People, Products, and Minerals
Unit 1/Activity 3

Economic Development and Resource Use

Learning Outcomes

- Infer the relationships among sustainability, resource availability, population growth, and economic development

Economic Development and Resource Use

The gross domestic product (GDP) of a country is frequently used as an indicator of a country's economic performance and its level of development. A per capita GDP is the overall GDP divided by the number of people in that country and can be used to more easily compare the economic performance of countries with different population sizes.

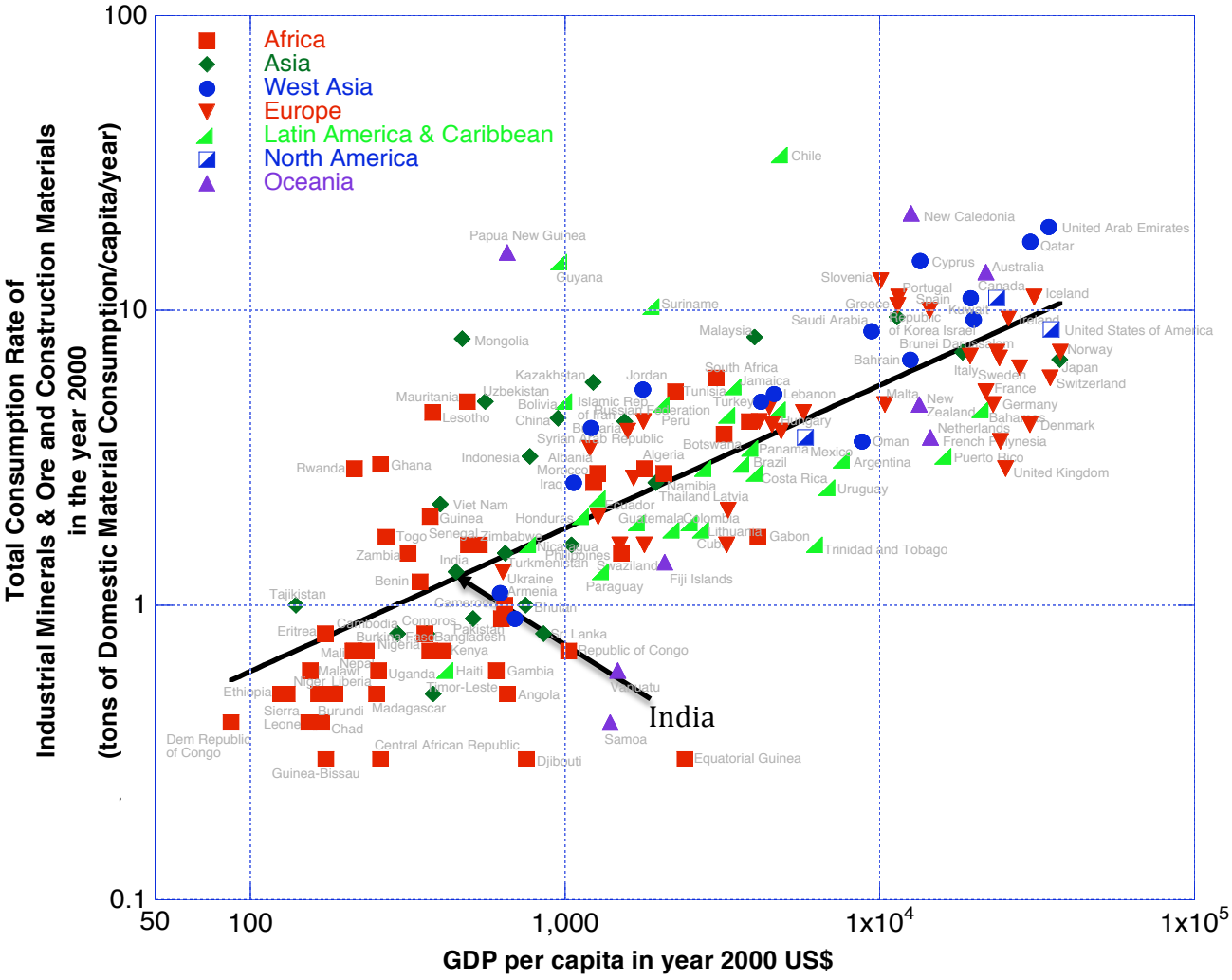

Figure 1. ***The relationship between gross domestic product (GDP) per capita and the total domestic consumption rate of industrial minerals & ore and construction material in tons per capita for ~150 different countries in the year 2000*** (Modified from UNEP Decoupling Report, 2011; Consumption (metabolic) rate data from Steinberger et al., 2010; GDP data from http://data.worldbank.org/indicator/ NY.GDP.PCAP.KD); Country region from http://unstats.un.org/unsd/methods/m49/m49regin.htm with the exception of considering Mexico as part of North America). Not all the countries plotted are labeled above due to space restrictions.

The plot above shows the per capita GDP of many countries versus a measure of their natural resource *consumption rate*. In this case, *consumption rate* is the domestic extraction of a material plus its imports minus its exports of those same materials (in tons per capita per year). In this case, the natural resources measured are Industrial Minerals & Ore and Construction Materials. As the legend denotes, different regions of the world are indicated by markers of different colors and shapes.

Questions

1) Provide the names of two countries that consume approximately the same amount of resources but have widely varying per capita GDP's.

2) Provide the names of two countries that have approximately the same per capita GDP but have widely varying total consumption rates.

3) Despite the pairs noted above, use the trend line in Figure 1 to describe the overall relationship between a country's wealth, as defined by its per capita GDP, and the amount of natural resources used (per capita), as defined by its total consumption rate.

4) Is India more or less developed (as determined by per capita GDP) than most of the Latin American and Caribbean countries (which includes South America)?

5) Using this trend (from #3) predict what will happen as India's economy grows.

Figure 2 (*below*) shows consumption and extraction trends for various types of products in three different regions (North America, South America, and India) since around 1970.

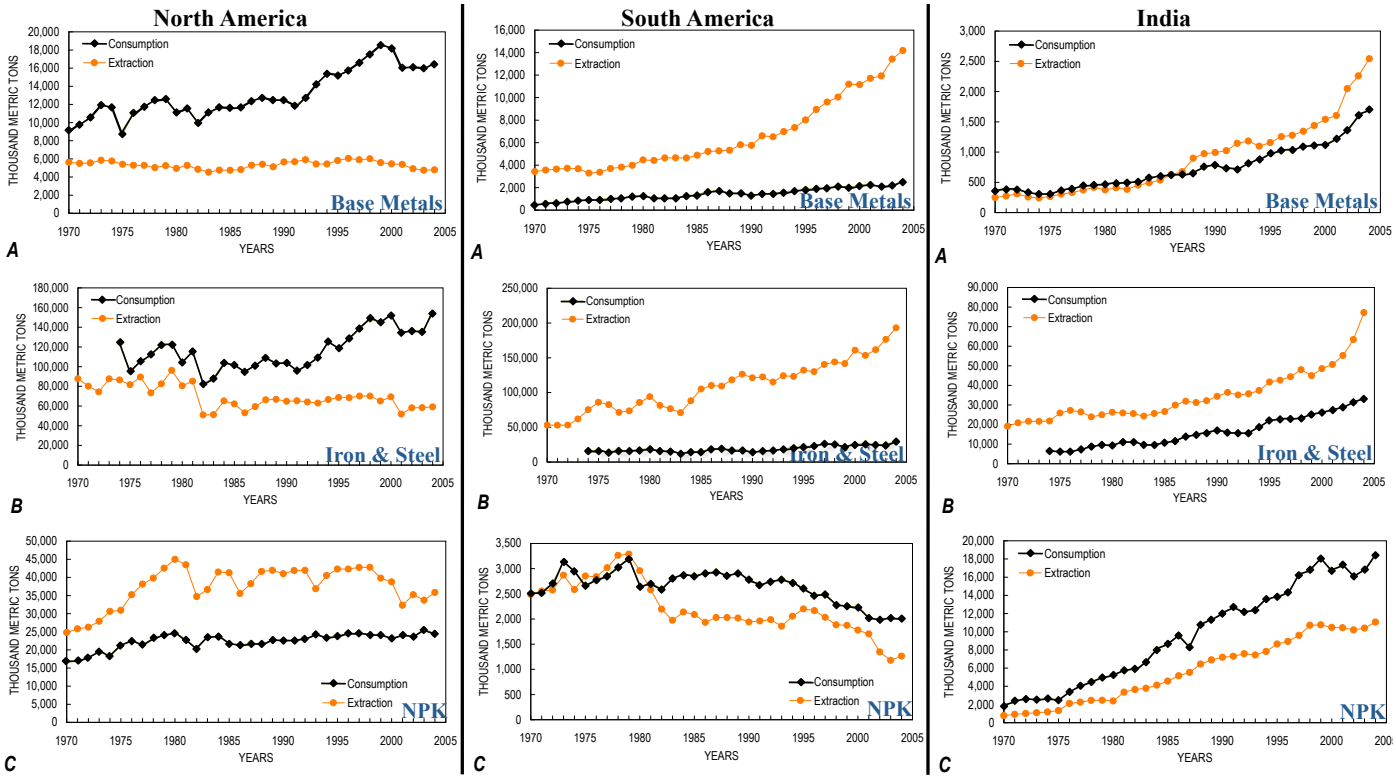

Figure 2: ***Consumption and extraction of various specific commodities in thousand metric tons for North America (left), South America (middle) and India (right).*** **A. Base metals (Aluminum, copper, lead, and zinc); B. Iron and steel; C. NPR (Nitrogen, phosphorus, and potassium), components often used in the production of fertilizer. From Rogich and Matos, 2008. North America includes the Canada, the United States, and Mexico.**

6) Describe the trends in consumption (toward more recent times) for all three regions.

7) Give a possible explanation for the trends in consumption in India. In North America?

8) India currently uses more NKP than South America, even though India is less developed. Why might that be the case?

Source Information for Figures:

Figure 1 Consumption (Metabolic) Rate data:

Steinberger, J., Krausmann, F., and Eisenmenger, N. (2010). "The Global Patterns of Materials Use: A Socioeconomic and Geophysical Analysis." *Ecological Economics* 69, no. 5: 1148–58. Data downloaded for plotting from: http://www.uni-klu.ac.at/socec/inhalt/3812.htm (see "Get data" link).

Figure 1 GDP per capita for constant 2000 US$ data for the year 2000:

Downloaded from http://data.worldbank.org/indicator/NY.GDP.PCAP.KD.

Figure 1 Country Classification:

From the United Nations Statistics Division at http://unstats.un.org/unsd/methods/m49/m49regin.htm. Exception is that Mexico is considered on the plot to be part of North America, rather than Latin America/Central America.

Figure 1 concept (and general source of information):

Fischer-Kowalski, M., Swilling, M., von Weizsäcker, E. U., Ren, Y., Moriguchi, Y., Crane, W., Krausmann, F., Eisenmenger, N., Giljum, S., Hennicke, P., Romero Lankao, P., Siriban Manalang, A., and Sewerin, S. (2011). *Decoupling Natural Resource Use and Environmental Impacts from Economic Growth.* A Report of the Working Group on Decoupling to the International Resource Panel. United Nations Environment Programme. Downloaded from http://www.unep.org/resourcepanel/decoupling/files/pdf/decoupling_report_english.pdf on November 15, 2012 (Figure 2.6 on page 14).

Figure 2: Data and concept

Rogich, D. G., and Matos, G. R. (2008). "The Global Flows of Metals and Minerals." U.S. Geological Survey Open-File Report 2008-1355. 11 pg., available only online at http://pubs.usgs.gov/of/2008/1355/.

Other Information:

Fridolin, K., Gingrich, S., Eisenmenger, N., Erb, K.-H., Haberl, H., and Rishcer-Kowalski, M. (2009). "Growth in Global Materials Use, GDP and Population During the 20th Century." *Ecological Economics,* 68, no. 10: 2696–705.

Gross Domestic Product. *Encyclopedia Britannica* http://www.briannica.com/EBchecked/topic/246647/gross-domestic-product-GDP) (accessed November 15, 2012).

SERI, 2011. Global Resource Extraction by Material Category 1980–2008. . http://www.materialflows.net/trends/analyses-1980-2008/global-resource-extraction-by-material-category-1980-2008/ (accessed September 12, 2012).