Lecture 10: Natural Capital, a System of Environmental Accounts

Prof. Theising

Environmental Economics

Econ 4075

Who is better off?

$$$$$

Income
(GDP)

$$

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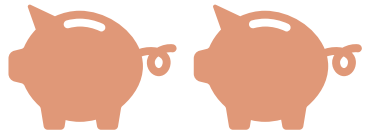
Savings (stocks)



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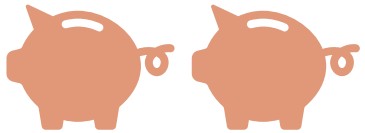
Drinking Water



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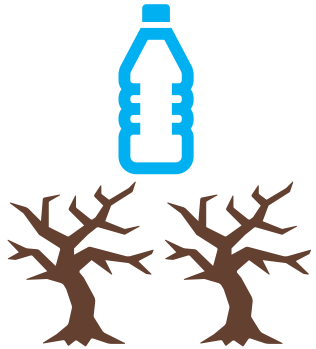

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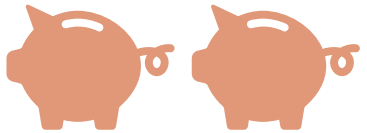

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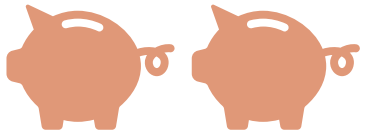

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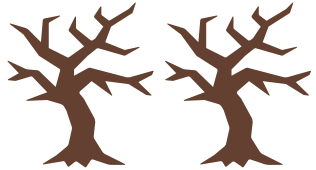

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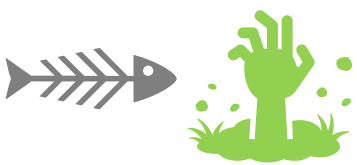
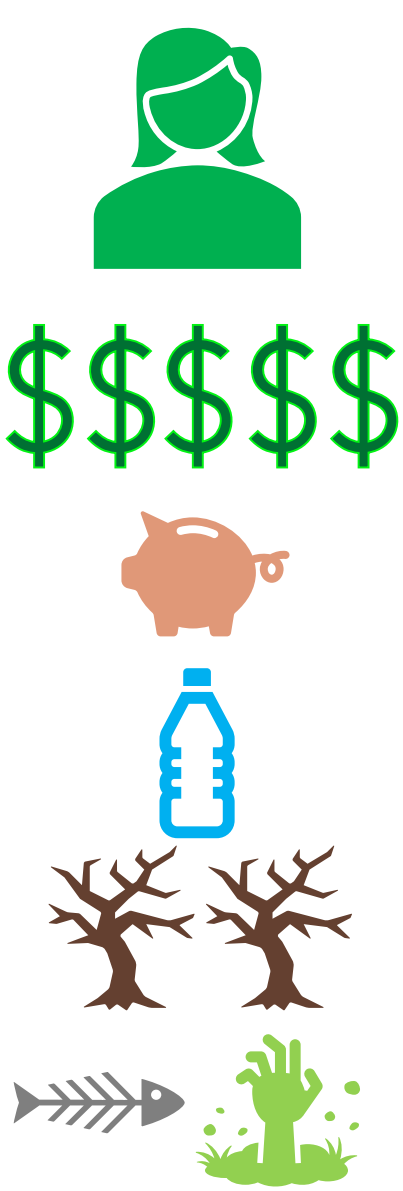
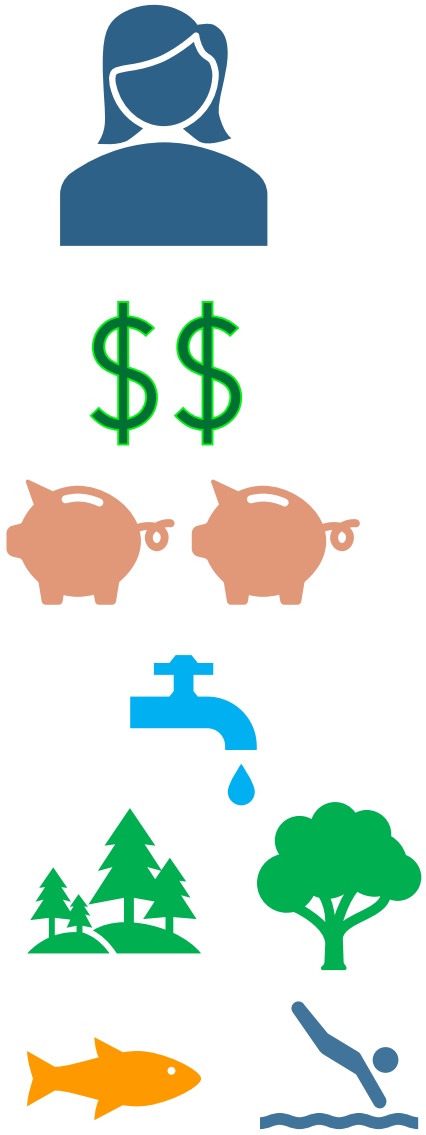


Aquatic Health



Who do we want to represent our future selves, or future populations?



Robert F. Kennedy's remarks at the University of Kansas; March 18, 1968

“Too much and for too long, we seemed to have surrendered personal excellence and community values in the mere accumulation of material things. Our Gross National Product…counts air pollution and cigarette advertising, and ambulances to clear our highways of carnage. It counts special locks for our doors and the jails for the people who break them. It counts the destruction of the redwood and the loss of our natural wonder in chaotic sprawl. It counts napalm and counts nuclear warheads and armored cars for the police to fight the riots in our cities.

Yet the gross national product does not allow for the health of our children, the quality of their education or the joy of their play. It does not include the beauty of our poetry or the strength of our marriages, the intelligence of our public debate or the integrity of our public officials. It measures neither our wit nor our courage, neither our wisdom nor our learning, neither our compassion nor our devotion to our country, it measures everything in short, except that which makes life worthwhile.”

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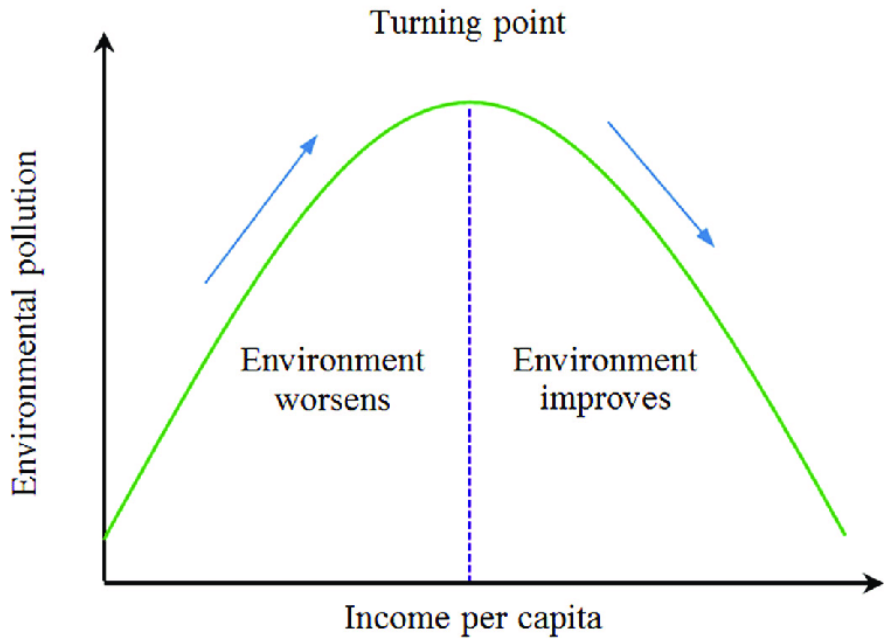
- Simon, the inventor of GDP, warned of exactly the type of devotion to a single metric!

So, are we doomed?

- Probably not in the way that is suggested by *The Limits to Growth* argument. Why?
- We know that scarcity provides prices, it provides incentives, and it drives societal change in ways that were not accounted for in the *Limits*.
- We also know that technological change is an incredible thing.
- Can this help explain the intuition behind the shape of the Environmental Kuznets Curve?



Sustainability, in Economic Terms

- The economic lulls of the 1970's and 1980's spurred a bunch of critical thought on what the term "sustainability" actually means. Clearly defined terms help advance conversations.

- Robert Solow provided one of the most widely adopted definitions in economics:

    - **Sustainability requires that we leave future generations the capacity to be as well off as we are, as to avoid enriching ourselves by impoverishing our successors.**

Sustainability in Economic Terms

The motivation underlying Solow's definition is not new:

"The nation behaves well if it treats the natural resources as assets which it must turn over to the next generation increased, and not impaired, in value; and behaves badly if it leaves the land poorer to those who come after it. That is all I mean by the phrase, conservation of natural resources. Use them; but use them so that as far as possible our children will be richer, and not poorer, because we have lived."

– Theodore Roosevelt, 1910

Sustainability, in Economic Terms

- More from Solow:

  "The standard of living achievable in the future depends on a bundle of endowments, in principle on everything that could limit the economy's capacity to produce economic well-being. That includes nonrenewable resources, of course, but it also includes the stock of plant and equipment, the inventory of technological knowledge, and even the general level of education and supply of skills. **A sustainable path for the economy is thus not necessarily one that conserves every single thing or any single thing. It is one that replaces whatever it takes from its inherited natural and produced endowment, its material and intellectual endowment. What matters is not the particular form that the replacement takes, but only its capacity to produce the things that posterity will enjoy.** Those depletion and investment decisions are the proper focus."

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- Robert Solow provided one of the most widely adopted definitions in economics:
    - Sustainability requires that we leave future generations the capacity to be as well off as we are, as to avoid enriching ourselves by impoverishing our successors.

- Building on this definition of sustainability, think back to intermediate economics and the concept of scarcity rent.

- Is extracting a scarce resource (natural nonrenewable resources) necessarily a bad thing? Likely depends on what we do with those scarcity rents (revenues)!

Sustainability, in Economic Terms

- Examples of investments made using scarcity rents
    - Norway establishes a Petroleum Fund to invest tax revenues from oil companies operating in the North Sea. That fund is now worth over $7 trillion dollars! That's 20x their annual GDP.
    - Similar, the Alaska Permanent Fund is at $70 billion
    - Contrast this with UK's use of these scarcity rents, used to boost current consumption in the 1980's and lift them out of a recession.

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- Is it clear which one of these approaches is consistent with the definition of economic sustainability? While Norway and Alaska sure seem like winners, arguments could be made that UK was also acting sustainably.

Investing in a Hypothetical Future

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- But in seeking “sustainability” for future generation about which we know very little about, do we dismiss the very real inefficiencies of today’s wealth distributions?

- Overinvesting in climate policies today that will benefit future generations could amount to shifting the consumption of poor residents in poor countries today to their future, likely wealthier, counterparts.

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- On Earth Day, April 24th, 2022, The Biden Administration announced a new effort to establish a system of environmental accounts for the United States.
- How would this work, and how does it compare to GDP?
- It's useful to think of the proposal as a correction to traditional measures of income. For example, Net Domestic Product (NDP) is GDP minus the depreciation in capital.
- But what forms of capital are currently included?

Correcting GDP for Natural Capital Depreciation

- As with any capital, depletion of a natural resource depreciates its value.

Example: Coal Extraction

  - The extraction of 1 ton of coal adds $20 to GDP
  - Accounting for the depreciation of the mining equipment adjusts GDP to a measure of GNP of $10
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- Which measure is more useful for evaluating economic sustainability?

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- However, if the economic value of the excluded capital has increased overtime, then the bias has also.
- For example, wealthier societies participate more in outdoor recreation. Often competing with production things like mining that *are counted* in GDP/NDP!

This is happening.

- As you heard in the Fenichel podcast, cross-US-governmental efforts have just begun.

"But now, the first-ever U.S. National Strategy to Develop Statistics for Environmental-Economic Decisions (National Strategy) recognizes and addresses this issue. **It creates a U.S. system to account for natural assets—from the minerals that power our tech economy and are driving the electric-vehicle revolution, to the ocean and rivers that support our fishing industry, to the forests that clean our air—and quantify the immense value this natural capital provides. This National Strategy will help us understand and consistently track changes in the condition and economic value of land, water, air, and other natural assets**. It will also help the federal government fulfill its responsibility to the American people to provide a fuller understanding of our economy. And it will provide data to guide the federal government and the economy through the transition we need for sustainable growth and development, a stable climate, and a healthy planet.

- This is a 10-15 year gov't project… but will also surely impact how private industry measures ESG impacts. Exciting opportunities out there…

Last thoughts:

From the conclusion of Solow's RFF monograph:

"I have suggested that an innovation in social accounting practice could contribute to more rational debate and possibly to more rational action in the economics of nonrenewable resources and the approach to a sustainable economy. There is a trick involved here and guess I should confess what it is. **In a complex world, populated by people with diverse interests and tastes, and enmeshed in uncertainty about the future (not to mention the past), there is a lot to be gained by transforming questions of yes-or-no into questions of more-or-less**. Yes-or-no lends itself to stalemate and confrontation; more-or-less lends itself to trade-offs. The trick is to understand more of what and less of what."

Next class

- Prof. Austin takes over for a couple weeks starting on Wednesday!

- **Reminder:** Case Study #2 is on the course github repository. Hopefully you are finding it a great introduction to climate-economy models, DICE, and coding, all in one! Due Oct 2nd by 11:59pm