Real-world-economics-outline

Friday, April 24, 2015

Contents

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1 INTRO

1.0.0.1 Importance of economic dynamics for the earth system and global sustainability

- Human economic activitiy has a deciding role for the future of our planet. Yet some may argue that economics out of the three pillars of sustainability development - the social, the economic and the environmental - is the pillar least integrated in current approach to sustainability science.
- The human economy is a driving factor of biodiversity loss and climate change. At the same time, global economic inequalities themselves can be viewed as one of the greatet barriers for addressing global environmental and socio-economic challenges.

- At the same time Growth in human population and the economy are two trends that epitomizes the current environmental challenges of biodiversity loss and climate change and improvementes in living standards in many countries that have undergone economic growth in the 20th and 21st century. Associated with these trends is the dilemmas of global equity on a finite planet, including the question of whether countries with large economic prosperity need to consume less to allow the developing countries to achieve similar living standards.
- In this context, understanding how the economy is linksed to the environment and to social aspects of society is of foundational importance for the science of global sustainability.
- It is therefore concerning that scientific fields of the three pillars of sustainability are still only connected to a very limited extent. In particular, the field of economics and finance remains the pillar most poorly addressed by sustainability science [**REF**]. This is of great concern for the prospects of sustainable development guided by sound advice from the scientific community.
- To address the need to integrate economics and finance better with sustainability science, in this Sustainability Science perspective we highlight two areas of importance:

  1) recent advances in integrating economics into sustainability-oriented sciences.
  2) major gaps for integrating economic into sustainability-oriented sciences.

1.0.0.2 A brief history of sustainability science - what concepts has been important for SS

- Sustainability science emerged as a unified discipline in the beginning of the 21st century (Bettencourt and Kaur 2011). Before and after its unification, contributions to sustainability science has mainly come from three broad fields, the social sciences, engineering and the biological sciences (Bettencourt and Kaur 2011).
- Contributions from these fields have mainly come from a small number of disciplinary clusters. For example, contributions from engineering has mainly come from systems and complex engineering and research. Contributions from the biological sciences have mainly come from the field of ecology with contributions to bidodiversity and ecosystem services. Similarly in the social sciences, contributions have not been evenly distributed across the field.
- *Maybe describe more here some of the important concepts of sustainability science - but may be too redundant for the type of article.*
- The contribution of the social sciences has remained fairly constant over time, but increased slightly since the unification in 2003 (Bettencourt and Kaur 2011).
- *Key papers* * Future challenges, Charles Perrings PNAS 2007 * "Although both economics and ecology are still full of examples of disciplinary myopia, the integration of the disciplines through such ventures has generated more flexible and adaptive solution to both the management and the science of common-pool environmenta resources (12, 13)." * Evolution of sustainability science * Beyond panaceas * Science Magazine, Introduction, Sustainability Science paper, Kates and … * William C. Clark and Nancy M. Dickson - Sustainability science: The emerging research program -PNAS 2003

1.0.0.3 History of economics and sustainability science - what generally characterizes the research questions that have been taken up?

- Sustainability science has been succesful in addressing a number of economic issues. These include the interactions between the natural resource base and human income, such as Sub-saharan African exceptionalism in world poverty and the role of deprived natural resources, ethnic diversity, inequality and institutions in keeping many people caught in a "poverty trap" (Kates and Dasgupta 2007). Another area of economics that have been advanced by sustainability science is the operationalization of

ecosystem services (or natural capital) valuation (Daily and Matson 2008), both through national statistical accounting schemes [Mäler, Aniyar, and Jansson (2008)}, now mandated by the OECD under the termninology of green accounts, and, through on-the-ground ecosystem service based governance through actions spanning from the community level (Cowling et al. 2008) to the national level (Liu et al. 2008).

- The above two examples serve to illustrate that sustainability science' occupation with economics has mainly followed **two** pathways. (1) The role of disparity and central mode of human income and its interactions with the environmental system and the social effects it brings with though complex feedback loops. (2) Valuation of earths natural capital and operationalizing local and national governance schemes of these assets.

1.0.0.4 History of economic and sustainability science - what generally characterizes some of the research questions that hasn't been taken up?

- Other economics-related research questions have barely been addressed by sustainability science (*at least when judging by the content published in the xxx number of articles under the sustainability science label in PNAS). Some of the most notable areas of omission appears to be the role of international licit and illicit financial capital flows and trade for sustainable development, and the role of financing and key-financial players in ensuring democractic or other political sustainablity transitions.
- Is this because sustainability science is naive to the role of money in decision making?
  - We can not rule out this explanation, however sustainability science has dealt with issues of corruption in e.g. developing countries.
- Is this because these branches of research are less well developed in economics and finance?
  - Doesn't seem likely since sustainability science has taken on other areas of research that have only recently emerged or been limited to small communities.

1.0.0.5 Recent history of decreasing diveristy of economics and relations to other disciplines in terms of sustainability related questions

- The fields of economics and finance research have changed over time. In particular, recent contributions document how the economical sciences during the 20th century underwent a continuing decrease in the diversity of research questions and methods being used (Colander 2005).
- *What about the recent history of finance research? Find some references to document this.*
- Recently, and partially fuelled by the financial crises of the 21st century. There has been a concerted effort to re-energize the field of economics with a return to a more diverse set of approaches and questions. It remains to be shown, however, if the recent changing dynamics of economics research will also lead to an uptake of sustainability related questions.
- In recent decades many of the economical questions most pertinent for global sustainability have been addressed in communities that are only tangentially connected to the core fo economics research and in some cases arguably more closely connected to sustainability science. These include, the investigation of the material foundation and material limits to economic growth (club of rome ref, Brown et al. 2014; Burger et al. 2012; Burnside et al. 2012), the valuation of natural capital [Costanza and Daily refs], the global structure of the economy (M. Lenzen et al. 2012), the impact of economic activies, such as trade, on the environment and vice versa [natural resources refs],**xxx**, **xxx**, **xxx**.
- In the meantime, sustainability science must actively seek to integrate with those communities that address questions of economics and finance most pertinent to global sustainability.

- *Mention somewhere that the economical sciences have gone through a phase of decreasing diversity. A diversity that is now returning following the prolonged financial crises of the United States and Europe. Sustainability science can play an important role in maintaining this diversity by more fully integrating with some of the emerging branches of research.

1.0.0.6 Summarizing intro and outlining content and purpose of the main body of the paper

- In the following we … , …

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2 RECENT ADVANCES

2.1 Two advances in integrating the earth system in economic accounting

2.1.1 Greener economic accounting for natural capital

2.1.1.1 History of the ecosystem services and natural capital concept

- The ecosystem services and natural capital concepts evolved out of other related concepts in the 1980's linked to the "land economy" and were mainstreamed in particular through the Millennium Ecosystem Assessment published in 2005 (Millennium Ecosystem Assessment 2005). From a historical perspective (Gómez-Baggethun et al. 2010) "the trend towards monetization and commodification of ecosystem services is partly the result of a slow move from the original economic conception of nature's benefits as use values in Classical economics to their conceptualization in terms of exchange values in Neoclassical economics". This trend has led to debate over whether the use of the concept in its current form would stall aims of conservationists (Norgaard 2010; Norgaard 2008). The contrary argument sees the benefit of co-existence and exchange between a diversity of concepts and approaches, including both traditional biodiversity conservationist and newer ecosystem service or natural capital based apparoaches (Tallis et al. 2008; Reyers, Polasky, Tallis, and Mooney 2012; Reyers, Polasky, Tallis, Mooney, et al. 2012). The main feature of the inclusivity argument is that the diversity of concepts are needed to interact with as many stakeholders as possible for the parrallel pursuit of conservation and enviornmentally sustainable economic development (Tallis and Lubchenco 2014).

Gomez-Baggethun (Gómez-Baggethun et al. 2010) in her review concludes that the focus on monetary valuation and payment schemes related to the ecosystem services and natural capital communities has indeed contributed to attract political support for conservation. At the same time "*a growing number of ecosystem services may have been commidified and the Neoclassical economics paradigm and the market logic to tackle environmental problems*" amplified.

- Payments for ecosystem services [e.g. Kelsey Jack et al. 2008 PNAS]

2.1.1.2 Global economic dynamics in natural capital and ecosystem services

- In 2014 (Costanza, Groot, et al. 2014) estimated the annual monetary loss of ecosystem services from land use change between 1997 and 2011 to range between 4.3 to 20.2 trillion USD.

2.1.1.3 Recent impact of the ecosystem services and natural capital concept

- A lot of progress has been made since the inception of ecosystem services valuation in the *XXXX*. Notable progress, includes the inception of the Intergovenrnmental Platform on Biodiversity and Ecosystem Services (Díaz et al. 2015). Political attention to global sustainability and the unsustainable dynamics of current measurements of economic growth has facilitated international research progress on integrated measures of growth, such as the Genuine Progress Indicator (Costanza, Kubiszewski, et al. 2014). Such integrated indicators of social, environmental and economic progress are now being suggested as indicators for the UN Sustainable Development Goals (Costanza, Kubiszewski, et al. 2014). In 2015 all OECD countries will adopt mandated green accounting systems (**REF**). The InVest tool developed to incorporate natural capital into decisions, is now *GIVE EXAMPLES OF NOTABLE USE*.

2.1.2 Telecoupled dynamics of global trade

- Leontief 1970 envisioned national accounting as a way of measuring the impact of economic activities and human consumption on the environment. With recent progress in accounting for resource use in globalized production and consumption chains using global multi-regional input-output models (MRIOs) to link together resource extraction, import, consumption and exports in national accounts (Manfred Lenzen et al. 2012, Lenzen et al. (2013), Lenzen et al. (2014)). Early phases of that vision is now being implemented in a number of ways. By associating the MRIO with enviromental and social variables (so-called satellite variables), environmentally and socially extended MRIOs are produced that allow to assess the environmental and social interlinked impacts of global ecnomomic activity (e.g. Wiedmann et al. 2013, M. Lenzen et al. (2012); Marques et al. 2012).
- Early assesssments of long-standing economic hypotheses such as the Environmental Kuznets Curve and the paradigm of relative and absolute decoupling have been compromised by not acccounting for resources used in foreign contributes in the production of commodities consumed domestically. Still challenged a need to interpolate large amounts of missing data, the model provides a significant advancement in order for sustainability scientists to assess the degree to which relative and absolute decoupling is being reach in the globalized economy Wiedmann 2012, whether an Environmental Kuznets Curce really does exist, assess the domestic economic, environmental and health impact of pollution attributed to commodities that are being consumed in foreign countires (Marques et al. 2012), and similar how global trade drives biodiversity threats in the developing countries (M. Lenzen et al. 2012). One of the latest applications of this methodological advance will be a dataset on the value added to national economies by trade to be released by the United Nations Conference on Trade and Development (http://unctad.org/). The dataset provides a new opportunity to assess and evaluate **...XXX**. These assessments have fundamental value for sustainability science as they answer basic questions about future paths for human development and the sustainability of current economic paradigms.
  - *References*
    * Leontief, W.; Ford, D. Environmental repercussions and the economic structure: An input-output approach. Rev. Econ. Stat. 1970, 52 (3), 262???271
    * Leontief, W. An information system for policy decisions in a modern economy. In Input-Output Economics; Oxford University Press: New York, 1986; pp 418???428.
    * Leontief, W. Structure of the world economy. Am. Econ. Rev. 1974, LXIV (6), 823???834.
    * Local impacts of trade and financial markets: Economic change effects on land use change (“, a recent doubling in commodity prices has created incentives for landowners to convert grassland to corn and soybean cropping”) [Wright and Wimberley, PNAS 2013] and (Lybert et al. 2011 PNAS - booming markets for Moroccan argan benefits some rural households but threatens endemic forests)
    * Trade and emissions [e.g. China’s international trade and air pollution in the United States, Lin et al. 2014 PNAS] and Lenzen and Wiedmann studies. [i.e. consumption based accounting of official trade statistics]

2.1.3 Socio-economic inequality and health and environmental quality

- Global impacts of inequality
  - challenges for global governance of the commons -
    * Inequality in contributions to global climate change together with global economic inequality largely explains the deadlock in climate change negotiations and the global south's insistence on their rights to develop (Roberts 2001; Blaxekjær and Nielsen 2014)
  - global economic implications of poverty traps exacerbated by trade, ethnic diversity and resource endownments
    * A special issue on the African poverty trap in PNAS (Kates and Dasgupta 2007) revealed that ethnic diversity contributes to keep countries trapped in poverty (Collier 2007). Therefore, alleviation of such cases requires special regulatory interventions in the global economy (Hyden 2007)
- Local impacts of inequality
  - Local hotspots of economic inequality is correlated with loss of biodiversity (Mikkelson, Gonzalez, and Peterson 2007; Holland, Peterson, and Gonzalez 2009) and poverty hotspots exhibit poorer environmental quality and hence opportunities for improving public health (Cushing et al. 2015)
  - *References*
    * The Haves, the Have-Nots, and the Health of Everyone: The Relationship Between Social Inequality and Environmental Quality Annual Review of Public Health, 2014
    * Cost-effectivness of conservation actions (e.g. Jonathan Hoekstra, PNAS piece, 2012)
    * A review of financial instruments to pay for predator conservation and encourage human-carnivore coexistence

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3 AREAS THAT NEED ATTENTION

3.0.4 Finance in politics, financial players an dynamcis

3.0.4.1 Role of finance in preventing democracy and implications sustainable transitions *A study from 2014 have documented how the role of campaign financing in US politics may lead to in-validation of long held theories of political science, such as the median voter theorem (Gilens and Page 2014). Similar ongoing studies are documenting how the probability of getting elected is correlated with the amount of campaing funds raised [**Cite Tom Ferguson research**]. The regulated earns more than the regulator and this financial inequality may present some moral challenges for sound decision-making in regulators (Ferguson and Johnson 2010).

*Such questions are of clear interested to sustainabliity science and research on global sustainablity. For example, what are the implications for the likelihood of sustainability transitions? If decision makers make choice in the interest of their financiers instead of in the interest of their electorate, may this either increase or decrease the likelihood and speed of sustainablity transitions wanted by the electorate?

3.0.4.2 Impact of ownership structures and financial corporations on global sustainability (key players)

- A recent study have documented that a small number of financial institutions play an important role in linking the global economy together (Vitali and Battiston 2013). What are the implications for global sustainability of such hyper connectivity?. Can the concepts of key-stone species, for example, be transferred to financial capital holders, and does this concept also apply to the socio-environmental effects of actions taking by the financial actors. Ongoing research are just starting to investigate such questions in the marine realm [*get Calle, JB and other SRC folks to fill in here*]. Similar research could be taken on in the agricultural and silvicultural realms with regard to land-use change etc.

- **Fertilizer prices** is one case where prices may be controlled by a cartel-like ownership structure and could be a terrestrial model for the key-financial actors model (**Christopher Gilbert GEDB seminar 150424**). **(Ott 2012)** "Torero (2011) examines the market structure and shows that the fertilizer industry is a global one with a high level of concentration." **(Hernandez and Torero 2011): "The results of the study indicate that the fertilizer industry is a global market with high levels of concentration and increasing trade. The top five countries control more than 50 percent of the world's production capacity for all major fertilizer products. There is also a high level of concentration at the country level among the major producing countries, except for China. The high and increasing levels of trade in the industry are evident from the higher dependence of several regions on imported fertilizer." "*It appears that despite the high levels of concentration in the industry, prices are even higher in further concentrated markets due to the apparent greater market power enjoyed by a couple of firms.*"

3.0.4.3 The global impact of investments and market dynamics

- The great recession of 2008 and the prolonged recession in Europe have been two of the most influential events on western hemisphere policy in the 21st century. Both recessions were partially caused by the influence of increasingly complex financial system on commodity prices such as housing prices and even national savings (Greece) [find articles on investment in the national savings of Greece, Italy and Spain **REFS**]. The impact of the following economic downturn on important environmental policies such as energy investments can be seen e.g. in many nations decision to explore options for liquified shale oil and natural gas and lowered ambitions in national and supra-national plans of transitioning to renewable energy sources [**REF**].

- Increasing investment in food commodities from index investors in 2007 may have exacerbaed the spikes in food prices in 2008 and 2011 and consequently had a role in the social unrest that these price rises helped unleash (**Christopher Gilbert GEDB seminar 150424 - Index investor activity increased before price spikes**).

- The integration of financial market dynamics and complexity with sustainability science seems an important agenda to ensure a more resilient and holistic response to such events.

- Examples of remaining research questions with regard to the financial crisis are:

  - What have socio-environmental impacts been of the fincial crisis on other continents?
  - Can key trends in environmental and social degradation or improvement be traced to events relating to the financial crisis.
  - How do other actors respond to financial crisis. Do they e.g. learn to anticipate negative impacts from prolonge recessions caused by financial market complexity?

3.0.5 International financial transactions and flows

3.0.5.1 Social and enviromental impact of financial transactions

- With increasing complexity of financial markets, impacts of capital flows are in a manner similar to impacts of production and consumption in globalized supply chains becoming harder to track. Are

international financial transactions playing important roles in determining social and environmental outcomes in regions where they flow from, through and end-up. Are these outcomes positive or negative for global sustainablity?

3.0.5.2 Social and enviornmental impact of illicit financial transactions

- While captial flows of the financial market may prove an important factor influencing the likelihood of sustainable transitions, much of international trade happens outside the market. For example, the international market for wildlife medicine largely occur through illicit financial transactions. Such markets and transactions may in some cases have more immediately obvious impact on socio-environemntal sustainablity. For example, the negative impact of such trading on threatened species, sometimes appearing on the brnk of extinction, is well-documented through declines in e.g. elephants and rhinos in Africa. Tragically, from trophy hunting it has been shown that increasing rarity of hunted species may only increase the exclusiveness, price and demand for their derived products - potentially leading to a self-reinforcing feedback loop toward further decline (Palazy et al. 2011; Palazy et al. 2012). In other cases, the effect of illicit international capital flows are much less well documented. **give examples** Thus, whether licit or illicit, untangling the teleconnected socio-environmental effects of international capital flows should be of priority to sustainability science.

  – Trade Policy and Public Health - Annual Review of Public Health - Vol. 36: 325-344 (Volume publication date March 2015) - First published online as a Review in Advance on December 10, 2014 - DOI: 10.1146/annurev-publhealth-031914-122739

3.0.6 Financial innovation for sustainabiltiy

3.0.6.1 Innovation of investments for sustainability

- Non-governmental financial investments are playing an increasing role in addressing concerns related to social and environmental sustainaiblity, in the developing as well as the developed world [**REF**]. Philanthropy has played a role in ensuring environmental, social and economic sustainability for centuries. Associated with the increase in the role of private investments has been an increasing diversification of types of investments for sustainability [**REF**]. From the well-known micro-financing strategies [**REF**] to green bond markets and other types of investment for impact [**REF**].

- Sustainability science needs to embrace these recent developments by asking a number of research and solution-oriented questions: (1) How effective are private financial investments in ensuring positive sustainability-related outcomes, compared to, for example, governnmental investments?; (2) Which types of private financial investments are most effective in various geographical areas and in solving different sustainability-challenges.

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4 FUTURE PERSPECTIVES AND CONCLUSION

Text to be added here.

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5 Supporting notes

5.0.6.2 Notes on integration

- Emphasis on need to fully integrate economics and finance into sustainability science.
- The current state of sustainability science or (environmental, social and economic sciences) is ripe with example of lack of integration.
  - Examples of lack of integration between ecological, social and economic perspectives:
  - Lack of integration of an explicitly ecological perspective into social sciences and socio-economic policy (Brown et al. 2014, Burnside et al. (2012))
    * With the implication of overlooking natural resource exploitation as an underlying trend for the "great recession" (Brown et al. 2014)

5.0.7 Older snippets

5.0.7.1 INTRO The concept of capital is important to sustainability science and environmental conservation

- The concept of capital, a term borrowed from economics, is foundational for sustainability science. Natural, social and financial capital distinguishes between the assets possess in currencies of environmental, societal and monetary value. This is one example of an important interplay between sustainability science and economics where sustainability science has adopted central concepts of economics. Sustainability science is addressing some research areas of economics
- Sustainability science has begun to address the interplay between economic dynamics/sustainability and socio-environmental sustainability. Examples include, (1) the influence of economic inequality on environmental sustainability, (2) the measurement of economic growth integrating measures of financial capital with social and natural capital.

Sustainability science has been slower to pick up other central lines of economic research * However, many central areas of economics has yet to make into integrated sustainability research. These include, (1) the influence of money in politics and how they influence democratic transitions toward sustainability, (2) how international monetary transactions and illicit capital flows influence social and environmental outcomes at their destinations and to what extent this tele-couples econo-socio-environmental dynamics in areas fare apart.

5.0.7.2 Main body

- Green accounting (progress, next steps)
- Inequality and environmental, social and financial sustainability
- The role of money in facilitating or slowing down democratic transformations toward sustainability

Perspective * From green accounting to national accounts revisions

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5.0.8 Even older snippets

5.0.8.1 Title: *Blind spots: Gaps and recent progress in linking real world economics and sustainability science*

5.0.8.2 Tenet: Sustainability science has made good progress in showing the environmental and social effects and limits to current resource use. Yet, the field has had what can best be described as a "blind spot" to the impacts of capital and so-called real world economics on the environmental and social aspects of sustainability.

5.0.8.3 Format suggestions: A comment or perspective piece, e.g. for PNAS sustainability science section, or some more realistic target journal. The piece would comment on and highlight recent progress and future potential for stronger integration of real world economics into sustainability science.

Four topics to highlight as gaps or areas of recent progress Remaining gaps

- The influence of capital in governance on environmental issues
- International financial flows and consequences for democracy and the environment Areas of recent progress?
- The environmental and social sustainability of income distributions (an area of progress?)
- Macroeconomic indicators (an area of progress?)

The influence of finance in environmental decision making

Main argument: Democracy as a cornerstone in a future Anthropocene that is just, fair and sustainable.

Research questions: Do elected representatives represent the electorate and the environment? What is the role of vested interest in environmental policy?

Research needs: Studies looking at voting behaviour of elected representatives on environmental issues in relation to campaign financing and total amounts of raised capital and public opinion etc.

Illicit financial flows - hidden connections to democracy and the environment?

Research questions: What is the role of financial flows in and out of countries in affecting foundational aspects of a sustainable future?

1) Do international investment/money laundering affect aspects of democracy and thus opportunities for sustainability?
2) What are the direct and indirect impacts of international financial flows? Are they captured by analysis of commodity flows and supply chain/life cycle analysis?

Resources:

- Biocapacity exports and imports (Lenzen, political ecology)
- Lenzen, M., Moran, D., Kanemoto, K., Foran, B., Lobefaro, L., & Geschke, A. (2012). International trade drives biodiversity threats in developing nations. Nature, 486(7401), 109-112. doi:10.1038/nature11145
- Lenzen, M., Kanemoto, K., Moran, D., & Geschke, A. (2012). Mapping the structure of the world economy. Environmental Science & Technology, 46(15), 8374-81. doi:10.1021/es300171x

- Datasets on financial flows (illicit financial flows report/database, Garry has database)

Sustainable income distributions (an area of recent progress?)

Research question:

Which (post-transfer) income distributions are most sustainable in terms of environment (and other aspects of human wellbeing)?

Recent progress:

Happiness and inequality studies?

GDP growth and inequality studies (does GDP growth increase inequality while decreasing ecosystem and human well-being?)

What are unaddressed gaps here?

Resources:

Garry Peterson publications in PLoS One and Conservation Biology.

What are other important resources Garry?

The sustainability of macroeconomic indicators (an area of progress?)

Aim of section: Highlighting progress in reforming macroeconomic indicators of growth to include ecoysytem services and human well-being. Research question: I'm not sure what the area for sustainability science is her

Basically I guess this section could be a description of the many known undesirable environmental and societal effects of a pure GDP growth based focus and an analysis of science' role in current progress in changing the policy agenda.

Resources:

Costanza, R., Kubiszewski, I., Giovannini, E., Lovins, H., McGlade, J., Pickett, K. E., . Wilkinson, R. (2014). Time to leave GDP behind. Nature, 505, 283-285.

And Ida's ecological economics paper and global environmental change paper

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