EPSc 116A: Resources of the Earth
Some Main Points of Lecture 2 on Ch. 3: Earth Resources through History

Themes: Resource usage: Where are we now? Where did we come from? Where are we going? Is the rest of world also going there?

Kinds and amounts of materials used; see Fig. 3-1 in text (Cf. “Baby figure”).

United States Geological Survey (USGS) slide shows changes in demands for materials 1900-1995.

The “needs of the day”; relation between (perceived) need and usage--effect of availability.

Earliest times: drinking water, salt, stone for tools (flint), pigments.

15,000 B.C. humans already using metals. Which ones and why? Au and Cu. Not Fe??

9000 B.C. humans used fire clay to fabricate pottery.

By 4000 B.C., had learned to smelt copper sulfides to recover metal. Use of charcoal for heat and as a reducing agent.

During Dark Ages (500-1000 A.D.), little exploitation and usage of resources. Then in 800, discovered Erzgebirge metal deposits in Germany.

Control over resources means power.

How has resource availability affected course of history?
   Example of Roman empire. Lessons?
   Spanish empire cf. British empire in the Americas

Your book Fig. 3.8 shows a time line with lists of the chemical elements that were discovered.

Industrial Revolution 1700’s & 1800’s: example of more complex, higher-order resource needs
   coal and iron
   James Watt’s steam engine in 1770
   system of railroads

Industrial Revolution also brought more widespread pollution.

Efficiency of production leads to more goods at lower prices. Question: Good and bad??

Where’s the problem?
   US has 5% of world’s population, but uses about 30% of mineral resources (pollution)
   World requirement, to match US standards, would be 7-8X increase in production/year

Over
How do countries “pull this off”?

- **Table 3.1** on U.S. production and usage figures for commodities, in 1875 and 2005.
- **Table 3.2** on % of known world reserves of commodities in 6 industrial countries
- **Fig. 3.9a** on % importation by U.S. of resources/commodities in 2008
- **Fig. 3.11** on changing proportion of U.S. production of important metals

**Question:** What are the problems with import reliance?

**Fig. 3.9b** takes data from Fig. 3.9a and organizes it geographically. See major players.

How and why are Japan and U.S. different in their resource situation (geologic & economic)?

natural evolution of supply-demand system

- **Fig. 3.10** shows traditional stages in mine development: follow each curve/parameter over time.
  Also envision snapshot of a given country at this moment in time.

Efficiency can stave off some of the “senescence” in mine development.

Problems faced by U.S. and other countries in “mid-life”

- increases in efficiency will taper off
- high development costs: technology costs; safety assurance; good labor practices
- environmental restrictions and responsibilities increase, which increases production costs

How are we doing? How concerned/freaked should we be? The reserve situation is one good measure.

**Fig. 3.12** shows changing availability for different KINDS of resources. Explain “20th Century U.S. Mineral Prices Decline in Constant Dollars”: USGS Open-File Report 00-389

International issues

- who “owns” the resources: govt. vs. individuals; nationalization
- the BIG SIX: U.S., Canada, South Africa, Australia, Russia, China (much unknown)
- international trade – e.g., Iran (oil, Strait of Hormuz)
- cartels and syndicates: **Table 3.3** Economic leverage: good and bad. OPEX, DeBeers
- ocean-mining: exclusive economic zones
- effect of government subsidies

Strategic resources: rather open-ended definition. Stockpiling.

Modern trends:

- rate of mineral resource usage>> rate of population growth
- increasing % of resources used in a country “must” be imported
- governments intervene in various ways: regulations, subsidies, cartels

››› Don’t forget to turn in the write-up on Science vs. Beliefs next Monday.