Which financial architecture can protect environmental commons?

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The protection of environmental commons remains one of the most pressing problems in "collective action", vital to the resilience and sustainability of societies and their economies. The discourse around "natural capital" potentially offers a way to integrate decisions about the commons effectively into economic decisions. Investing in the commons is key to protecting the flow of services provided to society by natural capital. Recent exploration of the potential for investing in natural infrastructure has highlighted numerous mechanisms, which could help turn this proposition into a reality.

What do we mean by environmental commons?

Traditional understandings of environmental commons

The term environmental commons usually refers to natural resources like air, water or woodlands, which are shared by all members of a society. Such resources are "held in common" by all members of society, rather than being owned privately by selected individuals. Two competing narratives have dominated policy debates about the commons over recent decades. In one view (attributable to Garrett Hardin), shared access to common resources leads to over-use and eventual collapse (the 'tragedy of the commons') [1]. Hardin's answer was to "privatise" (i.e. establish property rights over) them. In another view (attributable to Elinor Ostrom), common pool resources can be managed effectively at the local level, provided certain social conditions (such as transparency) are met. It remains a reality that environmental commons tend to be undervalued by society, particularly where no local oversight exists, and as a result, they have suffered severe declines in quality in many places [2].

Environmental commons through the prism of "natural capital"

One way in which economists have attempted to protect environmental commons is by framing them as "natural capital". By analogy with the concept of physical capital, which represents the stock of productive assets on which future economic output depends, the concept of natural capital is designed to capture the idea that natural resources provide a flow of "environmental services" on which society depends. These services include (for instance) the provision of healthy air, clean water, food, timber, livelihood and opportunities for recreation as well as the regulation of flood risk and climate change, through carbon sequestration.

Soil provides an under-appreciated example of natural capital. It performs several vital functions such as supporting food production and storing water and carbon, and its ability to do so is lessened as it becomes degraded, with implications for both agricultural production and ecosystem integrity. It has been estimated that the costs of soil degradation in England and Wales amount to £1.2bn per year [3]. Damage to the environmental commons therefore feeds directly into costs for governments, business and households, just as damage to physical capital does. Conversely, investing in natural capital can help improve the resilience, health and productivity of national economies.

The terminology of natural capital is not universally accepted. Critics point out that environmental commons differ in significant ways from physical capital, that assigning a monetary value to nature risks commodifying it and that the environmental commons should not be regarded (even by analogy) just in terms of their use-value to humans [4]. Protecting the natural environment certainly creates significant intrinsic benefits that are valuable in their

(1) HARDIN G. (1968), "The Tragedy of the Commons", Science *162: 1243-8; OSTROM E. (1990),* Governing the Commons – The evolution of institutions for common action*, Cambridge: CUP.*

(2) The 2005 Millennium Ecosystem Assessment estimated that some 60% of global ecosystems have been degraded by anthropogenic activity.

(3) Cranfield University (2015), The Total Costs of Soils Degradation in England and Wales.

(4) MONBIOT G. (2018), The UK Government wants to put a price on nature, but that will destroy it, The Guardian, 15th May 2018. See also O'NEILL J. (2017), Life Beyond Capital, University of Surrey: CUSP, https://www.cusp.ac.uk/themes/m/m1-6/

own right and are also essential to deliver key global environmental commitments such as the UN's Sustainable Development Goals (SDGs [5]) and the Paris Agreement on climate change.

Nonetheless, the term "natural capital" has the advantage of opening up conversations about environmental commons within the world of finance and investment. It emphasises the importance of ecosystem services to the economy and, combined with the ability to assess the value of environmental commons, it allows for them to be 'internalised' into economic decision-making processes. The rest of this paper therefore uses the concept of natural capital to discuss the barriers that stand in the way of greater investment in the environmental commons and explores the policy solutions that could help overcome these barriers.

Why is there limited investment in natural capital?

There are multiple barriers to investment in natural capital.

Lack of a clear revenue stream

By far the greatest barrier to investment in natural capital has been that of generating a reliable and recognised revenue stream: if you were to take out a loan to finance a natural capital project, how would you pay it back? How can an investor make returns if they invest (for example) in peatland restoration? This question of a clear revenue stream is at the root of the lack of investible propositions and an investment "pipeline" in natural capital.

The key issue is that services provided by nature have traditionally remained under or un-valued, even though they often provide quantifiable financial benefits, particularly in terms of avoided costs (such as healthcare [6]) and unquantified benefits like wellbeing [7]. Often, realisable returns are only a fraction of the benefits actually delivered by an investment. Benefits often accrue to a wider or different set of people than those who make decisions about the resources and often over longer time horizons.

Natural capital approaches have sought to take the first step in addressing this by creating a correlation between these resources and the benefits they convey. The UK's Office for National Statistics (ONS) valued the removal of harmful pollution and carbon dioxide by woodland at £1.8bn in 2015, based on the avoided health costs associated with respiratory and cardiovascular illnesses and subsequent years of life gained and deaths avoided [8].

However, avoided costs do not currently constitute revenue although the insurance industry could deliver revenue streams based on avoided costs.

A scale and liquidity problem

Natural capital projects by design tend to be at a relatively small scale, taking place at a local or catchment level. Investors typically favour large-scale projects to maximise value for money. Institutional investors for example have minimum investment amounts of €25 million to €50 million [9]. These disadvantages small scale investments, where investors incur high costs for identifying projects (search), evaluating them (due diligence) and for completing the transactions. Projects also often vary hugely, so they cannot be consolidated to provide economies of scale.

A second challenge related to scale is that small projects run by conservation groups or farmers may not have sufficient assets to offer as collateral, limiting access to traditional debt financing (i.e. loans) from banks. This is a significant restriction for those that lack the financial literacy to engage in complex or innovative finance models.

Finally, natural capital infrastructure is inevitably an illiquid asset. Prudential regulations (such as Solvency II [10]) place limits on institutional investors' capacity to take a stake in illiquid assets and places unfavourable capital treatment upon these assets, resulting in a lower return on capital, reducing the attractiveness and affordability of such investments at the institutional investor level.

Lack of standardised data and information sharing

Data around natural capital investment outcomes and tools for interpreting that data are currently insufficiently mature. There are significant gaps in knowledge around natural capital generally, and a lack of joined up approaches to data collection, measurement and monitoring of natural assets. In the UK, there is no single method for collection or date for baseline data and some assets (e.g. soils) have yet to be assessed in detail across the whole country. Many different agencies are responsible for data collection, resulting in gaps and duplications across the board [11].

The expertise required for investment in natural capital remains siloed, with little overlap of knowledge between the conservation and financial industries. Project developers lack the support they need to structure investable propositions and bring projects to a stage of investment-readiness. As the market remains niche, most investors lack the internal resources required to dedicate towards evaluating natural capital investments, creating a vicious circle.

Reliable data: an important first step to better value and invest in environmental commons

What does not get measured gets ignored by businesses and investors

Without a baseline, we can have little confidence in delivering meaningful improvements to our natural assets.

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(5) Natural Capital relates to SDGs 2, 3, 6, 9, 11, 12, 13, 14 and 15.
(6) Natural England has estimated that if every household in England had equitable access to good quality green space, then £2.1bn could be saved in averted health costs. Natural England (2009), Our Natural Health Service: The role of the natural environment in maintaining healthy lives.
(7) University of Essex (2013), Ecominds effects on mental wellbeing: an evaluation for Mind.
(8) ONS (25 July 2017), UK natural capital: ecosystem accounts for freshwater, farmland and woodland.
(9) HMG Patient Capital Review (2017), Financing Growth in Innovative Firms.
(10) European Union Directive 2009/138/EC harmonising insurance regulation.
(11) Natural Capital Committee (September 2017), Advice to Government on the 25 Year Environment Plan.

Measuring a business or a country's reliance on natural systems is the first step to reducing that reliance, by enabling better decision making and driving sustainable, long-term growth. For example, it takes over 50,000 litres of water to manufacture a car; awareness of their reliance on water meant that UK car manufacturers reduced their water consumption per vehicle by 50% between 2000 and 2012 [12].

Once natural assets at risk are clearly identified and the effectiveness of protection or improvement schemes can be properly measured, this will produce better decision-making and support businesses in taking investment decisions to improve their reliance on the natural environment and the state of natural assets.

The UK's Natural Capital Committee has recommended for example that a comprehensive national report on the state of the environment be completed by the end of 2019, including a focus on opportunities for its improvement. Another measurement option is Natural Capital Stress Testing, which is being developed by WWF. This is a tool to track emerging environmental risks and help identify and prioritise policy actions to be taken in response [13]. For example, through its pilot application, the food and beverages sector in the UK was shown to face significant risks.

Natural capital accounting at the organisational level

Highlighting operational risks and opportunities linked to natural resource management will transform the business case for natural capital investment. This relies on robust data. Widespread adoption of natural capital approaches can facilitate accurate calculations of revenues or other financial impacts like avoided costs. It will also draw out where the performance and value of a business is dependent upon the availability of well-managed natural processes and resources. For example, it is by measuring and monetising its significant dependence on the availability of timber for its products that European home improvement retailer Kingfisher adopted a responsible sourcing strategy and committed to becoming a "net positive" business for timber, helping to sustain and create more forest than it relies on for its products.

More robust natural capital data will provide transparency for investors to better understand the environmental impacts of investments as well as their portfolio risks. Clearly tagging investments that have natural capital benefits will help to build a useful data set linking natural capital to financial performance. That will make it easier to demonstrate revenue and/or lower investment risk, including reputational risk, facilitating additional investment. Credit rating agencies should also begin to incorporate natural capital factors in their analysis.

Businesses should learn from the best practice available, like the application of the Natural Capital Protocol [14], and use the data gathered to inform decisions. Accounting bodies also have a role to play in mainstreaming and harmonising these practices.

Setting up markets to invest in natural capital

Planning law and public procurement: the role of governments

Governments can play an important role in encouraging investment in natural capital and have several tools at their disposal. With public procurement representing around 14% of the EU's GDP, governments can send clear market signals by explicitly favouring those businesses that are able to provide goods and services in the most resource efficient way. Governments can combine a progressive procurement policy with a clear approach to lead by example when commissioning major infrastructure projects and introducing an "environmental net gain" principle for new infrastructure and housing developments in national planning systems. Taking a "biodiversity and environmental net gain" approach in major transport projects for example can provide a clear demonstration at scale of how infrastructure projects can be combined with an approach to avoid damage to existing biodiversity and natural assets and investments to improve the state of the natural environment.

Creating markets for eco-system services

The recent UK Ecosystem Markets Task Force was an industry-led review into business opportunities arising from the proper valuation of natural capital. A key recommendation of the Task Force was to increase investment in natural capital schemes by developing payments for ecosystem services (PES). The valuation of ecosystem services offers scope for making those responsible for damage pay for it; however, PES are developed on the basis that the beneficiaries of an environmental service pay those who maintain the ecosystem that provides it.

For example, water companies often make payments to farmers to implement improvements in their farming operations. This helps improve water quality by reducing nitrates, phosphates, agrochemicals and sediment in surface run-off [15]. There are a number of such schemes in the water industry but uptake in other sectors has been slow without any regulatory support.

PES arrangements create engagement between investors and ecosystem service providers but the latter must create a business case to which businesses can respond. Schemes can then produce a win for both buyer and seller. Governments can play a role in helping to support PES by removing existing barriers, creating stable and predictable conditions through smart regulations (for example regula-

(12) UK Government Ecosystems Market Taskforce (March 2013), Final Report: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/316101/Ecosystem-Markets-Task-Force-Final-Report-.pdf

(13) WHITE C., THOUNG C., ROWCROFT P., HEAVER M., LEWNEY R. & SMITH S. (2017), Developing and piloting a UK Natural Capital Stress Test: Final Report*, prepared by AECOM and Cambridge Econometrics for WWF-UK.*

(14) http://naturalcapitalcoalition.org/protocol/

(15) Department for Environment Food & Rural Affairs (DEFRA) (May 2013), Payments for Ecosystem Services: A Best Practice Guide*.*

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Le lac de Murighiol, petite ville de Roumanie se situant au cœur du delta du Danube.

"The European Investment Bank and European Commission are leading the way on this, by partnering to create the Natural Capital Financing Facility (NCFF). This is a financial instrument that supports projects delivering on biodiversity and climate adaptation (such as water reuse, soil pollution reduction and biodiversity compensation projects)."

tions aimed at improving the condition of a specific natural asset), and encouraging the brokerage of transactions.

The role of innovative financial products

The role of the bond market

The green bonds market has grown rapidly over recent years: Moody's credit rating agency predicts the market will reach $206bn in issuance in 2017 [16]. Green bonds have been popular for increasing liquidity of green investments and corporate green bond issues have been over-subscribed, implying a strong demand [17]. There is scope to increase the use of green bonds for natural capital projects. However, bonds require steady and regular yield, which ultimately relies upon having a revenue stream.

One possible solution is to tag natural capital projects on to regular bonds, where the product remains familiar and returns are steady for the potential investor, with additional reputational benefits arising from the natural capital element. Another would be to develop metrics for natural capital bonds, akin to the "tonnes of carbon saved" measure applied to many green bonds, to increase attractiveness to impact investors who may look beyond only financial returns.

As a practical example, municipal bonds are a subset of green bonds that can be used for local resilience. Proceeds can be put towards natural capital projects which have a direct benefit for the area. For example, local authorities can issue a bond which funds a natural flood management scheme, reducing future liabilities in the event of a flood. Municipal bonds also benefit from the clear accountability for where proceeds are being spent. This is a growing field: the State of California issued over $1.3bn of municipal green bonds in 2016, including $500m bond from the San Francisco Public Utilities Commission for clean water projects [18].

Targeted public funds

Targeted public finance can be particularly effective in expanding the pool of potential investors, improving economics of marginal projects and sharing information to reduce perception of risk for key sectors [19]. In the UK,

(16) Bloomberg (10 March 2017), Green Really is Gold for These Bond Lovers.
(17) Schroders (July 2015), Green Bonds – A Primer.
(18) California Association for Local Economic Development (CALED) (19 January 2017), California Green Muni Bonds Top $1.3 Billion in 2016.
(19) Vivid Economics (2011), Economics of the Green Investment Bank.

whilst still under public ownership the Green Investment Bank's £3.4bn investment in green infrastructure projects crowded in £12bn of additional investment [20].

In some less mature infrastructure areas such as natural capital projects, targeted public funds can be vital to establish proof of concept and create viable markets for private investment at a commercial rate. National governments should consider setting natural capital investment funds to provide seed finance for priority projects.

The European Investment Bank and European Commission are leading the way on this, by partnering to create the Natural Capital Financing Facility (NCFF). This is a financial instrument that supports projects [21] delivering on biodiversity and climate adaptation (such as water reuse, soil pollution reduction and biodiversity compensation projects) through tailored loans and investments, backed by an EU guarantee. The ultimate objective of the NCFF is to demonstrate to investors their attractiveness for the longer term, in order to develop a sustainable flow of capital towards those projects and achieve scale.

Projects financed through the NCFF need to generate revenues or demonstrate cost savings. Along with the financing facility, there is a technical assistance facility that can provide each project with a grant of up to a maximum of €1m for project preparation, implementation and the monitoring of the outcomes.

Tackling the short-termism of financial markets

Geared to think short-term

Short-termism is a particular barrier to green infrastructure investment. Climate change and environmental degradation risks, some of which are inherently long-term, are likely to be missed by financial analysis due to the short-term focus of current risk and valuation models, and the lack of adequate information to assess risks. This favours investments with short-term returns rather infrastructure and exposes long-term equity investors to under-priced risks. There are however a range of regulatory changes that could help overcome the short-termism of financial markets.

Broadening the scope of fiduciary duties

Fiduciary duty requires those entrusted with managing money (fiduciaries) to act prudently in their protection of beneficiaries' (those whose money they are managing, e.g. savers') interests [22]. However, the duties are not clearly defined in law. To address this, governments should introduce a legal duty for fiduciaries to consider financially material environmental, social and governance (ESG) risks, building for example on the findings of the UK's Law Commission's 2014 review [23]. This should extend to all investors, including asset managers and intermediaries (including credit rating agencies) in line with the findings of the EU's High Level Expert Group on sustainable finance (HLEG) [24].

Linking incentives to long-term performance

Incentives should be introduced across the investment chain to link performance to sustainability. For example, every member of HSBC's Management Board has sustainability metrics built into their annual and long-term performance scorecard, used to determine any variable pay awarded [25]. The EU's HLEG on sustainable finance sets out further detail on how incentives can work across the chain, including moving away from short-term industry benchmarks [26].

Adjusting capital weighting requirements

International and European rules designed to ensure prudence in the financial system include 'capital weighting' requirements, which require financial institutions to hold money against their investments in reserve, in case of financial downturn leading to significant losses. Whilst greater prudence is to be encouraged, investing over the long term in infrastructure as a means of increasing financial stability should be supported by prudential rules. The EU is therefore considering introducing a "green supporting factor" to reduce perceived risk and lower capital requirements for banks to direct capital towards green investments [27].

Conclusions

The protection of environmental commons remains one of the most pressing problems in "collective action", vital to the resilience and sustainability of societies and their economies. The discourse around "natural capital" potentially offers a way to integrate decisions about the commons effectively into economic decisions. Investing in the commons is key to protecting the flow of services provided to society by natural capital. Recent exploration of the potential for investing in natural infrastructure has highlighted numerous mechanisms, which could help turn this proposition into a reality. Some critical challenges remain. Financial investment requires a monetary (as well as social) return. Finding ways to capture the economic value of ecosystem services, such as through regulatory and public policy interventions, may turn out to be critical in protecting the intrinsic value of the commons.

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(20) http://bit.ly/2nb1b1k
(21) Examples of projects being financed are available here http://www.eib.org/products/blending/ncff/project-examples/index.htm
(22) ShareAction (October 2014), Fiduciary duty explained.
(23) Law Commission (July 2014), Fiduciary Duties of Investment Intermediaries.
(24) EU High Level Expert Group on Sustainable Finance (January 2018), Final report.
(25) HSBC (November 2017), Environmental, Social and Governance (ESG) Supplement, Supporting sustainable growth.
(26) Recommendation 7, HLEG on Sustainable Finance (January 2018), Final report.
(27) "Brussels looks at easing bank capital rules to spur green investment", Financial Times, *(2 January 2018).*