. •Resource Booms
Resource Surges

- Economic upswings drive prices up
- High prices trigger search and extraction
- Waves of extraction hit producer regions
- Boom times – for some
Boomtowns

- Sudden prosperity
  - New investment
  - Output rise
  - Labor influx

- Chaotic growth
  - Male, single, ‘sin’, shacks, etc.

- Ghost towns
  - Aftermath
The China Price

- China’s resource ripple effect
  - Australia
  - Latin America
  - Africa
  - Central Asia

[Graphs and charts related to merchandise trade balance and economic growth in Africa over ten years.]
Torn Asunder

- Internal struggles over resource wealth
  - Iraq
  - Nigeria
  - Bolivia
  - Burma
  - Tibet