LECTURE 21

Natural Resources & Industry
Natural Resources & Industry

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

A. Natural Resources

B. Throughput

C. Nature’s Surplus
Labor works with 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)](image-url)
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
  - Silviculture
I. Resource Inputs

A. Natural Resources

B. • Throughput

C. Nature’s Surplus
Are resources obsolete?

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

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

No War
For Oil
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
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
Exploitation of 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 (see lecture 24)
Labor v. 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. Marxist theory of exploitation

- **Return of nature**
  - *Ecological value*
    - Exploitation of nature
Natural Resources & Industry

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

A. • Production

B. Location

C. Markets
Extractive industries

- Specialized resource sectors
  - Supply other industries
    - Part of social division of labor
Mining
Energy
Water supply
Geography of extraction

- Tied to physical geography
  - ‘endowments’, ‘deposits’, ‘land’
  - *But only up to a point (see below)*
II. Resource Supply

A. Production

B. • Location

C. Markets
Location & resources

- Classic (Weberian) location theory
  - Industry moves to resources

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

- Capital intensive
- Technologically sophisticated
- ‘Natural monopoly’
Best locations

- 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…

- Capital investment
  - Power, water, transport

- 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

A. • Markets
Resource exchanges

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

- Commodity futures & options
Global market geography

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

- Warehouses near exchanges
- Nickel - day’s supply near London
Natural Resources & Industry

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

A. Resource Frontier

B. Making Resources

A. Race for Resources
Growth & resource search

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

- Technical change key
Capitalist vanguard

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

- Primitive accumulation
  - Commodification of nature
  - Enclosure of the commons
  - Dispossession of people
The shifting frontier

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

- Therein lies a world’s history…
  - Central Europe to Scandinavia
    - Metals & wood
  - Europe’s American colonies
    - Silver mines & sugar islands
  - Britain moves north
    - Wood to water to coal
III. Geographic Dynamics

A. Resource Frontier

B. •Making Resources

C. Race for Resources
Resource supply at home

- 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
Industrialization ‘creates’ resource supply

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

- **Supply side**
  - Investment
  - Machinery
  - Know-how
Leading role of resource sectors

- First modern industries
  - Smelting, metallurgy
  - Steam engine, hydraulics
  - Drilling, elevators, pumps
  - Mills as proto-factories
Moral of 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
III. Resource Dynamics

A. Making Resources

B. Resource Frontier

C. • Race for Resources
Epochs of Expansion

- Colonial era
  - Europeans divide Africa
- Postwar era
  - US demand & global reach
    - Resources for the Future
- Asian competition
  - Japan & China
US global octopus...
Japan’s global reach
China’s resource appetite

- Massive demand
  - Iron, copper, oil, etc.

- Rising global prices
  - Squeeze profits in China

- China’s global search
  - Alliances of convenience
New Global Competition

- Price run-up in 2000s
  - triggers new scramble
- China panic?
  - New African Command

[Image: Chart showing China's imports of soybeans, crude oil, and copper ore and concentrate from 1999 to 2007.]

[Image: The Economist magazine cover with articles listed.]
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IV. • Resources & Development
IV. Resources & Development

A. • Resource Curse?
B. When Resources Fail
C. Dross into Gold
D. Resource Booms
Are resources a 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)
International division of labor

- Manufacturing nations vs. resource supplier nations
  - (primary products, staples)
IV. Resources & Development

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

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

- Market glut
  - Too many producers
  - Intense competition

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

‘Dutch disease’ rare
Failure to industrialize

- Lack of industry (primary producer)
  - No processing
  - No suppliers
  - No multiplier

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

A. Resource Curse?
B. When Resources Fail
C. *Dross into Gold*
D. Resource Booms
California’s mineral wealth

Figure 4: All California Mineral Production, 1887-1940

Figure 3: California Crude Oil Output, 1903 - 1940

Data Source: Output from Conservation Committee of California Oil Producers and average per barrel price as well from U.S. Department of Commerce/Bureau of the Census, Historical Statistics of the United States and Statistical Abstract of the United States.
Capitalist success story

- Local accumulation
  - Property & access
  - Banking centers
  - Reinvestment
- Industrialization
  - Processing
  - Machinery
  - Infrastructure
  - Tech. innovation
Leading role of resource sectors

- Capital Accumulation
  - Guggenheim, Hearst, Getty, Bush
  - Saudi Arabia, Dubai, Venezuela
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 growth hit producer regions
Riding the China wave

- China’s ripple effect
  - Australia (west)
  - Latin America
  - Africa
  - Central Asia
Boomtowns

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

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

- Ghost towns
  - Aftermath
Torn asunder

- Internal struggles to control resource wealth
  - Iraq
  - Nigeria
  - Bolivia
  - Burma