The System of Environmental-Economic Accounting

Overview and key concepts

MMPA Conference: Sustainability: A Call to Action

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Michael Vardon
Associate Professor, Environmental Accounting
Fenner School of Environment and Society
michael.Vardon@anu.edu.au

Australian National University

Acknowledgement of country

We acknowledge and celebrate the First Australians on whose traditional lands we meet, and pay our respect to the elders past, present and emerging.

https://www.schoolsreconciliationchallenge.org.au/wp-content/uploads/2020/11/NSWRC-language-map-update-A3-text-boxes-2020_updated_detailed.pdf

About me

PhD in ecology

Made a career out of counting things

- Crocodiles, bats, water, ecosystem services

Move to ABS in 2000 a turning point

- Director of Centre of Environment and Energy Statistics 2006
- Left ABS in 2014 to come to ANU

Member of the Editorial Board of SEEA

At ANU focused on education, research and applications (rather than production)

Advisor on environmental accounting

- World Bank
- United Nations
- Several governments

Assisted many counties

- Australia to Zambia and more than 20 in between

Many papers

- Profile on Researchgate, https://www.researchgate.net/profile/Michael-Vardon :

What is accounting?

Recording of transactions between two entities (or parties)

What are transactions?

Exchanges

- Monetary - goods and services (products) and assets
- Non-monetary – ecosystem services, residuals (e.g. CO_2 emissions)

Who are the entities or parties?

Institutional units

- Corporations, households, NGOs, government

Environment

- Specific parts (e.g. minerals, ecosystems, atmosphere) and locations

Who uses accounting?

Managers

- Evaluation of performance
- Planning for the future

Owners

- Evaluation of performance (e.g. of the managers)
- Decisions to sell or buy more

Potential investors and financiers

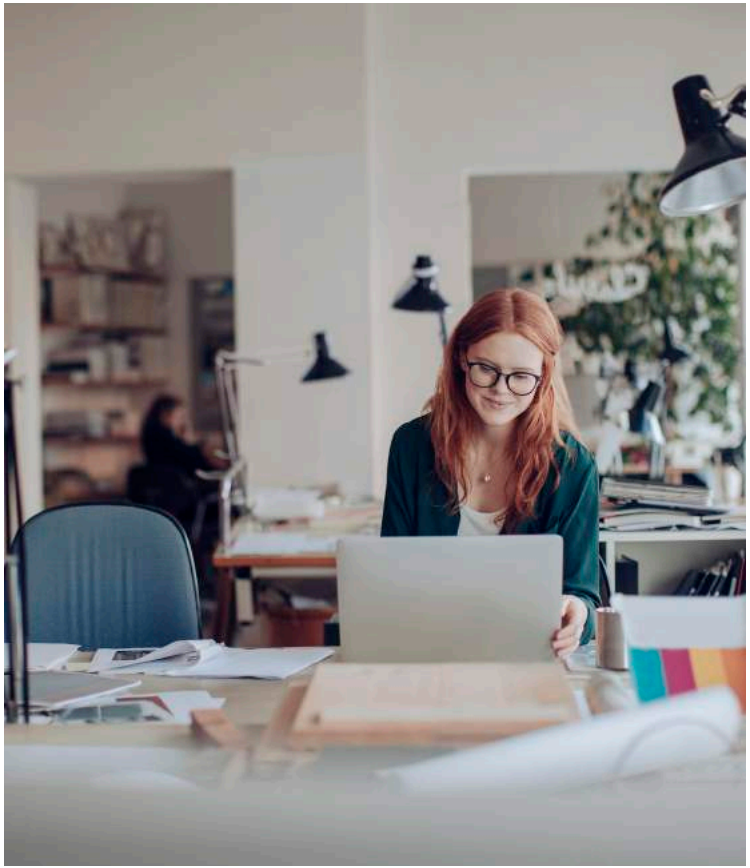
- People and business looking to invest
- Banks looking to make loans

Regulators

- Compliance with law (e.g. taxation)

Consumers of goods and services (‘social licence’)

Potential employees (or immigrants)



Why use environmental accounts or accounting?

Incompleteness of current economic accounts

- Don’t incorporate many flows between economy and the environment or flows in physical terms
- Do not account effectively for the cost of the use of natural resources
- No clear or common definition of environmental activity

Links to information required for assessing sustainability (SDGS, Green Growth, etc.)

Provides a regular suite of integrated information

- Enabling regular reflection and identify issues and track effectiveness of current policy and management (accountability)
- Analysis of issues, assess policy options and implement policy and management decisions

Synthesizes and harmonizes available information and improves data coherence and coordination

“If you don’t measure it, you can’t manage it”

Evolution of business accounting and corporate governance

1494 Pacioli treatise on accounting

1600-1800s Rise of corporations

- E.g. East India Company

1934 US Securities Exchange Commission

1973 International Accounting Standards Committee

Since 2001 International Accounting Standards Board

1994 King report on Corporate Governance

- 2002 King II, 2009 King III, 2016 King IV

1997 Global Reporting Initiative

- Draft Guidelines 1999, latest 2021

2007 Prince's Accounting for Sustainability Project (A4S)

2010 International Integrated Reporting Council – six capitals

2011 Discussion paper

2013 International Integrated Reporting Framework

- Update expected soon

2016 Natural Capital Protocol

- Capital Coalition

https://capitalscoalition.org/wp-content/uploads/2021/01/NCC_Protocol.pdf

Evolution of environmental-economic accounting

1929 The Great Depression

1936 Keynes Theory of employment, interest and money

1939 World War II

1953 System of National Accounts (SNA)

- Updated 1968, 1993, 2008 (revision in progress)

Rio 1992 Agenda 21

1993 System of Environmental-Economic Accounting – SEEA

- Updated 2003, Standardised 2012

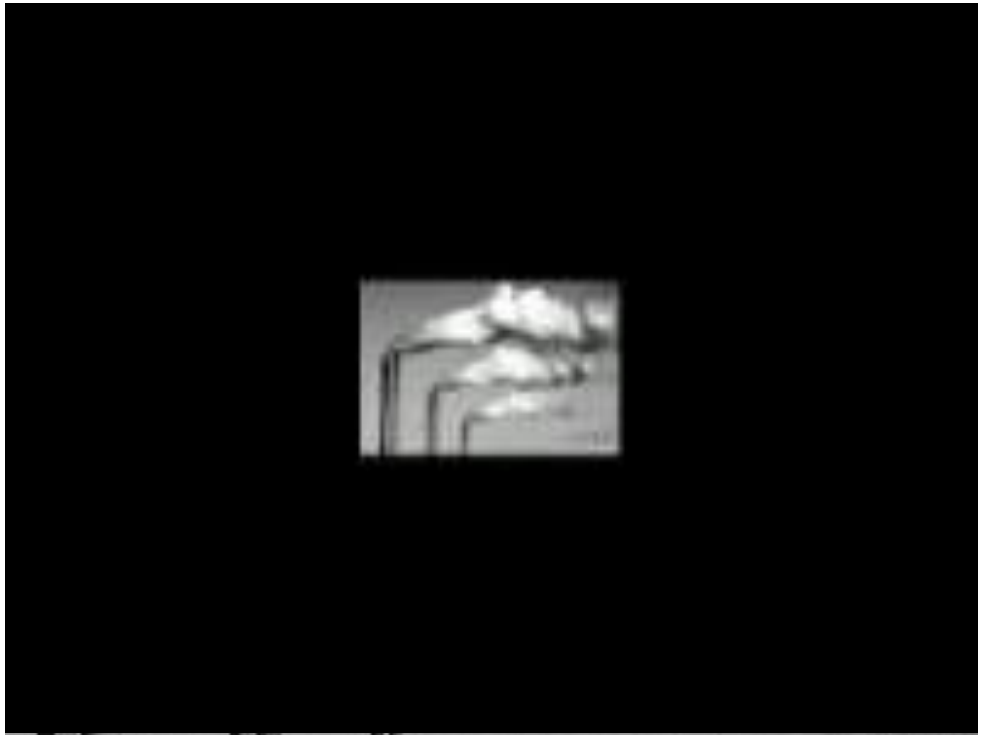
2021 SEEA Ecosystem Accounting

Robert F ('Bobby') Kennedy on GDP in 1968

GDP measures everything but what is important

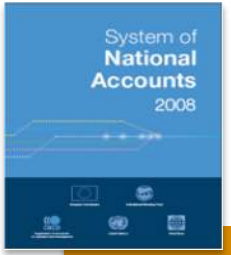
Need something more

- Beyond GDP – more than 900 indicators (Hoekstra 2019)
- Human development index
- Adjusted macro-economic indicators (e.g. Adjusted Net Savings)
- Environmental (e.g. Carbon footprints, emergy, econds)
- Suites of indicators (e.g. SDGs)
- Rio 1992 – we need to recognise the value of nature



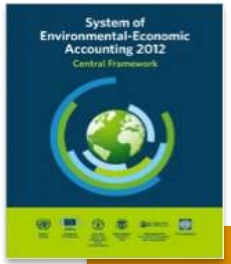
https://www.youtube.com/watch?v=77IdKFqXbUY

The accounting family



System of National Accounts

- Monetary measures
- Asset and production boundaries set by economics
- Production defined as being capable of being sold in markets
- Assets defined as being owned and capable of being used for economic gain



SEEA Central Framework

- Physical quantity measures added to monetary measures
- Asset boundary expanded
- Assets no longer have to be owned or capable of being used for economic gain

SEEA Ecosystem Accounting

- Physical quality (or condition) measures added
- Production boundary extended
- Production from ecosystems recognized and does not need to be sold in markets

SEEA implementation

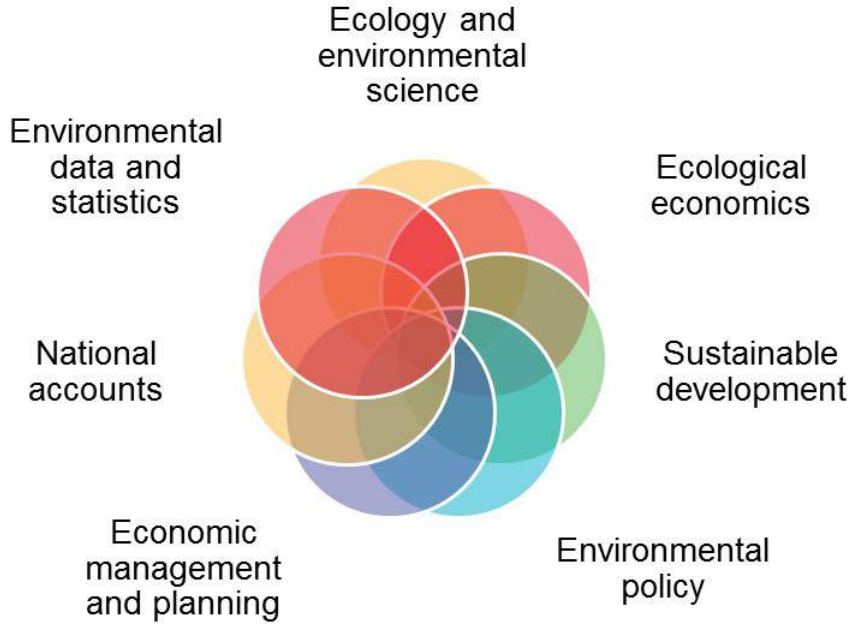
Accounts mandated in EU

"The adoption of this economic and environmental framework is a historic step towards transforming the way we view and value nature. … We must reflect nature's true value in all our policies, plans and economic systems. The rewards will be immense."

UN Secretary General, António Guterres (March 2021)

Institute for Development of Environmental-Economic Accounting

Environmental-economic accounting is built from the concepts and knowledge from many areas – multidisciplinary

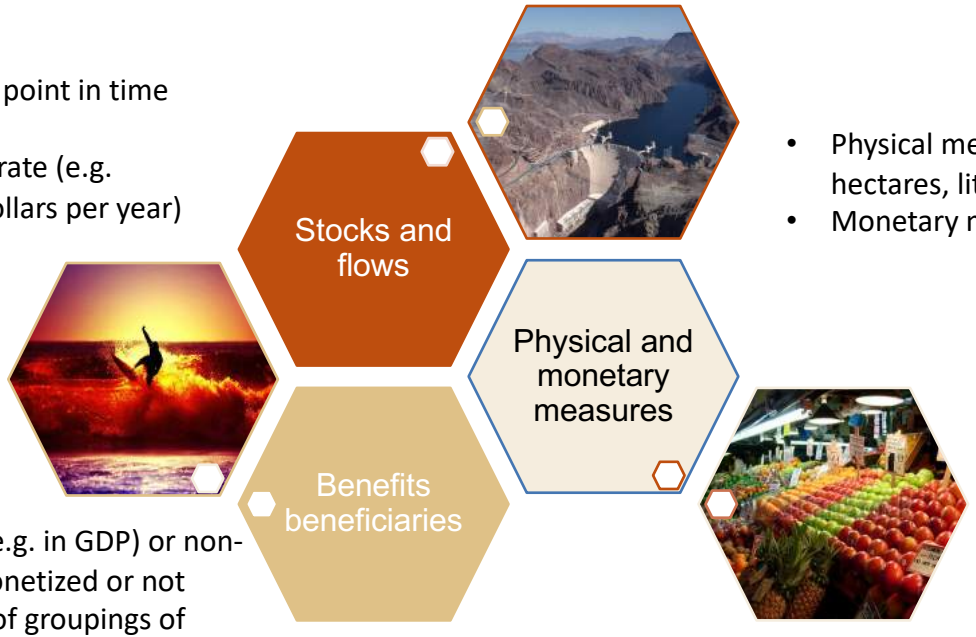


Where does your understanding start?

No one knows it all

Three pairs of concepts for environmental accounting

- Stocks are measured at a point in time (e.g. 1 January)
- Flows are measured as a rate (e.g. megalitres per annum, dollars per year)



- Physical measures like kilograms, hectares, litres, parts per million, etc.
- Monetary measures like $, €, ¥, £, etc.

- Benefits may be in SNA (e.g. in GDP) or non-SNA (e.g. not in GDP), monetized or not
- Beneficiaries are people of groupings of people (e.g. farmers, government, miners)

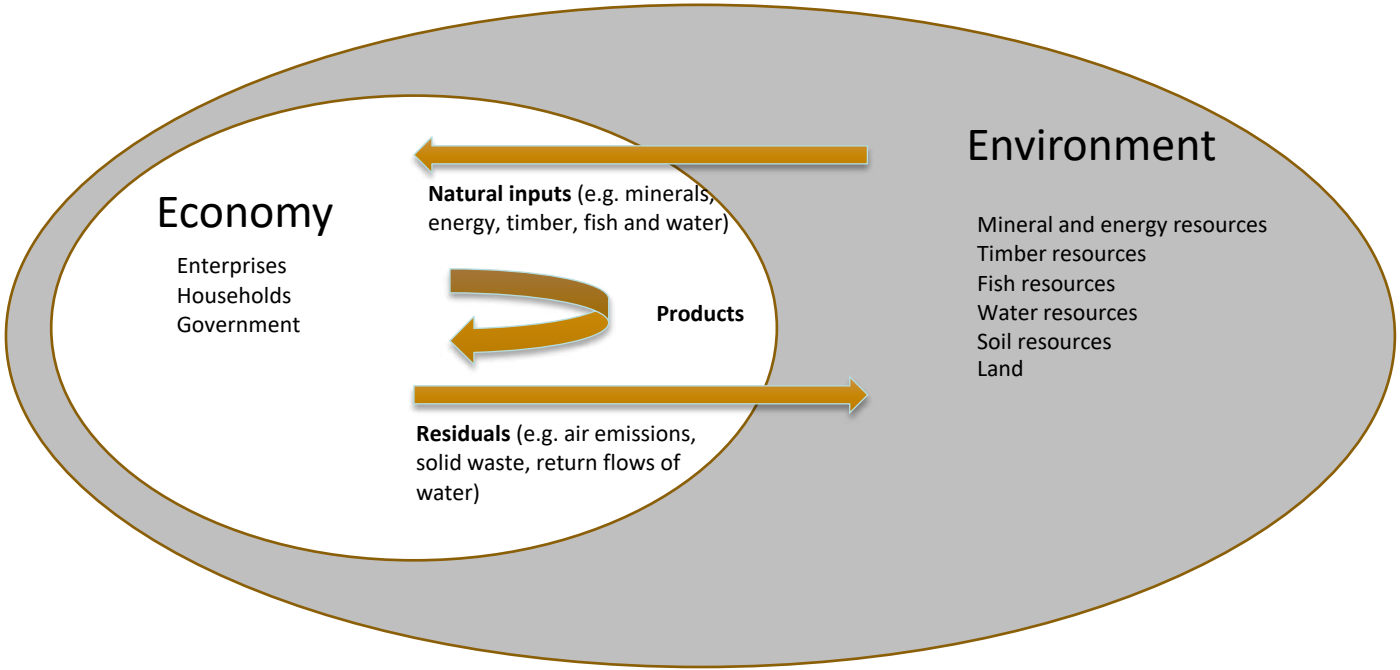
The fried egg view of the economy and environment – SEEA Central Framework

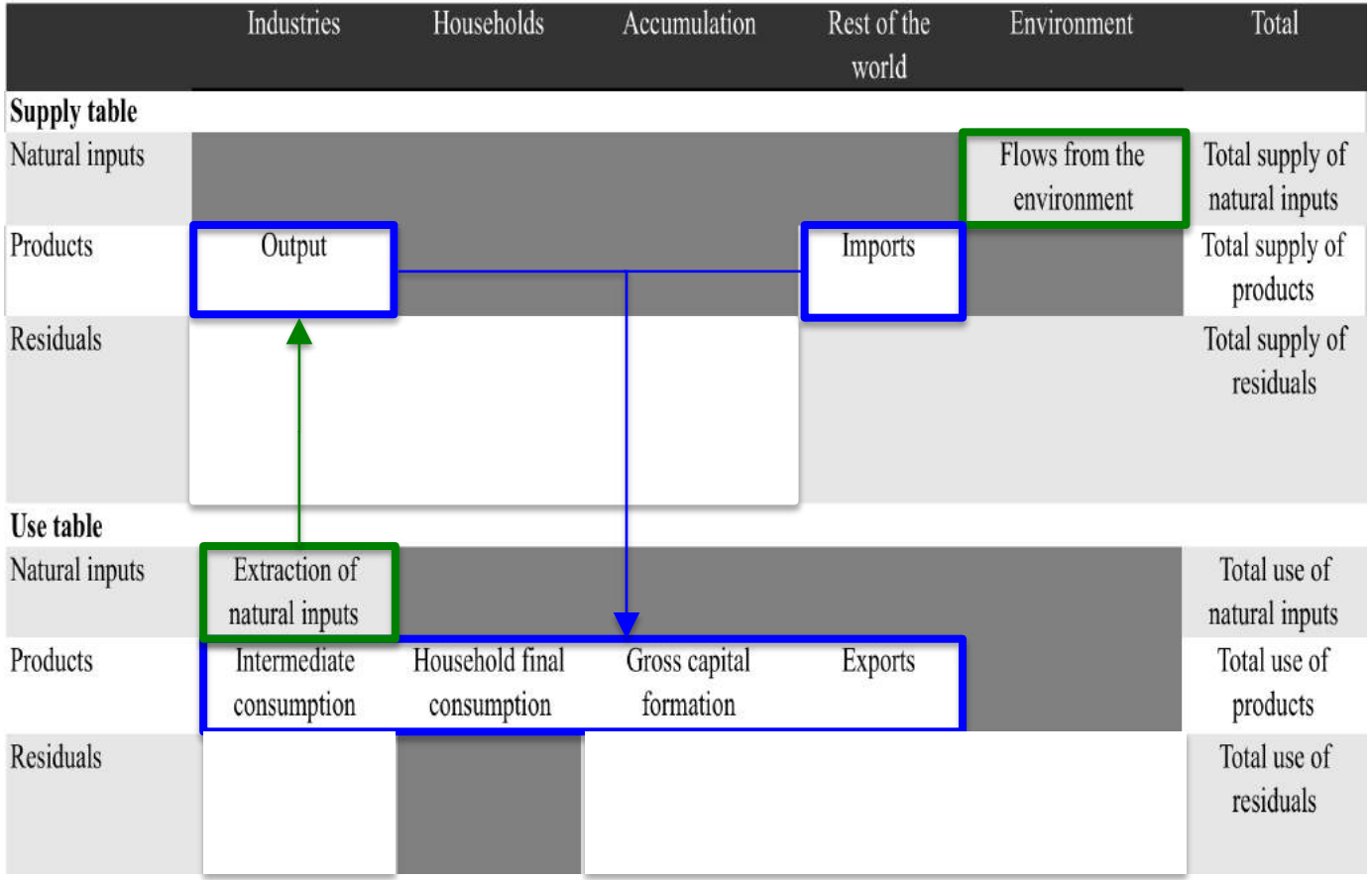
Flows between the environment and economy

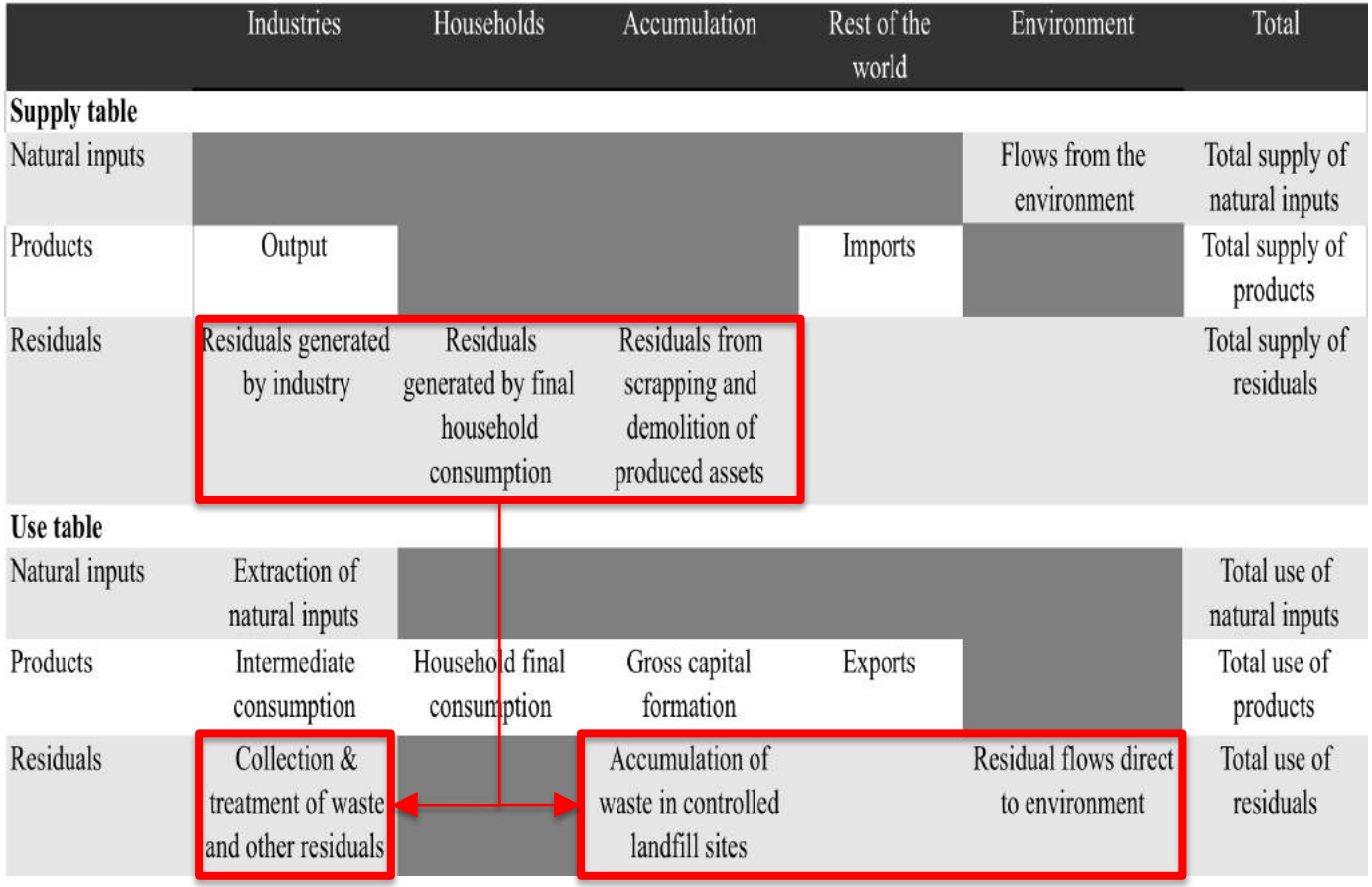
- Natural resources
- Residuals

Flows within the economy

- Products (goods and services) for final and intermediate consumption




Industries
Households
Accumulation
Rest of the world
Environment
Total
Supply table
Natural inputs
Flows from the environment
Total supply of natural inputs
Products
Output
Imports
Total supply of products
Residuals
Total supply of residuals
Use table
Natural inputs
Extraction of natural inputs
Total use of natural inputs
Products
Intermediate consumption
Household final consumption
Gross capital formation
Exports
Total use of products
Residuals
Total use of residuals


Industries
Households
Accumulation
Rest of the world
Environment
Total
Supply table
Natural inputs
Flows from the environment
Total supply of natural inputs
Products
Output
Imports
Total supply of products
Residuals
Residuals generated by industry
Residuals generated by final household consumption
Residuals from scrapping and demolition of produced assets
Total supply of residuals
Use table
Natural inputs
Extraction of natural inputs
Total use of natural inputs
Products
Intermediate consumption
Household final consumption
Gross capital formation
Exports
Total use of products
Residuals
Collection & treatment of waste and other residuals
Accumulation of waste in controlled landfill sites
Residual flows direct to environment
Total use of residuals

SEEA Ecosystem accounting a step further

Ecosystem asset
- Extent
- Condition

Ecosystem services
- Provisioning
- Regulating
- Cultural

Benefits

Beneficiaries

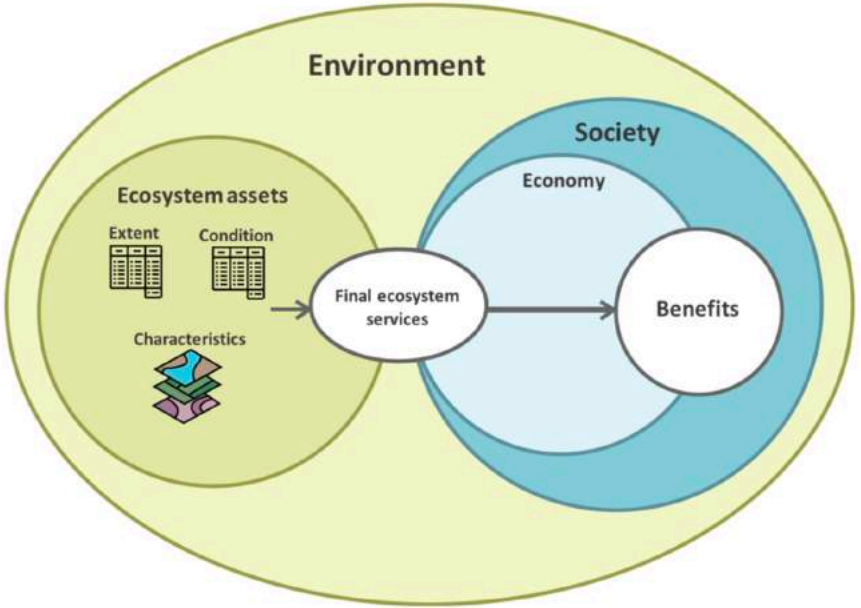


Figure 2.1 SEEA-EA, p. 28

Ecosystem accounting conceptual model

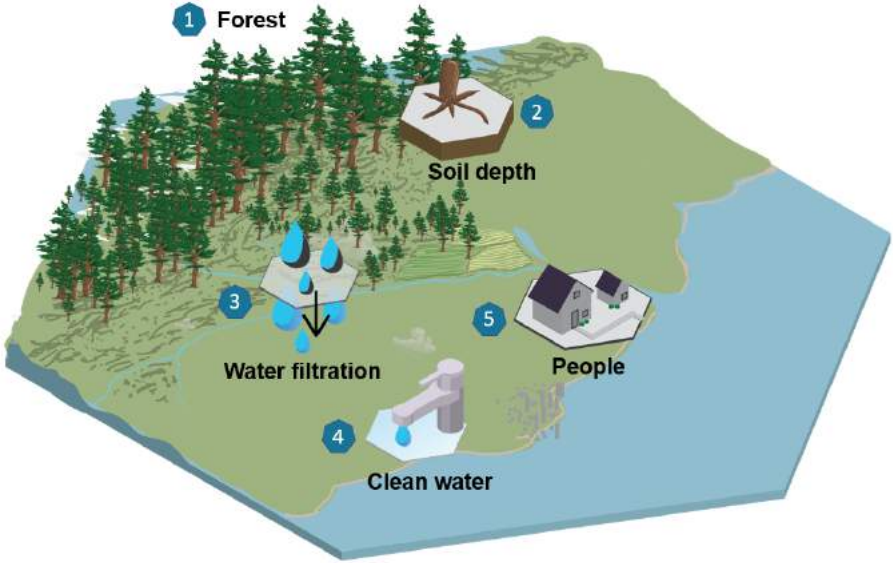
1 Ecosystem asset – forest

2 Ecosystem condition – soil depth

3 Ecosystem service – water filtration

4 Benefit – clean water

5 Beneficiaries – people



Source https://seea.un.org/ecosystem-accounting

Ecosystem accounting accounts and connections

Types of accounts

- Ecosystem extent
- Ecosystem condition
- Ecosystem services

Monetary and physical

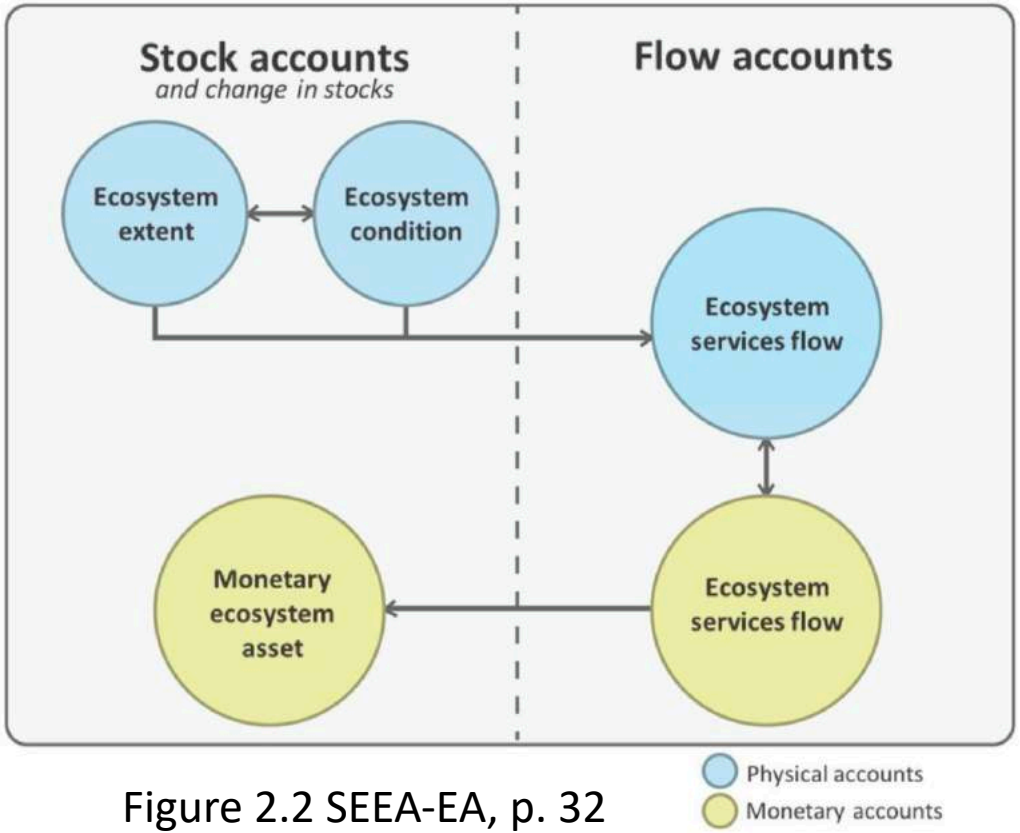


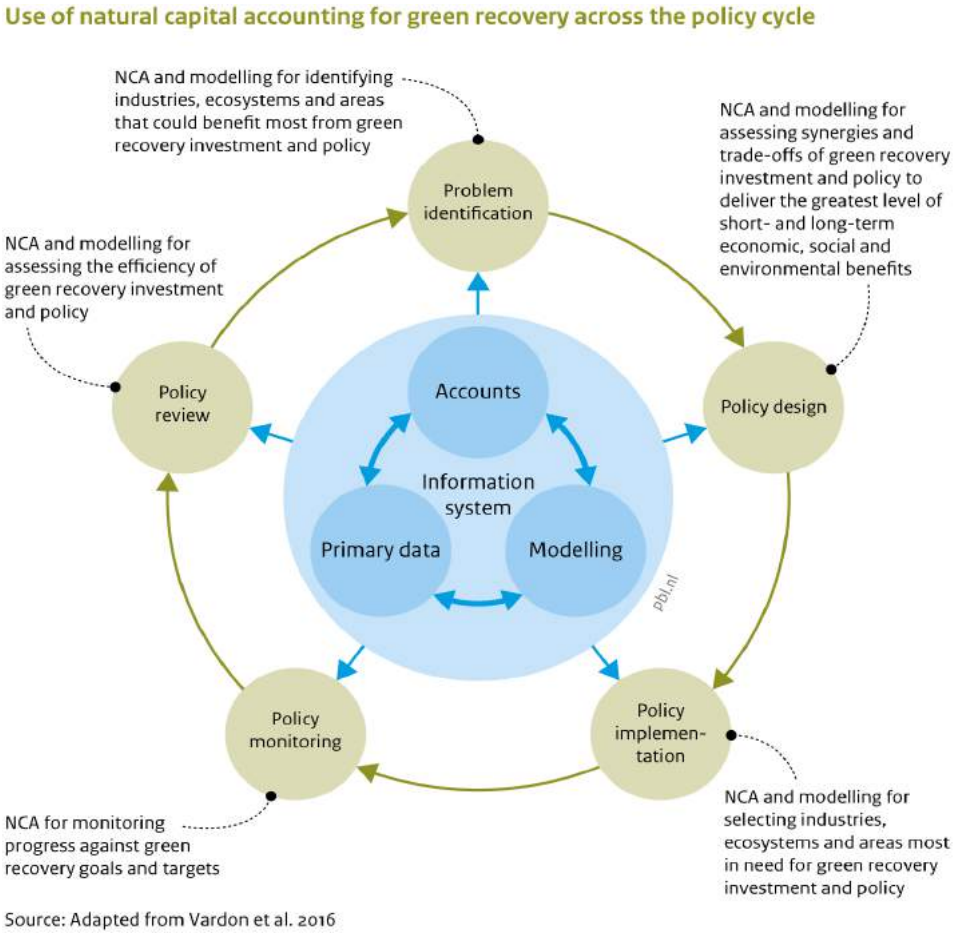
Figure 2.2 SEEA-EA, p. 32

NCA and the policy cycle

An **information system** that supports the **full policy cycle**

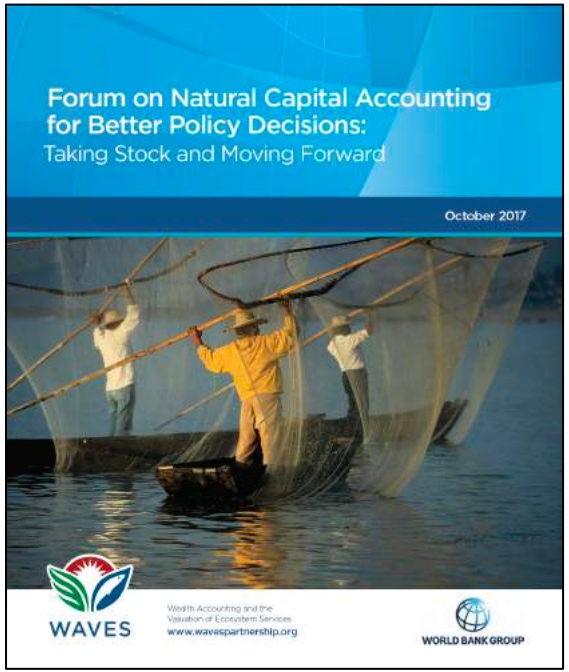
From experimental to main stream

- Moving from the “accounting push” to the “policy pull”
- Made possible by the work of many people, spanning countries, disciplines and agencies and sectors



Vardon et al 2016. The accounting push and the policy pull: Balancing environment and economic decisions https://doi.org/10.1016/j.ecolecon.2016.01.021

SEEA in action



https://www.wavespartnership.org/en/knowledge-center/forum-natural-capital-accounting-better-policy-decisions-taking-stock-and-moving

https://www.pbl.nl/sites/default/files/downloads/pbl-2021-greening-the-recovery-to-make-it-last-4458.pdf

SEEA assessing trade-offs between ecosystems services and land management

Links to SEEA accounts

- Land
- Water

Ecosystem accounts

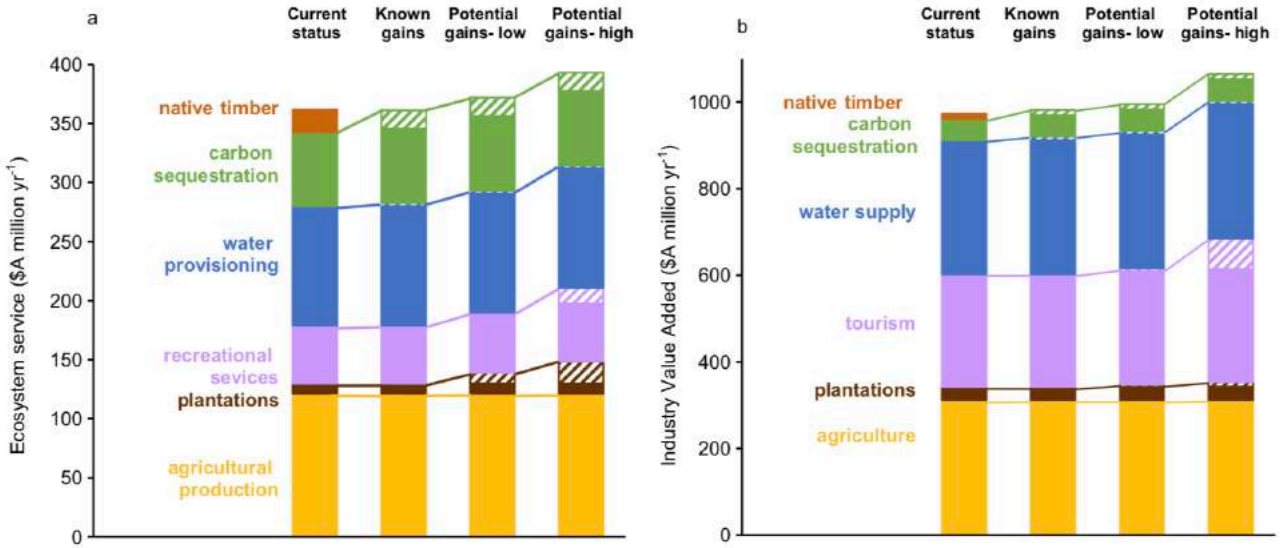
- Multiple services
- Biodiversity
- Valuation

Scenario modelling

Different management options

Impacts of climate change

Greatest gains at least cost



Keith, H., Vardon, M., Stein, J.A., L. Stein, J.L. and & Lindenmayer, D. (2017). Ecosystem accounts define explicit and spatial trade-offs for managing natural resources. Nature Ecology & Evolution (18 September 2017): doi:10.1038/s41559-017-0309-1
https://www.nature.com/articles/s41559-017- 0309-1

Were accounts a factor?

Ecosystem services from forests in Victoria

- 2019 Department of Environment, Land, Water, and Planning

https://www.environment.vic.gov.au/__data/assets/pdf_file/0034/459574/Ecosystem-services-from-forests-in-Victoria-Assessment-of-Regional-Forest-Agreement-regions.pdf?_ga=2.234791709.2082286093.1635045580-345827392.1635045580

https://www.abc.net.au/news/2019-11-06/native-timber-logging-in-victoria-to-be-phased-out-by-2030/11678590

Information and institutions

If existing national intuitions have failed, maybe we need a new one.

A Natural Capital Bank

- Custodian of natural capital
- Sets thresholds – natural capital adequacy
- Monitors thresholds
- Manages the cumulative impacts
- Assess substitutability
- Allocate available natural capital to development
- Negotiates investment in restoration by government (in effect, repay ecological debt)

GLASGOW, SCOTLAND - NOVEMBER 02: Chancellor of the Exchequer, Rishi Sunak, arrives at COP26 with his Green Budget Box where he will lead Finance Day and deliver a keynote speech to COP26 delegates at SECC on November 03, 2021 in Glasgow, Scotland. Rishi Sunak will be setting out plans to encourage UK industry to work towards the country's 2050 net zero target. (Photo by Christopher Furlong/Getty Images) (Photographer: Christopher Furlong/Getty Images Europe)

Earth's Value Is Being Left Off the Balance Sheet

comment

From natural capital accounting to natural capital banking

Natural capital accounting will confirm what we know — without change, we are headed for environmental disaster resulting from economic growth. We propose a natural capital bank, a new institution to help maintain natural capital adequacy and chart a course to a sustainable future via accounting.

Michael J. Vardon, Heather Keith, Peter Burnett and David B. Lindenmayer

In March 2021, the nations of the world adopted standards for natural capital accounting called the System of Environmental-Economic Accounting (SEEA) Ecosystem Accounting (SEAA-Ecosystem Accounting). Our proposal is to take the next step towards sustainability by institutionalizing the management of natural capital by government via accounting through a natural capital bank. Dialogue with our peers about the merits of our proposal has revealed scepticism, raised many questions and shown different understandings about current institutions, why they have exactly how much natural capital we have, how much we need, how it is changing and to what degree, if any, natural capital is substitutable'. What we do know from the 2019 Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services Global Assessment and other sources is that the natural capital balance is declining and we are approaching', or may have already crossed, some critical ecological thresholds'. To address natural capital decline, goals and targets have been set via international agreements such as the Paris Agreement on climate change, the Convention on Biological Diversity Accounts (SNA), in a parallel set of physical and monetary accounts. By doing this, SEEA-Ecosystem Accounting provides a way to integrate ecological information into government decision-making by presenting it in a form that is interpretable by the economic institutions that lie at the heart of government — central banks, treasuries and ministries of finance.

These institutions rely on the SNA for information. The SNA describes mainstream macroeconomic theory and has evolved since its inception in the 1930s[1], being updated three times, with another revision underway. The SNA is infamous

Vardon, M.J., Keith, H., Burnett, P., Lindenmayer, D.B. (2021). From natural capital accounting to natural capital banking. Nature Sustainability: 4, 832–834 https://doi.org/10.1038/s41893-021-00747-x

Business and National Accounting for Natural Capital— Toward Improved Understanding and Alignment

Similar

- Uptake variable
- Not ‘normalized’, an optional extra
- Growing interest

Different

- Clear international standard for SEEA
- Incorporation of ecosystem services in SEEA
- Business accounting is a huge profession

Other

- Clear professional accreditation path for traditional business accounting

Aspect for comparison	Business accounting	National accounting
History	In practice for centuries, since the Pacioli treatise of 1494	Evolved from business accounting and macroeconomic theory beginning in 1930s with Keynes
Scope	A single economic entity, for example, a particular business (company)	Entire economy—all business, government, nongovernmental organizations, and households
Key concept and approach to accounting for the environment	Records the transactions of a particular economic entity; records mostly flows of natural resources and pollution; can be a physical or monetary system (or both); a double entry system.	Same as for business accounting, but records the entries by both parties to transactions, hence quadruple entry; both economic agents involved as well as the environment and an entity
Size of profession	Huge number of professionals around the world	Small number of professionals, nearly all in government
Path to profession	Clearly defined higher education path and certification; taught at some schools and most universities	With the exception of ANU, not taught at universities; path to profession through specialist areas of national statistical agencies or central banks
International standards for NCA	Still emerging; Many countries are undertaking projects to develop national standards for NCA or sustainability reporting; early adopters include South Africa, the Netherlands, France, and the Philippines.	Defined by SEEA; started in 1993 and completed in 2012; ecosystem accounting standards being developed
The starting point for NCA	Inputs include water, energy, timber, fish, and land; pollution generation (for example, CO_2, emissions, wastewater); environmental protection and management expenditure	Inputs include water, energy, timber, fish, and land; pollution generation (for example, CO_2, emissions, wastewater); environmental protection and management expenditure
Purpose of accounting for natural capital	Understanding supply chain dependencies; risk management; market advantage for (1) sales and (2) current or future investors	Complement to traditional economic measures, for example, GDP; development planning; modeling (for example, input-output analysis and forecasting)
Presentation of traditional financial and national accounts	Usually as financial statements as an annex to annual reports or similar documents; reflect on the year and chart a path for the future; supported by detailed notes	As a set of accounts with limited reflection and interpretation; no future pathways explored (left to other parts of government)
Presentation of NCA	Can accompany annual reports and the traditional accounts, but often in separate reports (for example, sustainability reporting); increased use of internet-based sustainability reporting	Natural resources are shown in national balance sheets of a few countries; most countries include them in a set of environmental-economic accounts

https://www.wavespartnership.org/en/knowledge-center/forum-natural-capital-accounting-better-policy-decisions-taking-stock-and-moving

Final thoughts

Apocalyptic Scenes in Australia as Fires Turn Skies Blood Red

- Accounting for the environment is a natural extension of traditional national and business accounting
- We need the standards and must apply adhere to them
- Accountants provide the information, others make the decisions (but some accountants are decision-makers)
- Accountants tell you what happened, not what should happen (but we often have an idea of what will happen)
- Accountants must be trusted
- What if we do nothing?

Further reading

SEEA and SNA (links embedded in presentation)

Nordhaus, W.D. and Tobin, J. (1972): Is Growth Obsolete? in The Measurement of Economic and Social Performance, National Bureau of Economic Research http://www.nber.org/chapters/c7620

Lange, G.-M.; Wodon, Q., Carey, K. (2018). The Changing Wealth of Nations 2018: Building a Sustainable Future. Washington, DC: World Bank. World Bank, Washington DC. https://openknowledge.worldbank.org/bitstream/handle/10986/29001/9781464810466.pdf?sequence=4&isAllowed=y

Lucas P. and Vardon M. (2021), Greening the recovery to make it last: the role of Natural Capital Accounting. PBL Netherlands Environmental Assessment Agency, The Hague. https://www.pbl.nl/sites/default/files/downloads/pbl-2021-greening-the-recovery-to-make-it-last-4458.pdf

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The material includes contributions from a large number of individuals. Special thanks to Steve May, Sofia Ahlroth, Glenn-Marie Lange, Xiochen Zhang, JP Castaneda, Peter Burnett, Carl Obst, Rocky Harris, Paul Lucas, Ken Bagstad, and Jac Birt

THANK YOU

Contact

Michael Vardon
Associate Professor
Environmental Accounting
Fenner School of Environment and Society
T +61 (0)447 825 351
E michael.vardon@anu.edu.au

Australian National University