

## Unit 1. Scope of the problem

### Reading assignments

Date	Reading	Discussion/presentations
Tuesday, Jan. 18	None	Course goals and mechanics
Thursday, Jan. 20	Brown, Chapter 1, <i>Selling Our Future</i>	The challenge of sustainability
Tuesday, Jan. 25	Brown, Chapter 2, <i>Population Pressure: Land and Water</i>	Limits to land and water
Thursday, Jan. 27	1. Wackernagel et al, <i>Tracking the ecological overshoot of the human economy</i> 2. Fund for Peace, <i>FSI Indicators</i> (handout and <a href="http://www.fundforpeace.org">www.fundforpeace.org</a> , "Failed States Index 2010" button)	Indicators for sustainability

## **Learning objectives and assessments**

1. Develop a sense of the challenges of sustainability (Brown).
  - a) Describe underlying reasons why recent trends in grain prices differ from fluctuations of previous decades.
  - b) Explain how food security is affected differently by the melting of ice sheets (e.g., the Greenland ice sheet) vs mountain glaciers.
  - c) Explain the sense in which international land acquisitions, rising food prices, and market mechanisms constitute a positive feedback loop.
  - d) Describe differences between how decisions are made in market-directed economies vs in centrally-directed economies.
  - e) Explain how the service value of a natural asset (oceans, rivers, fossil fuels, the atmosphere) is different from its commodity value. Example: forests of the Yangtze River valley are worth more as flood-preventers than as lumber.
  - f) Sketch cross-sectional diagrams of fossil and non-fossil aquifers.
  - g) Describe why large-scale dust storms in China are more common today than in previous decades.
  - h) Explain why depletion of underground water presents a greater threat to grain production in India and China compared to the US.
  - i) Explain how importing grain can compensate a nation's water shortage.
  - j) Describe developments in the last decade that have led to tighter connections between the price of grain and the price of oil.
  - k) State the four objectives of Plan B, and describe their interdependences.
2. Be familiar with regenerative models for tracking sustainability (Wackernagel et al).
  - a) State six human activities that require the most biologically productive space.
  - b) State the approximate areas currently available for food-related use (growing crops, grazing, and fishing) globally.
  - c) Describe economic information provided by aggregate biophysical indicators.
3. Be familiar with state stability as it relates to sustainability (Fund for Peace).
  - a) Discuss indicators 1-12 used by the Fund for Peace to rank the viability of states.
  - b) Name a few states in worst (FSI>90) and best (FSI<30) categories.
4. Develop quantitative skills (lecture).
  - a) Write numbers in scientific notation to a specified number of significant figures.
  - b) Define the meaning of prefixes "mega" and "giga".
  - c) Carry out exponential growth and decay calculations.
  - d) Carry out calculations using input/output tables.