

Natural Capital Accounts, Bonds, Certificates, Markets Promises and Risks

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Overview

Humanity is desecrating our earthly home (UNEP 2019). The immediate causes are self-evident. The deeper structural causes are more contentious. The appropriate responses (in policy and practice) are even more controversial: address the root causes or deploy the dynamics which created the problem in the first place.

This paper is concerned with ecosystem degradation as a subset of this broader environmental crisis and is focused on one particular policy approach to managing ecosystem degradation, namely, natural capital accounting and related innovations including bonds, certificates and markets (Obst 2017, KPMG and National Farmers Federation 2019, IDEEA Group 2020, Smith, Ascui et al. 2020, World Bank 2022).

The paper starts with a review of the concepts and disciplines of natural capital accounting. Following this, a number of uncertainties are discussed including measurement challenges and transaction costs, distributional and equity issues, different stakeholder interests, and alternative strategies for achieving the very real objectives which natural capital theory seeks to address.

The paper concludes that while there are some applications where natural capital theory may add value it has significant intrinsic limitations, in particular, tying the value of the environment to its contribution to the human (capitalist) economy; and locking in environmental short termism through the discount rate.

Natural capital accounting is promoted as the basis for attracting private capital into the funding of protection and restoration through the creation of a market in certified improvement. This project (a market in natural capital improvement) promises to be complex, inefficient, and open to manipulation. Much of the support for this project is coming from stakeholders who stand to benefit regardless of its effectiveness in environmental stewardship.

Natural capital accounting obscures the role of profit incentives, competitive pressures, corporate power and globalization in driving extractivism and pollution. Indeed, as an approach to funding conservation it seeks to harness these dynamics.

Humanity is desecrating our earthly home

This desecration is evident in ecosystem degradation and loss of biodiversity; in pollution (especially carbon pollution but also plastic pollution) and resource exhaustion (eg, water, fish and rare earths).

The impacts of extractivism² and pollution on peoples and cultures is an intrinsic component of this desecration. The impacts of ecosystem degradation are unequally distributed socially and

1. I am not an expert in ecology or accounting. These notes have been put together to assist me in thinking through a particular set of choices regarding remnant bush restoration and protection. DGL

2. The term extractivism is used here to refer to production systems (in the mining, farming, logging and fishing industries) which in effect are extracting and commodifying natural capital.

globally. Inequalities in wealth and power are associated with unequal access to the benefits and unequal exposure to the harms of unsustainable exploitation of our natural environment. Stark inequalities in wealth and power are also manifest in the development and implementation of policies ostensibly designed to address such eco-degradation.

Structural causes

The causes of environmental crisis are manifold and include overproduction, overconsumption and externalising the costs of production to the environment. (The corollary is that if environmental costs were factored into the cost of production the producers and users would be forced to pay greater attention to conservation.)

Externalising the costs of production to the environment has been going on forever. What is different now is that the scale of extractivism and pollution greatly exceed the capacity of natural systems to adapt to the extractions and pollutions.

This increase in scale corresponds to the emergence of capitalism and the incentive to maximise profits by externalizing the costs of production to the environment.

Distribution also matters. With the emergence of monopoly capitalism and then transnational capitalism the power of capital to transfer to others the costs of environmental degradation has also increased. Even though global warming is represented as a global crisis, the behaviour of rich countries and rich people clearly reflects a view that they will be able to minimize the impacts of eco-degradation and global warming on themselves. At best this reflects a lack of solidarity with poorer countries and poorer people but where it perpetuates environmental degradation and its disproportionate impact on others, it must be seen as a form of environmental aggression.

Clearly the huge growth in human population over the last few centuries is a factor in driving eco-degradation and pollution. However, this needs to be contextualized with a view to the concentration of material consumption and pollution in the rich world and the role of poverty (and global inequality) in driving population increase.

Policies and practices

A range of policies and strategies has been advanced to address global eco-degradation. The profit-driven externalization of environmental costs associated with short term planning horizons is widely recognized as a key dynamic; potential solutions vary regulatory approaches (command-and-control) and policy approaches to market-based strategies.

Market based strategies to address global warming are now familiar including carbon budgets, green bonds, cap-and-trade mechanisms, emissions trading and carbon markets.

The focus of this paper is on a variation of these market-oriented strategies, directed at responding to ecosystem degradation, rather than carbon pollution, and centred around the practice of natural capital accounting (and related innovations).

Natural capital accounting

The concept of natural capital is based on an analogy with the conventional economic theory of capitalist enterprise. The enterprise has *capital* in the form of buildings, machines, raw materials and people. These forms of capital are used to produce *commodities* for sale. The revenues from sales pay for the costs of production including maintenance of the asset base, as well as profit to the proprietor.

Under natural capital accounting the ecosystem (the farm, the forest, the air, rivers, or the ocean) is regarded as 'natural capital' and the 'ecosystem services' produced by the ecosystem are analogous to the commodities produced by the enterprise. These 'ecosystem services' may involve actual commodities (wood, fish, farm products); or may comprise 'public goods' including clean

water, clean air, biodiversity and cultural values (recreation and identity) (World Bank 2021).

Natural capital accounting promises a proper evaluation of natural assets like forests and oceans and highlights the shortsightedness of drawing down natural capital as if it were infinite.

Natural capital theory has long had supporters in the environment movement (Schumacher, Daly, etc). It has also been promoted by the World Bank and in Australia by the National Farmers Federation and the forest products industry. The CSIRO has provided advice to forest products industry about the use of this approach.

Many environmentalists hope that natural capital accounting might strengthen the case for environmental regulation (including requiring business to internalize the costs of ecosystem services) and might help to mobilise funding (public and private) for environmental protection and remediation (Bilmes 2021).

Natural capital accounting starts with a metaphor; conceptualizing the value (for humans) of 'the environment' as an 'asset' from which the 'ecosystem services' upon which humanity depends are derived. However, the vision of natural capital theory goes beyond metaphor; looking to convert the metaphor into a practical approach to protecting and restoring natural capital by deploying the resources and disciplines of the financial markets. To achieve this several further innovations are required:

- Standardized and accountable methodologies are required for assigning a value to natural assets and ecosystem services and assigning a value to improvements in natural capital;
- Financial market innovations are needed to mobilise long term financing for protecting and restoring natural assets; and
- Financial instruments which can monetise the environmental improvements (the value added to natural capital) are needed in order to provide a return on investors' equity or debt.

Valuing natural capital

The value of natural capital is calculated on the basis of the contemporary market valuation of ecosystem services (resource rent) drawn from that asset.

Lange and colleagues (2021) describe their valuation of fisheries:

For the core accounts, fisheries asset value is based on the resource rent generated in a given year, assuming a 100-year lifetime of continued rent and 4 percent discount rate. This approach does not explicitly quantify the change in fisheries stocks because, unlike other natural capital assets, global estimates of the stocks of all the species groups for all countries are not currently available. However, estimates of the sustainability of current fishing operations as well as estimates of the impact of climate change on species distribution and abundance are available. This information is used to construct alternative scenarios of the value of fisheries.

The rules for determining whether ecosystem services are being produced from a stable asset or reflect the progressive running down of that asset are problematic. In the fisheries case study, a significant depletion of fish stocks is identified, based on progressively falling harvest levels.

Biophysical (non-financial) measures can be deployed to provide an independent assessment of the stock of natural capital (fisheries, forests, water) and whether it is being exhausted or restored. Standardised and accountable methodologies for the biophysical assessment of improvements in natural capital is a necessary precondition for the development of financial markets for natural capital improvement (see below).

However, the financial value of natural capital stocks (and improvements) is determined on the basis of the resource rent: the monetary value of ecosystem services produced by that capital, which can be realized in the market place.

Alternative approaches to valuing the environment

This assumption that the value of nature depends on its contribution to the capitalist economy excludes from consideration potential ecosystem services which are not currently drawn upon and excludes ecosystem services to non-human entities and communities.

The view that our shared earthly environment should be valued in terms of the money value of ecosystem contributions to the capitalist economy and that the effort we put into protecting and restoring will depend on values so determined is not universally appreciated.

In many indigenous cultures there is a recognition of the intrinsic value of nature; that looking after Mother Earth is a human obligation based on our kinship with all living creatures (Hall 2019).

Private financing

One of the central arguments for natural capital accounting is that it could enable the mobilization of private financing for conservation projects, including environmental protection, by assigning an economic value to the work being undertaken, either as a project or as a corporation (Obst 2017, KPMG and National Farmers Federation 2019, Smith, Ascui et al. 2020, Bilmes 2021, ClimateWorks Australia and National Australia Bank 2021).

This scenario involves different forms of financing and the creation of new financial instruments which will monetise the enhanced value of the natural capital and provide a return to investors. Investors (other than philanthropists) buy or lend in the anticipation of a financial return arising from the work undertaken in protecting or restoring natural capital.

Private financing can take the form of equity, philanthropy, short term lending by banks and longer-term finance through bonds (as in 'Green Bonds'). Since the protection and restoration of natural capital is generally a long-term process, longer term instruments such as bonds are particularly important.

An enabling policy context can be critical for the raising of debt capital through bond markets. In relation to renewable energy this may be through low-carbon policy mandates such as clean energy standards or deployment targets (as in cap and trade programs). Likewise, tax concessions on revenue from investments in renewable energy may make such investments worthwhile. Or it may be simply through winding back public subsidies to fossil fuels.

Critical to the private financing strategy is the private capture of the enhanced rental revenues consequent upon natural capital protection or restoration.

Monetising improvements in natural capital

Green bonds could be used to support plantation development in which case the anticipated returns would be from asset appreciation (and the possibility of selling the plantation) or in the longer term from the sale of wood products. In the context of native forest timber harvesting in Australia the economic attractiveness of investing in plantation timber would be greatly enhanced by winding back the public subsidies to native forest timber harvesting, such as rent-free access to established forests and their soils.

However, many of the ecosystem services deriving from natural capital are 'public goods' (clean water, recreation, identity). Such public goods are non-rivalrous - use by one person doesn't reduce their availability to others - and non-excludable - users cannot be barred from accessing them or required to pay for them. Accordingly, they cannot be exchanged as commodities in a marketplace. The private capture of the benefits flowing from ecosystem restoration is more complex.

The financial innovations being developed to fund natural capital improvement draw heavily on the experience of similar innovations in relation to carbon pollution and renewable energy

(International Energy Agency 2020).

The various forms of ‘emissions trading’ (within and between countries) generally depend on a mandated limit on greenhouse gas production (by the enterprise or the country) with the provision that emissions above that limit are acceptable if they are ‘offset’ by the purchase of ‘carbon credits’ from vendors who have already invested in emissions reduction (or absorption).

It is worth noting several criticisms of emissions trading schemes, including:

- **Additionality:** refers to the certification and sale of emissions “avoided” (which were never going to be emitted) or carbon “absorbed” (which was going to be absorbed anyway) (Barata 2016, GHG Management Institute and Stockholm Environment Institute nd);
- **Measurement:** flawed measurement of emissions and offsets (including failure to report emissions);
- **Displacement:** carbon credits purchased to allow continued pollution in the metropolis while offsets originating in developing countries (which have not contributed to global warming) restrict their economic development (Chowdhury and Sundaram 2021);
- **Low pricing:** the cost of ‘offsetting’ per tonne of CO₂ is way below the revenues flowing to the big polluters if they are allowed to continue to emit.

The term ‘additionality’ refers to the debates about how to ensure that offset reductions would not have occurred in the absence of the market for carbon credits. Are the offsets really ‘additional’? (See GHGMI & SEI for more.)

‘Green washing’ – participation for public relations purposes rather than real mitigation – is widespread. See [ClimateActive](#) for a list of “businesses and organisations that have proven that they are measuring, reducing and offsetting their emissions, with a net result of zero emissions.” They include AGL, Ampol, BP, Australian Mines Ltd, and several banks (Climate Active 2019).

There are alternatives to emissions trading including a carbon tax or ‘command and control’ measures such as closing coal fired power, subsidizing renewable energy and mandating electrified transport. It maybe that emissions trading has a role but the transaction costs of assuring integrity, equity and efficiency are significant.

Certification

These debates regarding carbon markets are relevant to natural capital accounting and the monetization of the benefits flowing from investment in improved natural capital. Where an investment in natural capital improvement yields direct benefits in terms of commodities produced (wood from forests, fish from oceans) the pathways to monetizing the environmental benefits are, at least in principle, reasonably clear.

However, where the benefits include significant public goods (improved biodiversity, ecosystem resilience, recreational opportunities, cultural values) which cannot be commodified a more indirect approach is called for.

Certification is the key to monetizing the returns on investment in natural capital. There are several initiatives under way directed to creating schemes for the standardized and accountable estimation of the value added to natural capital through particular investments.

The case for an “ecosystems services market that delivers specified and defined biodiversity outcomes” was elaborated in a report produced for the National Farmers Federation by KPMG in 2019 (KPMG and National Farmers Federation 2019).

Farmers recognise the need to protect the Natural Capital that underpins their production systems. However, there is currently little or no recompense for the services the natural systems on their properties deliver to society.

While there is a benefit to landholders, Natural Capital on private land has been providing public good conservation outcomes. However, without a new ecosystem services market

paradigm, these public good outcomes will continue to be unacknowledged. This is to the detriment of landholders who are required to continually invest in environmental stewardship activities. Farmers should be encouraged through performance measures – such as ecosystem services payments – to continue to undertake environmental stewardship and deliver wider biodiversity outcomes to meet public good demand.

A subsequent 2021 report prepared by PWC for the National Farmers Federation and funded by the Macdoch Foundation (PWC, Macdoch Foundation et al. 2021) quotes a farming executive, “Farmers who are unable to measure and report on their natural capital will soon not be able to attract capital – either debt or equity – and eventually may even struggle to find commodity offtake partners”.

The threat is that both the banks and the supermarket giants may require such certification as part of achieving their ESG targets.

In parallel, the Commonwealth Department of Agriculture, Water and the Environment with the National Farmers Federation is developing the Agriculture Biodiversity Stewardship Package (Department of Agriculture 2022). Researchers at the ANU have been funded to design and develop rules and processes for measuring, reporting and verifying environmental outcomes in farm biodiversity projects.

The voluntary Australian Farm Biodiversity Certification Scheme will allow Australian farmers to showcase best practice natural resource management to sustain and build biodiversity. Certification will enable consumers to identify Australian produce from farms that sustain our biodiversity and promote community recognition of farmers’ agricultural stewardship.

Biodiversity certification could help improve the profitability of farm businesses by supporting access to markets, creating price premiums for their produce, lowering capital costs and giving farmers access to information about ways of improving land management practices.

To be certified, farmers will need to undertake specified land management practices and report on-farm biodiversity outcomes.

The Carbon + Biodiversity Pilot is using a market-based mechanism to reward farmers for increasing biodiversity. Farmers who undertake plantings for carbon can receive additional payments for maximising the biodiversity benefits from these plantings by: planting a mix of species; and managing and looking after that vegetation.

The Enhancing Remnant Vegetation Pilot will be a scientifically robust on-ground trial that aims to improve existing native vegetation on farms. It will test biodiversity protocols developed by the Australian National University. Successful farmers would receive payments to manage and enhance significant remnant native vegetation on-farm. Examples include: installing fencing, carrying out weeding, pest control and replanting.

The National Stewardship Trading Platform will enable farmers to connect with buyers of biodiversity outcomes and kick-start private sector biodiversity markets. The platform will integrate spatial information alongside buyer and seller information building transparency and credibility in the market.

The National Farmers’ Federation (NFF) was provided \$4 million towards development of an Australian Farm Certification Scheme. They commissioned a report by the Australian Farm Institute (AFI): *Recognising On-farm Biodiversity Management* (Australian Farm Institute 2020).

This project reviewed best practice management standards and collated extensive feedback from stakeholders with skin in the game to address the value proposition and potential barriers for adoption of a scheme within farming and NRM [natural resource management] communities. More than 500 individuals contributed their thoughts, opinions and expertise to the project. Information gathered in the desk review and consultation was analysed to determine key criteria for success, which in turn have informed recommendations for

development of a farm biodiversity certification or verification scheme trial.

During the consultation for this report, farmers identified the complexity, cost and difficulty of assessing and participating in multiple programs, as barriers to participating in current stewardship programs, including market-based initiatives.

Despite farmers' concerns about multiple programs the report recommended creating "an overarching framework that connects and verifies current and emerging programs and provides farmers with choice".

The challenge of standardized and accountable assessment of improvements to natural capital has been highlighted in The Natural Capital Investment Initiative (NCII), led by ClimateWorks Australia (based in Monash University) and supported by the National Australia Bank (ClimateWorks Australia and National Australia Bank 2021). In Phase 1 of the Initiative an open-source Natural Capital Measurement Catalogue (NCMC) was developed, which outlines a comprehensive set of natural capital measures and metrics at the property level. In Phase 2 (supported by the Macdoch Foundation) the NCMC is being piloted and tested. [Appendix B](#) of the Phase 1 report provides a 7 page summary of the measures of natural capital, ecosystem services, production and financial measures that comprise the Catalogue. Based on the AFI report of farmers' concerns about complexity the Phase 2 consultation outcomes are likely to be mixed.

It seems that natural capital measurement, using tools such as the Natural Capital Measurement Catalogue, is expected to serve several broad purposes:

- providing landholders (and their finance providers) with useful information about land management and natural capital improvement;
- advancing public policy goals regarding carbon pollution mitigation and biodiversity recovery by informing all stakeholders of progress to these ends (enabling policy interventions such as tax concessions to reward natural capital improvement);
- creating an ecosystems services market (analogous to the carbon emissions market) which will encourage banks and funds to invest in natural capital improvement, knowing that the outcomes of their investment will be monetised through certification of improvements and hence that they can be assured of returns on their investment.

Uncertainties

Measurement

Estimating the value of natural capital and ecosystem services is complicated by the lack of a taxonomy which is jointly comprehensive and mutually exclusive (that covers all such services without double counting). How to count an ecosystem service which is a service in its own right and is also an input to another service? Water is an ecosystem service provided by forests but it is also an input to biodiversity and to wood production. The competing uses for water in a drying climate adds another level of complexity, as in parts of Australia where farmers resent the conversion of pasture or cropland to plantations due to their higher water consumption.

The comparative measurement of natural capital across different estates presents challenges beyond sequential measurement designed to estimate improvements in natural capital in one particular estate. However, for public policy purposes (such as biodiversity), measurements of natural capital are required at scale, beyond single estates.

How to find a metric which allows the aggregation of measures of different forms of natural capital and of different kinds of ecosystem service. In the renewable energy space the mass of CO₂ (or CO₂ equivalent greenhouse gas) forms the common metric. Such a common metric will not be easily developed in relation to natural capital.

Discount rate

The future value of natural capital, for contemporary accounting purposes, is calculated (by the World Bank) using a discount rate of 4% per annum. The value for us now, of the asset in the future, is reduced by 4% per year from its current value. This means its assigned value reduces to insignificance very quickly in earthly times. 100 years is a long time for accountants but a very short time for biologists. The logic of the discount rate, that technological advances and changing 'consumer' preferences inevitably make future returns uncertain, has less relevance to 'natural capital' than man-made capital.

Reducing the future value of environmental assets has the effect of reducing the justification for the contemporary maintenance expenditure needed to preserve (or recover) the value of that asset. A discount rate of 4% renders the future worthless.

Valuing nature on the basis of its usefulness in a capitalist economy

The anthropocentric (capo-centric) instrumentalism of this core assumption is arresting. Does it matter if frog populations are declining if they do not contribute to the capitalist economy? Is global plastic pollution really a problem for capitalism given the huge wealth and turnover of the plastics and packaging industries? How much would a certified kilogram of plastic-pollution-reduced (or avoided) need to cost to make an impact on the global problem? What kind of price for units of Aboriginal-history-preserved would have prevented the destruction of Juukan Gorge by Rio Tinto?

Transaction costs

The measurement of natural capital and of ecosystem services may be undertaken at different levels of precision and discrimination. For estate management, and regional assessment for public policy purposes, structured expert judgement might suffice. However, if the results of such measurements are directed to monetizing a return on investment in natural capital improvement, then the reproducibility, integrity and accountability of such measures would be critical and would come with high transaction costs.

Additionality

The problem of additionality will bedevil any attempt to monetise improvements in natural capital. How to be sure that funding generated through an 'ecosystem services market' is not being used to fund natural capital maintenance which was already underway (or should have been).

To what extent does proper stewardship of land include preserving natural capital? Should landholders need to be reimbursed for maintaining natural capital or repairing degraded land.

How fair is it to facilitate funding for remediation for land which has been neglected as compared with landholders who have invested in maintaining their own natural capital?

Parallel benefits

There is a range of stakeholders who are supporting the progress of natural capital accounting who stand to gain in ways other than improved natural capital.

Foremost among these are the banks and fund managers who take a slice from every transaction they mediate and the consulting firms whose services will be called for extensively to make the system work.

Beyond these immediate stakeholders are the many businesses who seek to dress themselves in green for public relations purposes.

A different kind of benefit also accrues to those landholders, extractivists and polluters who fear that a rising public concern about biodiversity might lead to more interventionist 'command and

control' strategies by government.

The opposition of the automotive industry in Australia to tighter exhaust emission standards illustrates the desperation of the polluters to be allowed to continue to pollute. The wood products industry (including the CFMMEU) has demonstrated that it has the power to force the State Government to sanction the continued degradation of Victoria's native forests. Clearly they would prefer to pursue a complex and far away scheme designed to show that logging is sustainable while taking the last logs that the forests are able to supply.

Alternative strategies for managing extractivism and pollution

There are alternative strategies for managing the eco-degradation which accompanies extractivism and pollution.

A scenario can be imagined in which government invests public monies directly into the protection and recovery of native forest ecosystems; in which farmers who destroy their natural capital face land tax charges linked to the degree of eco-degradation; in which mining licenses are more strictly governed and miners are required to post up front the full funding required for remediation.

This kind of scenario might require increased taxes.

Addressing the root causes of depleted natural capital

Ultimately, any strategies for managing depleted natural capital need to address the root causes of extractivism and pollution. These include:

- the monopoly power of the supermarket chains to force prices on farmers which leave no margin for land stewardship;
- the power of transnational food corporations which dominate global food supply chains drawing on industrialised agriculture to produce cheap standardized foods in bulk and replace small farmers operating sustainably in traditional settings;
- the power of transnational miners to extort mining concessions from poorer countries and force other countries to match such unregulated and unaccountable mining practices;
- the power of transnational capital to perpetuate a commodity cycle of fresh raw materials, production, consumption and waste rather than a circular economy;
- the power of international finance markets to dictate
 - national finance policies, including winding back the taxation of transnational corporations, progressive personal taxation, and avoiding wealth taxes (forcing governments to look to private finance for land stewardship); and
 - national environmental policies

Conclusions

Natural capital accounting is a useful conceptual tool for thinking about extractivism, pollution and the externalization of the costs of production to the environment. As a conceptual tool it has important limitations, in particular, tying the value of the environment to its contribution to the human (capitalist) economy; and locking in environmental short termism through the discount rate.

Natural capital accounting is being promoted as the basis for attracting private capital into the funding of protection and restoration through the creation of a market in certified improvement. This project (a market in natural capital improvement) promises to be extremely complex, inefficient because of high transaction costs, and open to manipulation through the unsolved challenges of additionality.

It is apparent that much of the support for this project is coming from a range of stakeholders who

stand to benefit regardless of its effectiveness in environmental stewardship. One of the benefits to these stakeholders is that it defers alternative and more effective strategies drawing on the regulatory and funding powers of government.

Natural capital accounting obscures the role of profit incentives, competitive pressures, corporate power, and globalisation in driving extractivism and pollution. Indeed, as an approach to funding conservation it seeks to harness these dynamics.

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