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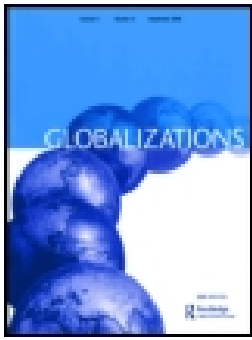
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The Dasgupta Review deconstructed: an exposé of biodiversity economics

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ABSTRACT

The Dasgupta Review is the latest attempt at justifying financialisation of Nature, but also much more. It represents a high point in applying concepts of capital and wealth accumulation comprehensively to all aspects of human and non-human existence. Unravelling the flaws in the arguments, contradictions and underlying motives requires both understand of and cutting through the specialist language, neoclassical economic models, mathematics and rhetoric. We offer a critical guide to and deconstruction of Dasgupta's biodiversity economics and reveal its real aim. Framing critical biodiversity loss as an issue of asset management and population size is a blind to avoid questioning economic growth, which remains unchallenged and depoliticized despite apparently recognizing natural limits. Dasgupta ignores long-standing problems with capital theory and social cost-benefit analysis. Rather than a scientific review of biodiversity economics he offers impossible to achieve valuation, based on old flawed theories and methods, embedded in an unsavoury political economy.

KEYWORDS

Biodiversity economics; financialisation of nature; environmental values; natural capital; social costs

1. Introduction

In 2019, Her Majesty's (HM) Treasury commissioned a study on the economics of biodiversity subtitled *The Dasgupta Review*, after its author Sir Partha Dasgupta. The final report was launched in February 2021 at an event hosted by the Royal Society and attended by the Prince of Wales and UK Prime Minister, Boris Johnson. As this indicates *The Review* was backed by the British establishment at the highest levels. The aim was to repeat for biodiversity what the, HM Treasury commissioned, *Stern Review* was perceived to have achieved for climate change (Stern, 2007), namely the promotion of orthodox economic and financial approaches to public policy ostensibly out of environmental and social concern (Spash, 2007b). Indeed, Stern was part of the officially appointed Advisory Panel for *The Review* along with a select elite including financiers, bankers and professors from Oxford, Cambridge, University College London and the London School of Economics (HM Treasury, 2019). Sir David Attenborough, naturalist and TV personality, was appointed official Ambassador for *The Review*, and controversially proclaimed that economists understand the value of biodiversity better than ecologists (Taylor-Dawson, 2021). Similarly, a range of business, financial interests and environmental organizations lined-up to promote *The Review* as an highly important ground breaking success.¹

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In fact, there is nothing new in *The Review's* orthodox economic 'solution' for loss of biodiversity, namely, putting a price tag on Nature so that businessmen and financiers can recognize its existence in their accounts, capture its value and profit from trading. Neither is there anything new about an economist claiming he can direct environmental policy by correctly pricing Nature to optimize resource management. However, Dasgupta does not stop there.

Human health, education and population are also to be monetized and treated like man-made capital. Together three forms of capital – natural, human and produced – are taken to represent the 'inclusive wealth' of humanity.² In this way, all social, ecological and economic aspects are equated, allowing their aggregation and integration into national accounting systems. Conflicting objectives and interests are assumed commensurable via reduction to monetary equivalents that support financial wealth accumulation. There is no error in this 'independent' report having been commissioned by the Treasury department under a ruling Conservative Party. While pricing, trading-off and optimizing are traditional economic fare, the political vision here involves a far reaching public policy agenda, promoting the total domination of non-financial aspects of life by finance.

The political support for *The Review*, in the context of Brexit, may be understood as trying to establish the UK as a world leader in environmental risk management and related financial services. The UK government has seed funded (£10 million) a new Centre for Green Finance and Investment (UK GCGFI) with physical hubs planned in London and Leeds. The aim is to accelerate development of data and analytics for gauging (physical and transition) risks for financial institutions with an initial focus on climate change (UK GCGFI, 2021). As stated by the Environment Secretary, George Eustice, realizing the aspirations set out in *The Review*:

is what lies at the heart of the government's 25-year environment plan, our approach to future farming policy, efforts to embed biodiversity net gain in the planning system, and other initiatives. (HM Treasury, 2021)

The UK has already published natural capital accounts (Office for National Statistics, 2020) and other nations are expected to follow. New Zealand and China are establishing national water and forest accounts and China a measure called 'Gross Ecosystem Product'. While the European Union (EU) and United Nations (UN) have pushed experimental natural capital accounting frameworks for more than a decade.

A core common claim, across these initiatives, is that sustaining economic growth requires a different measure than Gross Domestic Product (GDP), not because this is a problematic measure – 'as an economic indicator GDP has many virtues' (Dasgupta, 2021, p. 343 ft.nt.404) – but because this relates to income rather than wealth. Neither is the objective to abandon economic growth (in GDP or otherwise), but rather to maximize it under a new set of sustainability side-constraints. Indeed, Dasgupta (2021) states that GDP growth is compatible with 'sustainable development' (Dasgupta, 2021, p. 337) and that 'it could be possible for GDP to grow without an increase in demands on the biosphere' (Dasgupta, 2021, p. 339). Elsewhere he states that 'it is possible for both GDP and inclusive wealth to grow indefinitely even as they tend to finite limits [...], *provided* the stock of natural capital is large' (Dasgupta, 2021, p. 138). At the launch, he officially endorsed the aim of *The Review* as being to use Nature's goods and services to achieve 'sustainable economic growth and development' (HM Treasury, 2021). As with the *Stern Review* (Stern, 2007), the primary concern is to maintain business-as-usual and defend never ending economic growth against social and environmental critiques.

Central to Dasgupta's whole approach is an analogy between biodiversity protection and financial asset management. Destruction of Nature is blamed on a misallocation of capital investment,

with too much going to produced and human capital relative to natural capital. Curbing biodiversity destruction is then reframed as optimal asset management by a ‘citizen investor’ guided by ‘accounting prices’ that correct all market failures by internalizing externalities after calculations made by experts in social cost–benefit analysis (CBA). Dasgupta (2021, p. 276) states that: ‘[s]ocial cost–benefit analysis is a calculus for maximizing an economy’s inclusive wealth’. This builds on the UN supported study entitled *The Economics of Ecosystems and Biodiversity* (TEEB, 2010) that moved from monetary valuation to capturing value via new financial instruments, and linked directly into proposals to ‘hardwire biodiversity and ecosystems services into finance’ (UNEP Finance Initiative, 2010).

On this basis, and supported by powerful institutions and lobby groups, *The Review* places monetary valuation of Nature at the forefront of national and international environmental policy. The world is turned upside-down, so that wealth accumulation, sustainable growth (=development) and ‘the economy’ are the things in need of being protected, not Nature or biodiversity. Unfortunately, there is a widespread failure to understand this agenda and *The Review* in particular. Naïve environmentalists fail to see the forest for the trees and persist in supporting monetary valuation and financialisation of Nature. Environmental NGOs, and people like Attenborough, are totally wrong headed when they praise such economics, let alone see it as path breaking. As will be shown, *The Review* is the latest example in a trend towards the justification of business-as-usual, and apologetics for capital accumulating economies, in the face of climate change and ecological breakdown. This trend is something that has been repeatedly noted in *Globalizations* (e.g. Dale, 2020; Fletcher & Rammelt, 2017; Gills & Morgan, 2019; Spash, 2021a, 2021b; Stevenson, 2021), and of which its readers should be aware.

The Review in its full 610 page version is a user unfriendly technical report packed with standard neoclassical economic (mathematical) models, annexes and specialist terminology, but the abridged 100 page version misguides as to the problems underlying *The Review* and its failings. We therefore use the former. In Section 2, Dasgupta’s general overarching vision of ‘the economy’, society and Nature is presented. This reveals the heart of *The Review* as the capital approach. Section 3 explains this in more detail covering the concepts of produced, natural and human capital, and explaining the definition, valuation and problems of each in turn. Neither biodiversity nor social capital are treated as primary capital concepts and next we explain and question their role in *The Review*. We also briefly comment on the treatment of future generations (via discounting) and population. We conclude with a series of arguments as to why financial asset management is an inappropriate analogy for biodiversity conservation.

2. Dasgupta’s political economy and its values

While ostensibly about biodiversity loss *The Review* is in fact a broad reaching orthodox economist’s vision of how the entire world should operate. Humans are consumers who aim to maximize their utility, which can be variously described as happiness, welfare or (Dasgupta’s preference) well-being. Despite claims that the model is not restricted to ‘individuals’, that is exactly what is done, because the ‘economic agent’ – regardless of whether a generation, government or family – is an identical optimizing unit. This agent is only concerned to maximize utility, which through a series of equivalents becomes money; that is, utility = well-being = wealth = capital = money values.

Intergenerational well-being is defined as a function of four factors: consumption, investment in human capital, investment in technological innovation and extraction of natural resources. However, the overarching objective is to maximize intergenerational well-being deemed equivalent to inclusive wealth. Dasgupta (2021, pp. 41–42) refers to the move from well-being to inclusive wealth

as an ‘equivalence theory’ (actually more of a presumption than a theory). His central claim here is that: ‘social well-being is maximised *if and only if* inclusive wealth is maximised’ (Dasgupta, 2021, p. 42, emphasis original). As a consequence, maximizing inclusive wealth is considered to automatically maximize intergenerational well-being which is then framed as the objective of policy-making. Dasgupta terms this his ‘sustainable development theorem’ (Dasgupta, 2021, p. 333).

Dasgupta talks of ‘the economy’ (a phrase used 91 times) in the singular, as if only his chosen economic system could exist – an idealized market capitalism. All variety in actual social provisioning systems and alternatives across time and space are conveniently ignored. Also absent from the picture are corporations, one of the most powerful institutions in the modern economy, and the role of organized labour unions. What is recognized is that ‘the economy’ suffers imperfections because prices fail to reflect social values. This means government intervention must be allowed, although Dasgupta repeatedly emphasizes its dangers and especially market distorting (as opposed to market correcting!) subsidies. The question then becomes what form government intervention should take?

Addressing market failures is the job of what is in effect a central planner, but presented in the guise of a female ‘citizen investor’ or ‘social evaluator’.³ Governance for Dasgupta is about optimal investment in capital assets. Nature is something that gives a rate of return and that economists have failed to adequately include in their investment portfolios. He repeatedly remarks that: ‘The fault is not in economics; it lies in the way we have chosen to practise it’ (Dasgupta, 2021, p. 310, 498). This allows considerable rhetoric about bad economists, while basically promoting exactly the same (neoclassical) economic approach that has been around for the last 150 years or so.

That price-making markets fail to value things that matter to humans, and non-humans, is reduced down to accountancy, getting the prices right and social CBA. For Dasgupta the term ‘accounting prices’ is substituted for the traditional economic terms social cost or shadow prices. He states that: ‘In simple terms, accounting prices reflect the *true value* to society of any good, service or asset’ (Dasgupta, 2021, p. 503, emphasis added). There is meant to be a true environmental cost (Dasgupta, 2021, p. 219–221, 385, 470), although what this ‘truth’ is meant to mean is never addressed nor defined. In something of a contradiction, price-making markets are deemed to allocate resources efficiently (i.e. at least cost) and do so optimally (i.e. find a unique best outcome), but only once their prices have been corrected by expert economists/accountants.

That Dasgupta recognizes there may be limits to economic growth, some 50 years after the internationally renowned Club of Rome report by Meadows et al. (1972), is hardly progress, despite its acclamation by *The Economist* (2021), and others, as a major step forward by Dasgupta. He actually only references this foundational report once, in a footnote, where it is criticized for failing to include prices (a fallacious critique because prices are irrelevant as a mechanism in the scenarios, see Spash, 2021b). Like many other economists he proceeds to basically ignore the biophysical systems critique of capital accumulating economies that is implicit in Meadows et al. (1972), explicit in Georgescu-Roegen (1971) and core to ecological economics (Spash, 2020). Instead, the newly recognized limits become side constraints that can simply be dealt with by optimal investment strategies, getting the prices right and creating more wealth (i.e. growth as normal). Thus, even despite having highlighted his acceptance of limits, he uncritically presents models that allow for indefinite growth based on efficiency gains and technology – even overcoming the exhaustibility of resources such as oil, natural gas and coal (Dasgupta, 2021, p. 143).

Apparent concern for future generations and their survival is written-off in a traditional economic fashion by recommending a single discount rate, for all investments and all forms of capital (Dasgupta, 2021, p. 276). That is, the favoured mainstream economic accounting convention is employed to calculate net present values assuming all future humans will be better-off in terms

of having more consumption. Dasgupta – like other mainstream economists such as Nordhaus (2018) and Stern (2007) – relegates the fate of the future to a theoretical dispute over discount rates that he alternatively dismisses and employs at his own convenience (see Section 4 below).

In summary, Dasgupta is proposing the optimal management of life on Earth in all its facets, an all encompassing approach, made possible by assuming the only thing that matters is maximizing social value measured as monetary wealth invested in a capital stock. The aim of life is to maximize rates of return on investments. Achieving social good requires that the wise ‘citizen investor’ choose the optimal portfolio of capital assets.

3. The world as different categories of capital

According to Dasgupta (2021, p. 323) ‘Inclusive wealth is the coin with which economic progress or its absence should be measured’; constituted of three forms of capital: produced, human and natural. *The Review* then constructs a simplified model of the world that Dasgupta ambitiously claims ‘provides a complete capital theoretic account of human activities, from source to sink’ (Dasgupta, 2021, p. 137). This means Dasgupta’s approach to everything – human fertility, education, trust in society, species existence, the sacred in indigenous communities, ecosystem structure and function – is reduced down to the value of capital and returns on capital investment.

The capital approach employed is not new (e.g. Goodwin, 2003) and neither is the aggregation into inclusive wealth (UN University, International Human Dimensions Programme on Global Environmental Change, and UNEP, 2012). Only the questionable relegation of some assets to an enabling class appears novel. That is, anything outside of the three main categories of capital, that adds value, is considered to be an enabling asset, and this includes biodiversity and social capital (see Section 4 below).

3.1. Produced capital

3.1.1. What is it?

Produced capital is defined as ‘capital goods embodied in human-made goods or structures, such as roads, buildings, machines, and equipment’ (Dasgupta, 2021, p. 507). These are physical assets, generated by human transformation of natural capital, that are used to provide a flow of goods or services, e.g. a sewing machine, factory or computer. A private house counts as produced capital because it provides services (e.g. shelter) repeatedly over time. Intangible assets, such as company patents, are also included. Produced capital is then a diverse stock measured as a value in national wealth accounts, and an increase of which contributes to economic growth (GDP). Thus, ‘inclusive wealth increases *if and only if* aggregate consumption is less than net domestic product (NDP), that is, GDP less the depreciation of all capital assets’ (Dasgupta, 2021, p. 138, emphasis original). Measuring the value of capital is then essential to the whole approach.

3.1.2. How is it valued?

Different forms of capital cannot be aggregated physically (i.e. hammers and tractors do not add together). So what is the aggregate or total amount of capital? The stock can be measured either as: (i) the monetary cost of production or (ii) the monetary returns attributed to specific capital on future output produced (i.e. future profits). The former, (i) involves capital itself in the production of capital and so ends in circularity with the value of capital determining the value of capital, *ad infinitum*. One work around is to adopt a labour theory of value, so that all produced capital

is valued by the labour required for its production. Today this classical economic theory is generally rejected outside of classical Marxist economics.

As a neoclassical economist, Dasgupta opts for (ii), claiming that: '[a]ssets acquire their value from the services they provide over their remaining life' (Dasgupta, 2021, p. 138). This leads to an asset management approach whereby different types of assets, or forms of capital, are required to produce the same rate of return in order to achieve an optimally managed investment portfolio (i.e. that maximizes returns by equating returns on every investment at the margin). More simply, this means whether investing in produced capital, education or blue whales the economic agent ('citizen investor') seeks the same return. What is ignored by Dasgupta is a long history, that involved his own University and Economics Department, concerning problems with measuring capital.

3.1.3. What is problematic about it?

The failings of both approaches, (i) and (ii) above, were the subject of the 'Cambridge Capital Controversy', involving combat between economists in Cambridge England and USA. Starting in the 1950s this continued for two decades, or more, and was never resolved (see Cohen & Harcourt, 2003). In case (i) there is the need to take into account a flow of costs over time (period of production) which, in economics, requires knowing the rate of interest as a basis for equating values in different time periods. In case (ii) knowing the value of (profit from) a stream of future output (over a period of production) means calculating the net present value and so discounting it at a rate of interest. Knowing the rate of interest is required in both cases. However, the rate of interest is the return on capital investment, which requires knowing the quantity of capital. So, the value of capital cannot be determined without knowing the stock of capital, that, for multiple forms of capital, becomes a value which cannot be known without the rate of interest, which is defined by already knowing the stock of capital, and so on ...

Neoclassical economists (aka Cambridge USA) then opted for naïve empiricism and claimed they could collect data and observe the rates of return in actual markets without explanation as to how, or from where, it is produced. Thus, in this tradition, Dasgupta (2021, p. 40) claims that: '[t]he yield on investment in produced capital is its marginal product'. Solow, whom Dasgupta (2021, p. 8) cites as a major influence on his economics, has sought to justify this approach (Cohen & Harcourt, 2003, p. 260). Yet, the basic problem remains, the value of capital and, indeed, its definition, are left indeterminate and the empirical approach lacks validity.

The alternative is to admit that neoclassical theory bears no relationship to reality, and capital investment is not about simplistic production functions specifying the rate of return to different factors (i.e. land, labour, capital) measured by disaggregated marginal products, but, rather, concerns institutional arrangements to capture surplus. Indeed, outside of economic textbooks, the contributions of the separate factors to output cannot be determined, let alone a marginal product attributed to each (i.e. what is due to labour vs. capital, say the farmer versus the tractor, let alone the land!). Rather than marginal productivity theory we might instead consider that profit is derived from the social power of those able to appropriate the technological achievements of society as a whole. They may be capitalists in market dominated economies or functionaries of the State in centrally planned economies. Under capitalism the key to power lies in gaining private property rights over resources, and this then lies at the heart of the debate over biodiversity. What is at stake is the legal right and economic authority to capture the surplus created by the production process. This is why classical political economy (as opposed to neoclassical economics) connected individuals' dependence on the market for their livelihoods with social class, as the fundamental unit of analysis (Cohen & Harcourt, 2003).

A further problem, largely unrecognized by most economists (from either Cambridge or elsewhere), arises due to environmental pollution. As has been explained, capital is a monetary value dependent either on its cost of production or the value of what it produces. However, those costs and future return values are only valid for economic resource allocation if they take into account all associated social costs and benefits in the production and consumption process. Due to the all pervasive character of pollution that means all prices must be adjusted, but to what and by whom? If no objective value exists then economic theory cannot justify prices as valid reflections of a 'true' social value, let alone tell us what is the stock (i.e. value) of produced capital, or any other capital.

The Dasgupta Review provides an excellent example of the contradictions and how economists attempt to fudge all these issues. Dasgupta acknowledges the essential and central role of a common metric for his capital approach:

It is not enough to say that houses can be measured in physical units (floor space, say), they need to be compared with other capital goods, such as cars. We need a common unit. Valuing assets is a way to do that. (Dasgupta, 2021, p. 323)

However, he is also repeatedly forced to admit the practical problems of valuing things and the capital stock in particular. Yet, he assumes some social evaluation process will take care of finding the 'true price' by valuing everything in a money metric. Social CBA will be conducted by expert economists, or a 'social evaluator' nay 'citizen investor', who will miraculously solve all problems. Faith enters by the door and science leaves by the window.

3.2. Natural capital

3.2.1. What is it?

Dasgupta (2021, p.3) states that: 'In the Review, the terms Nature, natural capital, the natural environment, the biosphere, and the natural world are used interchangeably'. More simply all concepts of Nature are reduced to capital. Natural capital is an anthropocentric and utilitarian view of Nature, where Nature is reframed as contributing goods and services solely for human well-being (Hache, 2019). In *The Review*, ecosystem services are classified, following the Common International Classification of Ecosystem Services (see Haines-Young & Potschin, 2018), as either:

- Provisioning services: plants and animals for nutrition, materials or energy;
- Regulating and maintenance services: such as habitat and gene pool protection, flood control, pest and disease control; or
- Cultural services: covering intangible things such as the enjoyment and spiritual value of Nature.

Anything that fails to contribute to human well-being is ignored, deemed worthless, which again places valuation at the centre of the whole approach.

3.2.2. How is it valued?

Even if the, so called, stock of natural capital were known in physical terms it would, like produced capital, require a common value basis to make diverse elements comparable and commensurate. Numbers may be produced, as under existing 'experimental' approaches (e.g. Office for National Statistics, 2020), but aggregate numbers for national accounting do not help optimum portfolio investment (i.e. indicate rates of return on different investments). They also fail to meet the requirements of the neoclassical economic approach for scarcity prices of resources, the 'true' social values,

called ‘accounting prices’ by Dasgupta. Those values, as Dasgupta repeatedly tells us, cannot be found in any market. As he makes clear:

Only social cost-benefit analysis, using the same accounting prices as are estimated for sustainability assessment, would tell the social evaluator which investment projects are socially desirable. (Dasgupta, 2021, p. 351)

Decades ago environmental CBA developed a range of methods for imputing monetary values, but with limited applicability under specific conditions (Hanley & Spash, 1993; Spash, 2005). For a start, these methods only apply to marginal changes in environmental goods or services, not least because the value of money itself (its marginal utility) alters when there are large changes affecting income; also, economic welfare measures assume other things (e.g. all other prices) remain the same which is violated by large changes. Clearly things like mass extinction of species and human induced climate change are not small, marginal, changes.

Two approaches are employed by social CBA: revealed and stated preference methods. The first relies upon existing markets that can be associated with environmental attributes (e.g. air pollution affecting house prices) and so is severely restricted. The second uses surveys designed to illicit, primarily, willingness-to-pay for environmental changes. Dasgupta attends to one stated preference approach: the contingent valuation method (CVM). He claims that: ‘CVM is attractive because it appeals to our democratic instinct, that people should be asked for their opinion on matters that may be of concern to them’ (Dasgupta, 2021, p. 304). In addition, the CVM is promoted as widely applicable (unbounded by existing markets) to revealing values for everything from aesthetics to biodiversity loss. The ability to include a range of value categories contributing to an individual’s utility extends to including: ‘respondents’ sense of a species’ existence value—perhaps even its intrinsic value’ (Dasgupta, 2021, p. 304). Normally environmental economists define a set of four values: direct use, option, existence and bequest value. However, Dasgupta (Dasgupta, 2021, p. 301), for no apparent reason, claims a different set of six sources of value for biodiversity that mix-up objects of value with types of values. While all his examples are consequentialist and based on creating utility for humans, he confuses concepts of existence value with sacred values, moral worth and intrinsic value. So let us turn to the value problems.

3.2.3. *What is problematic about it?*

There are two major failings in *The Review* when valuing natural capital. First is the inability of economists to actually apply their utility preference value theory to obtain ‘true’ social costs (Dasgupta’s accounting prices). Second is the divorce between the economic theory of value and a range of alternative value theories held to exist in human societies. Each problem is taken in turn.

We can briefly illustrate some of the problems that have arisen in the application of preference valuation methods, including economists’ attempts to manipulated survey design and data in violation of their own theory (Spash, 2008a). Economic welfare theory requires that people should be compensated, not pay, for an environmentally degrading imposition on them (e.g. pollution, biodiversity loss). However, this is generally not undertaken because people could ask large sums, destroying the economic calculus, so economists prefer to restrict respondents replies to their income (i.e. ability to pay) regardless of their own theoretical requirements for validity (see Knetsch, 1990, 1994). Besides being the incorrect measure, willingness-to-pay is not a democratic approach seeking an opinion, as claimed by Dasgupta (2021, p. 304). Political deliberative approaches are quite distinct (Spash, 2007a), and mixed approaches raise serious challenges to neoclassical economic value theory (Spash, 2008b). Despite their attempts to control respondents, CVM produces results deemed unacceptable because people appear willing-to-pay too much or refuse to bid (i.e. protest).

Attempts have then been made to redesign the surveys to get the responses economists want and hence they developed choice experiments, cited as a problem solving advance by Dasgupta (2021, p. 304). Here respondents have restricted ability to protest, or violate the economists model of how they should behave, and can only refuse to answer completely and fall into the ignored non-respondent category. Failing ‘success’ with survey design, collected data may be subject to manipulation to get the desired values (Spash, 2008a).

An even more basic problem, with appealing to human preferences, occurs when people do not understand complex environmental issues, or terminology (e.g. biodiversity), or have never encountered a species or know nothing of the object of value (e.g. genes, microbes or distant ecosystems). The problems with respect to biodiversity have long been recognized (Spash & Hanley, 1995). However, many economists, including Dasgupta, naïvely refer to establishing ‘true values’ as if people had, stored away in their brains, values to every entity on the planet in every quantity and quality in which it might appear in an economic equation to be traded-off against something else, and that they can immediately produce such values on demand when asked their maximum willingness-to-pay (for or against an environmental change). In fact, when economists design their surveys, in order to obtain money numbers via stated preference methods, they may actually form respondents understanding as to what is the object of value and how it should be valued, and so form their ‘preferences’ and responses (Spash, 2002b).

Then there is the disconnect between marginal values sought by social CBA and the aggregate national income accounts covering the entire stock of natural capital. The study Dasgupta (2021, pp. 336–337, 374) takes as exemplary is by Managi and Kumar on ‘inclusive wealth’ for a total (not marginal productivity) value. Even this proves problematic. We are told that due to ‘data limitations’ natural capital was taken to be minerals and fossil fuels, agricultural land, forests as sources of timber and fisheries. The topic of biodiversity is totally absent. Instead of social values (aka accounting prices) we have a list of rather simple marketed inputs to production and consumption using market prices (Dasgupta, 2021, p. 113 ft.nt.133). Both theory and relevance go out the window, once again. As Dasgupta’s rhetoric rises, the failure of theory to translate into practice becomes transposed into theory acting as a surrogate means by which to justify cutting corners.

In practice, empirical corners have to be cut. An understanding of the tight [*sic*] theory helps accountants to justify the corners they choose to cut.

He then goes on to explain that:

Moreover, there are Nature’s objects and sites of cultural significance that resist being valued and placed in comparison to marketed goods. Societies record their presence and allocate funds to preserve and restore them. They fall outside the scope of national accounts. (Dasgupta, 2021, p. 337)

What then are the implications of recognizing the existence of things ‘that resist being valued and placed in comparison to marketed goods’? Apparently nothing! The divorce from, and applicability to, reality of Dasgupta’s theory is for him irrelevant because ‘[e]mpirical work is forced to cut theoretical corners’ (Dasgupta, 2021, p.350). Interestingly, in accepting a prize, and explaining why his main report would be technical and long, Dasgupta stated: ‘I’m very keen on not cutting corners’ (Tyler Prize, 2020).

Yet, despite the problems and contradictions Dasgupta implies all barriers to monetary valuation can be overcome. Of course they must be, if his sustainability theorem, is to progress into policy:

economic worth of natural capital remains the greatest barrier to an understanding of economic development. Until that ignorance is lifted, policy analysis will remain crippled and sustainability will continue to be a notion we admire but cannot put into operation. (Dasgupta, 2021, p. 353)

He is correct that *his* policy analysis is indeed crippled. However, that policy analysis can be conducted without his approach seems to pass him by, along with the impossibility of ever actually implementing anything close to what he suggests, regardless of how many theoretical corners he is prepared to cut.

The second major set of issues, in valuing Nature as capital, concerns downplaying variety in ethical systems (e.g. virtue, deontology) and the different ways in which the values of Nature are understood by humans (an issue Dasgupta, 2021, p. 352 briefly notes before moving on). The welfare economics underlying social CBA assumes that all values can be reduced to individual preferences as expressions of utility. However, people who hold rights-based beliefs, for example, fail to conform to this value system, so their responses to stated preference surveys cannot be interpreted as trade prices or social values (Spash, 2000b, 2000c). Refusing to make trade-offs is also a principled position disallowed by mainstream economics or treated as an anomaly (a lexicographic preference), but which can relate to intrinsic or other values beyond the economic calculus (Spash, 2000a; Spash & Hanley, 1995).

While Dasgupta (2021, p. 4) does mention that ‘Nature is more than a mere economic good [and] may also have intrinsic worth’, he simultaneously states it should be considered as an asset so that ‘the economics of biodiversity becomes a study in portfolio management’. At one point he draws a dichotomy between instrumental and intrinsic value (Dasgupta, 2021, p. 49), but then later includes intrinsic value under an instrumental category and equates it to willingness-to-pay for feeling good about species existence (Dasgupta, 2021, p. 301). He states that humans value Nature either because ‘it is sacred to us’ or is recognized to have ‘value independent of whether it means something to us’, termed moral worth, and these two together he calls ‘Nature’s intrinsic value’ (Dasgupta, 2021, p. 301). However, elsewhere he claims that:

The line separating an instrumental value from an intrinsic value is, in any case, wafer-thin when the instrument advances a value we hold deeply. What is taken to have an intrinsic value could well be an instrument for advancing a more deeply held value. Conversely, what advances a deeply held value could have instrumental advantages. (Dasgupta, 2021, p. 185)

His derision of people claiming ‘that life itself has intrinsic value’ is made by associating such a position with millions of species that lack feeling and self awareness, without explaining the relevance of this comment (Dasgupta, 2021, p. 49).

For Dasgupta (2021, p. 310) all values, including the sacred and intrinsic, are imparted to things by humans and do not exist in entities themselves. Recognizing there have been discussions of extending moral standing to non-humans he converts this into an issue of ‘personhood’ (equating to individuals), which concludes that ecosystems may have moral standing due to their having interests of their own. However, this is then summarized as being about ‘asking people to disclose the value they place on Nature [as] the first step towards an understanding of the full value of Nature, including its moral worth’ (Dasgupta, 2021, p. 313). Once again his discussion appears to have absolutely no implications for his economic analysis or his value theory and goes nowhere.

Monetary valuation and asset management can continue regardless of intrinsic value and moral standing. Similarly, sacred values can be dismissed as irrelevant to the economic calculus, because they merely add more value, in some undescribed way, to the economic calculations. So,

if biodiversity is worth preserving and promoting for purely anthropocentric reasons, it would be even more deserving of protection and promotion if it had sacred status. Therein lies the advantage of a limited point of view. (Dasgupta, 2021, p. 49)

That implies the anthropocentric, instrumentalist, preference utilitarian, profit seeking economic point of view is never meant to conflict with holding sacred values! In addition, sacred values are just some add-on that needs no serious attention in public policy. His discussions of sacred value, intrinsic worth/value, moral worth and non-instrumental ways of valuing appear totally disingenuous and rhetorical because they play no role at all in his understanding of value. His value system always reverts back to capital assets and ‘accounting prices’.⁴ He never defines exactly what he means by intrinsic worth/value. He fails to cite any relevant literature from, and completely ignores, the vast body of work in the fields of environmental ethics and values, debates on intrinsic value in Nature and critical economic studies on these topics in biodiversity valuation.

A key word missing from the report is incommensurability and an associated absence is plural values, along with any associated literature (for a short introduction see O’Neill, 2017). When different values exist, that cannot be summed together on the same basis, then issues of incommensurability arise. Dasgupta (2021, p. 257) states that:

the ideally rational and impartial spectator is able to compare individual well-beings. Our social evaluator recognises that. Personal well-beings are said to be *fully comparable* [...] Strong cardinality and full comparability are familiar notions.

Economists, like Dasgupta, assume away incommensurability, which is commonly recognized as the normal state of affairs.

The valuation question of social CBA, ‘what is your maximum willingness-to-pay for more/less X?’, implicitly assumes there is no moral objection to the question itself. What if X is time with your dying loved ones? Under this economic approach, answering the question means giving the value to you of your mother, father, brother sister, lover. The idea that time with a dying loved one, a non-human species, an ecosystem or anything else cannot be valued in this way is highly problematic for such economic accountancy, as adopted by Dasgupta, so it must be relegated to irrelevance by sidelining (his favourite tactic). Mention something and its importance and then go about your economic business as normal. The result is to totally ignore plural values and alternative (non preference utilitarian) systems of ethics as having any relevance to how ‘the economy’ should be run or Nature valued.

The basic fact is that if significant things cannot be valued as proposed, either due to inadequate methods or existence of plural incommensurable values, then the whole approach of *The Review* falls apart, along with neoclassical value theory. Money is used to create the illusion of a common metric. As we saw for the case of produced capital, the only sense to be made of such a singular concept as capital is to convert it to a common value basis. Whether returns to natural capital or the total stock of natural capital, there must be some means of summing-up everything that constitutes capital, which is impossible in physical terms. More frogs do not equate to fewer tigers. What then is ‘natural capital’? Without the money metric it is non-existent, a meaningless economic abstraction totally divorced from reality. The myth of optimal resource management directing environmental policy is then dead.

3.3. Human capital

3.3.1. What is it?

Human capital is variously described by Dasgupta (2021) as inclusive of a range of factors (state of health, knowledge p. 324; skills pp. 38, 506; reputation p. 179, aptitude p. 53, knowledge of and access to family planning p. 360), but most commonly health and education. It refers to ‘the

productive wealth embodied in labour, skills and knowledge’ (p. 505). The value of human capital is deemed to be the future market wages and salaries of an individual, in addition to their health, education and skills, as these factors contribute to their productivity. As Dasgupta explains:

the term human capital reminds us that assets can be ends, they can be means to ends, or they can be both. Reading is a pleasurable activity, but it is also necessary in a job that requires literacy. Similarly, a person’s health is both a desired end for him and a means to employment, meaning that health should be a component of human capital. (Dasgupta, 2021, p. 324)

Importantly, human capital includes population size (Dasgupta, 2021, p. 325), which means that a population increase would increase its value, other things being equal (as Dasgupta likes to say). That more people add more value (increase the stock) is of course problematic because of the implications and impacts, and because other things do not remain unchanged as a result. Dasgupta assumes that population is not controllable directly (Dasgupta, 2021, p. 143), but can be influenced by investment in human capital (i.e. women’s education, knowledge of and access to family planning services, Dasgupta, 2021, p. 360).

3.3.2. *How is it valued?*

The concept of human capital is heavily related to productivity in a wage labour economy. The healthier or more educated you are the more you produce and the more valuable you are.

Providing additional food to undernourished people via, say, food guarantee schemes not only increases their current well-being, it enables them also to be more productive in the future and to live longer. Because their human capital increases, the additional food intake should count also as investment. (Dasgupta, 2021, p. 276)

People who can be more productive have more value and those who live longer (i.e. the young) can be productive for longer, and so have more value, than others.

The two main elements, health and education, must be converted into monetary values to operationalize the human capital approach. According to Dasgupta (2021, p. 276): ‘That training people to be teachers is investing in human capital is simple enough’. Education appears straight forward to value because investment in education brings financial returns. The more educated you become, the more you earn, right? Well, not exactly, as will be discussed under problems.

Valuing health and life expectancy in monetary terms is both complex and ethically challenged. Studies in economic valuation of environmental impacts have over many years developed various measures for placing a value on life, or more precisely the avoidance of the risk of death, so avoiding infinite values (for an early contribution see Jones-Lee, 1976). Pollution can lead to premature death (mortality) and impacts on health (morbidity) which social CBA gives a monetary value in order to determine the optimal level of resources to be diverted to preventing morbidity/mortality.

Dasgupta (2021, p. 256) notes that: ‘The value of a statistical life (VSL), [is] a concept central to the meaning and measurement of human capital’. The idea is that monetary values can be placed on human life without specifying the people who will actually lose their lives as a result of a public policy decision. There are two main methods for assessing the risk of death or VSL. First, an individual may be directly asked their willingness-to-pay to avoid a risk or their willingness-to-accept compensation for incurring a risk. CVM surveys have been commonly applied but also been severely criticized (Jones-Lee & Loomes, 1997). The other main alternative is to use measures related to earnings, a revealed preference method, technically termed a hedonic wage approach. This might, for example, use actual wage differentials in jobs with a range of risks.

3.3.3. What is problematic about it?

The definition of human capital as productive wealth could be understood as framing a government's relations with its citizens primarily through the lens of their economic contribution, as if a human resources department, ensuring good health and education to the extent that it contributes to productivity. This implies allocating resources according to the expected payback, e.g. prioritizing young healthy adults. This productivist logic led some economists to justify eugenics (see Spash, 2021a). There are also long standing racist associations with references to lazy indigenous peoples by colonizing Europeans, and classist associations as in the history of removing common rights to force the poor into wage labour relations so they could become productive (Hill, 1997; Thompson, 1993).

The apparently simple case of investment in education also quickly runs into trouble. Financial returns neither require being educated nor does education bring financial returns *per se*. This is exactly why politicians who are concerned for financial returns seek to defund education in the arts, philosophy, classics and so on. Under capitalism it is business, banking and finance that 'makes money' not just being educated. Skills in arts and crafts quickly became regarded as redundant under the capitalist industrial revolution. Typically traditional knowledge is denigrated because it does not service the modern economy, or allow surplus accumulation, and therefore those trained in such knowledge are regarded as uneducated and ignorant. Reducing the value of education to a financial rate of return, that treats a human being as a capital asset, is a particularly reductionist approach to the meaning of life with serious consequences for public policy.

Health (mortality/morbidity) as a capital investment is even worse. Producing money numbers here requires the conjuring trick of talking about abstracted non-real people who are represented as 'statistical lives', under the VSL. For example, the results are used in transportation assessment to decide upon road building programmes and the installation of safety equipment. However, the public rejection of this approach is exposed when there is a train crash, people are killed and the public discover the lack of safety equipment is due to the calculation that it cost more than the expected fatalities times the VSL. Politicians rarely defend the numbers in such circumstances, although their transport departments may continue to use them on a daily basis.

A major example of the failings of VSL arose during the third assessment report of the Intergovernmental Panel on Climate Change (IPCC). Willingness-to-pay informed VSL, based on Fankhauser (1995, p. 47), gave a range from \$0.2–\$16.0 million with an average of \$3 million, and \$1.5 million adopted as the VSL for developed countries. Adjustment was made for income to give 'an arbitrary value of \$300,000 for middle income and \$100,000 for low income countries'. The result was a factor of fifteen difference between VSL in high (\$1.5 million) and low (\$0.1 million) income countries. A storm raged when the IPCC chapter employing this approach appeared (see Spash, 2002a, Chapter 7). Representatives from industrially developing nations, led by India and China, refused to accept the report citing it as absurd, discriminatory, unethical, technically inaccurate and anti the poor.

Shortly after the IPCC VSL controversy a prime example of commensurability problems arose when CBA was applied to climate change by Nordhaus (1998a, 1998b). He claimed increased morbidity/mortality would be outweighed due to increased leisure opportunities by a factor of 30 to 10 in China and by 38 to 3 in the USA. An example Nordhaus was using at the time concerned claiming that golfers may view global warming as a boon to year-round recreation. So, if we extend this logic to global studies, more golfing days in Florida could compensate for dead people in China.

The commensuration of values in *The Review* is no different. Classes of capital are values, equated and summed. Human capital is an aggregation of values so that, for example, more 'education'

can compensate for increased risk of death. More than this, if education pays better financial dividends than avoiding loss of life then, according to the economic accountants, the optimal world should have more education and more death.

4. Other issues

4.1. Enabling assets

According to Dasgupta (2021, p. 325), all in the world that is productive for human ends but neither produced, human nor natural capital can be classified as enabling assets,

“because they confer value to the three classes of capital goods by facilitating their use”. Although, “[e]nabling assets are not always usefully measurable, but that does not matter, for they enable human societies to function healthily; and these functions can be measured.”

Enabling assets include publicly available biodiversity and social capital. We will see below why such a framing is problematic.

4.1.1. Biodiversity as an enabling asset

Biodiversity is described as ‘a characteristic of natural capital [...] a factor influencing the productivity of natural capital, or more concretely, ecosystems’ (Dasgupta, 2021, p. 43). It is reduced down to an input to production, something that adds productivity to natural capital. Dasgupta claims that because biodiversity is only an enabling asset there is no need to measure its value directly.

Which is why environmental and resource economists estimate the accounting prices of items of natural capital—for example ecosystems—not biodiversity. The value of biodiversity is embedded in the accounting prices of natural capital.

This is factually incorrect both in terms of values being directly relevant to biodiversity and in that environmental economists have, from the start of their interest in the topic, attempted to value biodiversity (directly) using exactly the same CBA methods as Dasgupta recommends for ‘natural capital’. Indeed, an amazing gap in *The Review* is its failure to address a literature going back some thirty years on environmental CBA, biodiversity valuation and, not least, its fierce advocacy by the now forgotten David Pearce (deceased 2005), and his associates. Such environmental economists invoked the same neoclassical economics as Dasgupta to similarly support a ruling UK Conservative government struggling to address environmental crises. However, for them social value was directly applicable to biodiversity (e.g. Pearce & Moran, 1994), and they assumed there is ‘a marginal value of biologically diverse resources’ (Swanson, 1994, p. 34, 161).

The ghost of David Pearce certainly seems present in many of the claims Dasgupta makes about valuation, e.g. subsuming intrinsic values under existence values and so relegating it to a utilitarian concept (Pearce et al., 1989). Exactly why Dasgupta wants to relegate biodiversity to a more functional sub-role is unclear, but in a work supposed to address the topic as a ‘review’ he simply ignores the existing literature, and makes false claims about the practices and content of environmental economics. Perhaps his aim is simply to avoid discussing the controversies over economic valuation that raged, and the decades of failure in the application of the social CBA; an approach that he advocates as crucial and seeks to resurrect to produce ‘accounting prices’.

The other aspect of relevance here is how biodiversity is valued. What research from the early 1990s onwards uncovered was that people, when asked to state their preferences, may, in significant numbers, reject the economists valuation approach and instead hold multiple and

incommensurable values (Spash, 2000c; Spash & Hanley, 1995). They may hold rights-based positions and refuse to trade-off values, posing problems for mainstream economists, who, as has been mentioned, then respond by treating responses as anomalies (e.g. lexicographic preferences) to be dismissed (Spash, 2000a, 2006; Spash et al., 2000, 2009). This economics fails to empower ecologists, respect Nature, pay attention to biodiversity science or even listen to what people say when interviewed; it has been doing exactly the opposite (Spash, 2015; Spash & Aslaksen, 2015). Appealing to uninformed individual preferences about scientific concepts, species, genes and ecosystems makes little sense, and is certainly not about seeking any ‘true values’ (Spash, 2002b). Assuming people can be informed about biodiversity loss as a neutral act is at best naïve and at worst an excuse for deliberate manipulation. That the role of individual preferences as a means of policy guidance is highly problematic is not even on the agenda, but has serious public policy implications with respect to biodiversity and ecosystems (Spash, 2008c).

Even if all these problems, absent from *The Dasgupta Review*, did not exist, the capital asset approach would eradicate endangered species. A good example why is provided by Dasgupta himself, ‘saving Blue whales’. Dasgupta employs a standard neoclassical fisheries model that requires the growth rate, r , of the stock of whales converted into a monetary rate of return, or payback, to exceed the long run commercial interest rate on savings, ρ . As Dasgupta (2021, p. 354) states: ‘We [Dasgupta] take it that $r > \rho$ (otherwise the [International Whaling] Commission would not have found it profitable to preserve blue whales).’ Indeed preserving any species, or anything, that does not payback profit at the going commercial rate is inefficient. All slow growing species should be optimally and efficiently terminated. The stock should be liquidated and the capital invested elsewhere. Dasgupta is far from the first economist to propose optimal extinction as economically efficient (see Swanson, 1994), but he dishonestly hides this under the guise of ‘saving the Blue whale’!

We should remember Dasgupta’s (2021) words, that: ‘Ecosystems are capital goods, like produced capital (roads, buildings, ports, machines)’ (p. 52), while ‘Biodiversity is a characteristic of ecosystems. In the terminology introduced in Chapter 1, it is an enabling asset’ (p. 301). Blue whales are a bad investment, along with old growth forests and much else in Nature. There is much more money to be made in cutting down the Amazon and Indonesian forests to plant oil palm trees, and that is exactly what has been done. As Dasgupta (2021, p. 41) himself makes very clear:

An asset that has a lower rate of return than another will not be chosen. A portfolio is the best for the agent *only* if the assets in it have the same rate of return. (emphasis original)

Quite simply, much of Nature is a bad investment and should be eradicated because financial returns are higher elsewhere, and this financial profiteering is exactly how capitalism has been operating for centuries and why we confront an ecological crisis. Dasgupta’s capitalist approach to Nature does not preserve anything, it simply makes investors’ money, it accumulates financial capital. Biodiversity valued as a financial asset will be destroyed, not saved, by Dasgupta’s capitalist approach.

4.1.2. *Social capital*

Social capital is defined as mutual trust and associated norms of reciprocity that enable people to engage with one another.

Taken together, trust in others, confidence in government to deliver and in markets to function well, and the institutional arrangements that enable people to engage with one another for mutual benefit, is called *social capital* – a concept central to the economics of biodiversity. (Dasgupta, 2021, p. 167, emphasis original)

While mainstream economics commonly views society as comprising three classes of institutions (households, firms, government), ‘the idea of social capital illuminates a fourth class, comprising communities and civil society’ (Dasgupta, 2021, p. 167).

Dasgupta’s understanding here, and his capitalist reductionism, appear quite limiting. Non-monetary, non-wage labour, household activities are actually essential to the reproduction of any economy (as highlighted by feminist economics). The idea of a sphere that addresses the communal and cooperative activities, non-governmental and charitable sector has also been discussed as a major missing element in the traditional economic accounts of modern society (e.g. Adaman & Madra, 2002). In addition, Dasgupta’s view totally ignores the role of organized labour and Unions in the economy and society. Society is irreducible to a concept of capital.

According to Dasgupta (2021, p. 184), social capital must be optimized for several reasons. First, he believes trust and economic growth are positively related so that more cooperation improves efficient allocation of resources and so increases wealth. Second, civic engagement and membership in associations discipline governments and improve governance. Third, communities and civil society are regarded as essential for controlling Nature conservation and restoration programmes initiated by government or national/international NGOs (Dasgupta, 2021, p. 168).

In terms of explaining how to invest in social capital, *The Review* emphasizes that cooperation between people ‘depends on mutual beliefs, nothing more’ (Dasgupta, 2021, p. 184). Distrust, fighting and fear are exemplified as resulting from ecological stress, authoritarian government and ‘false rumours’ (Dasgupta, 2021, p. 184). Bringing together a range of actors – governments, NGOs and ‘increasingly’ private firms – is advocated to build local institutions to engage people in collective action and set rules. This is necessary because ‘beliefs do not appear out of nowhere’. Accordingly, this will be an institutional process: ‘That helps to align beliefs’ (Dasgupta, 2021, p. 181).

Aiming at increasing trust and collaboration in society is a laudable objective. However, some formulations in *The Review* raise serious concerns. These can be exemplified by recent attempts to ‘align beliefs’ in society.

- Consider the internationally praised national social capital metric of Bhutan, the Gross National Happiness Index. While largely ignored internationally, the government has used the same index to support cultural preservation advanced via ethnic cleansing of Nepalese Hindu minorities (Mørch, 2016).
- The UK government (2020) issued guidance on teaching in state schools stating that they should not under any circumstances use resources produced by organizations that take extreme political stances on matters such as a publicly stated desire to abolish or overthrow capitalism.
- In France recent decrees authorize the government to keep records on citizens political and religious beliefs (Agence France-Presse, 2021). A French minister stated that ‘our society has been too permeable to Islamo-leftism with devastating effects on our universities [...] intellectual complicity with terrorism’ (Selenite, 2020),⁵ with demands for a government enquiry about ‘Islam-leftism’ within French universities (Le Nevé, 2021).

These examples indicate the danger of blanket calls to ‘align beliefs’, and Dasgupta’s promotion of doing so between government, NGOs and the private sector. Diversity of opinions, different stakeholders perspective, ‘misaligned beliefs’ and public debates are what democracy is about. Aligning beliefs is more inline with totalitarianism. Absolute trust in government by all is also neither likely nor something to be ‘optimised’ via investment. Promoting such ‘social capital’ might easily be instrumentalised to silence critical voices, blame civil society for being uncooperative, depoliticize issues and

dismiss genuine concerns – class struggle, power relations, value conflicts. Civil society is also divided. For example, on the topic of financialising Nature, big conservation NGOs (e.g. WWF, Nature Conservancy) have supported neoliberal policies, whereas indigenous and human rights NGOs opposed them. Would aligning beliefs to build social capital result in NGOs being classified into ‘good’ and ‘bad’ with public funding and other means of enforcement? Overall the concept and promotion of social capital by *The Review* appears fuzzy, double-edged and dangerous for democracy.

4.2. Discounting the future

The mechanism chosen by Dasgupta to allocate natural resources between current and future generations is a social discount rate (SDR). Alternatives, such as allocation on grounds of justice, rights or needs, are therefore excluded, despite their commonly recognized relevance, e.g. in the case of carbon budgets. While acknowledging the major ethical objections to discriminating against future generations via discounting, Dasgupta (2021, Chapter 10) nevertheless chooses a positive discount rate. He justifies this using the dubious argument that since returns on judiciously chosen investments are positive (by assumption), fairness requires discriminating against future generations, because otherwise the current generation would be unduly limited in consumption and condemned to excessive poverty. This is a productivist logic based on assuming the future is always better-off.

Thus, Dasgupta follows standard neoclassical theory in treating future outcomes (flows of costs and benefits) for public policy projects as subject to a social time preference (STP). The basic position here is to follow a formulae, called the Ramsey rule, that determines the SDR and STP as follows:

$$\text{SDR} = \rho + \eta g = \text{STP}$$

where g is annual per capita growth of consumption, η is the elasticity of marginal utility of consumption and ρ is the utility discount rate, consisting of a component for pure time preference, δ , and, in HM Treasury practice, a component for certain types of risk, L . Components of the formulae are so uncertain that economists appeal to surveying themselves to get estimates (Freeman et al., 2018), as if this provided objective data. In *The Review* commitment to an actual number is vague, and subject to speculation as to economic growth and uncertainty. Elsewhere Dasgupta (2008) has argued that δ could be zero, while, contrary to others, he argues for a much higher η in the range 2–3 or more (p.151). The basic rate used by HM Treasury, in its Green Book, is 3.5%,⁶ where $\delta = 0.5$, $L = 1$ so that $\rho = 1.5$ with the remainder consisting of consumption growth $g = 2$ and $\eta = 1$. If Dasgupta’s argument for η is adopted then the STP would be between 5.5% and 7.5%, but he has argued favouring $\delta = 0$ which would give 5.0–7.0%. This is extremely high.

For comparison consider how Nordhaus uses such rates to recommend catastrophic global warming as economically rational. He states that ‘the cost-benefit optimum rises to over 3°C in 2100’ (Nordhaus, 2018, p. 452), and his Figure 5 shows a 2100 optimum around 3.6°C and rising, because he recommends discounting the future at around 5% (Nordhaus, 2018, p. 455), writing off any importance of future damages by 2100 (damages would weigh around 2% of their value today meaning, for example, under VSL an action saving 2 people today at the cost of killing 97 people in 2100 would be a net gain, an optimal choice). This is neither unique to Nordhaus nor new, for example, the economic working group of the IPCC third assessment used discount rates between 5% and 12% (Spash, 2002a, p. 203). A common claim, also made by Nordhaus, is that empirically observable rates of return should be used. However, in actual economies the rate of return on risk free investment has been zero or negative in real terms for years (Freeman et al., 2018, p. 16), but discounting has persisted regardless of the theoretical justifications.

In fact there is no such thing as a singular rate in actual economies. The recognition that differential rates for different projects is theoretically justified, and specifically for projects with environmental impact, has led HM Treasury to discount at a lower rate (1.5%) for project impacts on health and life. However, while recognized as formally correct Dasgupta (2021, pp. 275–276) rejects this on the grounds, not of theory but, that it will be ‘cumbersome’ in practice and ‘lead inevitably to errors’. Indeed he states it would be ‘unsafe’ because (now) the ‘social evaluator’ (or ‘citizen investor’) cannot be trusted to get things right. Instead he recommends a single rate applied to all projects. The reader might wonder at such pragmatism, for if all the problems of neoclassical economics can be so easily dismissed on a whim as impractical and too cumbersome for his social/citizen evaluator/investor this rather begs the question why he bothers us with his models, theories and extensive mathematical detours and what other fallibilities his central decision-maker might suffer from.

That markets are not guides to intergenerational fairness, ethics or equity, would seem to bring the whole approach into question. In his paper on discounting for climate change Dasgupta (2008, p. 167) concludes: ‘Intergenerational welfare economics raises more questions than it is able to answer satisfactorily’. However, as usual, Dasgupta’s recognition of the problems has no impact on his esteem for and continued use of neoclassical economics and, unsurprisingly, he recommends discounting on this basis.

4.3. Population growth

The Review puts great emphasis on the size of the global population, in the tradition of Malthus, while insisting that it does not. As Fletcher (2021, p. 3) notes:

the interrelation between social inequality and ecological destruction can be explained in one of two ways: as a function of human population growth creating resource scarcity; or as a product of a capitalist economic system demanding unsustainable resource use to facilitate economic growth that has little to do with satiating the needs of the human collective, but rather with enriching a select few at the expense of the rest—as well as at the expense of the planet as a whole.

The Review clearly chooses the first. The focus on global population size, natality rates and poor women’s education implicitly shifts responsibility and blame for biodiversity loss away from capital accumulation and on to developing countries and women.

5. Biodiversity conservation is not asset management

As we have explained, Dasgupta equates biodiversity conservation with asset management. The analogy attempts to avoid structural change and maintain the current economic system with relatively minor adjustments. This asset misallocation framing of biodiversity loss enables the continuation of economic growth subject to an added condition of (hopefully) not destroying life on Earth.⁷ In concluding our critical assessment of *The Dasgupta Review* we explain why drawing this analogy fails.

Dasgupta tries to claim all conservation requires investment. In fact, Nature can regenerate without human intervention (which in modernity is often the cause preventing this from occurring). Where ecosystem restoration involves opportunity costs to curb destruction, the aim is not a return on an investment. Preventing the destruction of Nature concerns stopping harm. Neither is preventing harm to others (human or non-human) a matter of profiteering or accumulating wealth. The view that biodiversity destruction is an issue of bad asset management is therefore far from self-evident and on the contrary quite controversial. The more prevalent and contrasting view is

that biodiversity destruction has always been a corollary of capital accumulating growth, since such economic activities are about appropriation and transformation of natural resources.

The analogy claims price-making markets are efficient, able to price scarce resources and allocate them optimally. Public policy is seen as fostering new environmental markets to provide the 'right incentives' for private actors to choose the optimal allocation of resources that would maximize and sustain economic growth. This aligns neoclassical economics with the neoliberal Wall Street Consensus that seeks to transform the State from a sovereign actor to a standard setter, provider of subsidies and means of de-risking private sector investment. That markets cannot achieve efficient allocation is why Dasgupta requires a 'social evaluator' and accounting (shadow) prices based on social CBA.

Actual price-making markets are nothing like Dasgupta's idealized model. Analysis of oil prices over the past century exemplifies the failure of such markets to price scarcity due to information effects and prices being determined mostly on derivatives markets, rather than physical supply/demand (Bouleau, 2018). While Dasgupta highlights government subsidies, as a key market failure, he ignores oligopoly and monopoly power as actualized today in the Davos elite of billionaires and institutionalized in the multi-national corporation. We should also remember that financial markets operate on the basis of greed, love of money and wealth accumulation, with speculators, price fluctuations, instability, bubbles and collapse (see Keynes, 1978/1936).

An asset manager's job is to maximize the return on a portfolio for a given investment mandate allowing for risk taking. Optimization, whether of financial returns, or well-being, reduces human action to pushing the limits and regulatory constraints to achieve maximum exploitation of others (human and non-human) in order to make profit; what Kapp (1978/1963) termed cost-shifting. When exploiting Nature and destroying biodiversity it assumes implicitly, and incorrectly, that sufficiently complete and certain knowledge exists to avoid high stakes failures and catastrophic outcomes. Crucially, optimizing reduces the margin for error and increases the risk of failure. Nature, by contrast, avoids optimization and is full of redundancies, that make for resilience and robustness.

Distinguishing between different types of unknown futures is important to understanding what actions should be undertaken. Typically economists reduce all unknowns to risk, which is the probability of an event occurring. So when considering a simple coin toss, for example, we can expect a 50:50 chance of heads or tails and then repeatedly toss the coin to see. In this case the possible future states or events are known and so are the probabilities. However, uncertainty and incertitude arise when we either only know the possible outcomes, but not their probability, or we know the risk, but not all the potential events. Human induced climate change is a good example, where future states involve unique events, such as the melting of the West Antarctic ice sheets, an unrepeatable experience, a knowable event without a probability distribution. We suffer from both partial ignorance and social indeterminacy, not least because humans are also unpredictable in their actions which may confound expectations. An important distinction is then that between weak uncertainty where events and probabilities can be assigned (Spash, 2002a, Chapter 4), and strong uncertainty where ignorance and indeterminacy dominate (Spash, 2002a, Chapter 5). The latter requires a different approach to public policy that entails precaution (Stirling, 2017), not risk management or risk taking. Yet, despite these distinctions having been recognized a century ago by Keynes (1988/1921), economists, like Dasgupta, Stern, Nordhaus and others, persist in reducing strong to weak uncertainty. While asset management and financial markets are generally designed to handle risk, they are unable to handle strong uncertainty. In fact, the greater strong uncertainty the more uncertain are the prices and the greater the chance of sudden and unexpected price crashes (Slovik, 2011). This inability to deal with strong uncertainty makes the asset management analogy both erroneous and dangerous. The analogy encourages misleading impressions of

substitutability and lognormal probability distributions, a false sense of predictability and promotes inappropriate financial concepts (such as diversification).

Asset management is a profession where there is a huge gain/lose asymmetry in decision-making, i.e. between potential gain and personal risk. Rewards are typically a function of both the quantity of assets under management and over-performance, but when asset managers fail they can only lose their job. They are incentivised by design to take a great deal of risk. The analogy implies this type of hugely asymmetric pay-off and limited accountability is the appropriate model to be adopted by policy-makers, Dasgupta's citizen investor. The psychology of a high stakes gambler hardly seems an ideal for public policy, especially where responsibility extends to existential threats to others (both non-human and human).

The psychological aspect of financial markets involves group behaviour creating instability. For example, the much-praised benefits of diversification (i.e. risk spreading) evaporate when a big crisis hits, because fear dominates behaviour (all correlations jump towards one). The 'risk appetite' of market participants disappears, and trading positions are closed to stop losses or lock-in profits in assets unrelated to the original event. This exemplifies how financiers' behaviour is dominated by interdependent expectations. Keynes (1978/1936, p. 156) described professional investment as like a newspaper competition in which the competitors have to pick out the six prettiest faces from a hundred photographs, the prize being awarded to the competitor whose choice most nearly corresponds to the average preferences of the competitors as a whole. You win not by judging who has the prettiest face, but by guessing whom others on average will likely think has the prettiest face, while they guess how you (and others) think they will think, and you guess how they think you (and others) will think, and so on. Investment is game-playing not truth seeking. It requires very different skills from Nature conservation or biodiversity preservation, where traditional and scientific knowledge provide causal descriptive understanding of biophysical structure that informs social practice.

6. Conclusions

The fact that governments have budgetary choices and trade-offs to make does not imply, in any way, that environmental policies are similar to asset management, which, for all the above reasons, is a deeply inadequate approach to public policy. Using the language and concepts of finance and capitalism to describe loss of biodiversity is far from neutral, certainly not scientific let alone objective, and misunderstands the object of concern. As we have explained in detail, Dasgupta is proposing old wine in old bottles. A neoclassical economics reliant on discredited ideas of capital that cannot be defined in any of its forms and values that cannot be calculated. A sense of déjà vu arises because social CBA was last so desperately hyped in the UK as an environmental fix during the 1990s as governments struggled to appear 'Green'. *The Dasgupta Review's* ground breaking vision is a world converted to financial assets, run by accounting prices, controlled by a female social evaluator where freedom is defined as social conformity to neoliberal capitalism and Conservative values – a world in which beliefs are aligned, future generations discounted and Nature that does not pay enough is liquidated as a bad investment.

The reasons why this is being undertaken are clear from its backers. The aim is to avoid policy debate while shaping how biodiversity loss and mass extinction are understood, restricting the options deemed feasible and making systemic alternatives appear undesirable. Promoting such an incorrect framing is deeply problematic and worrying, because it will not only misdirect public policy on biodiversity loss but also fail to address the structural causes of the ongoing social-ecological and economic crises facing humanity.

Notes

1. *The Review* was welcomed as a business and finance friendly initiative: Business for Nature (2021) noted businesses' critical and already active role in 'shaping Nature policymaking'; The Capitals Coalition (2021) notes the central message as 'one that will be familiar to many in our community' and 'look forward to continued work with the Dasgupta Review team at HM Treasury in our shared goal to ensure that a systems approach sits at the heart of economic planning and decision making at all levels'; Finance for Biodiversity (2021) praised it for 'highlighting the role of finance'; World Wildlife Fund (2021) welcomed it as promoting 'large-scale investments in Nature-based solutions', the Royal Society for the Protection of Birds CEO and Chief Economist referred to it as an 'excellent conceptual framework', 'ground breaking' and justifying Nature protection to achieve 'broad-based sustainable growth'!
2. Introduced by the UN and meant to be measured by its Inclusive Wealth Index (UN University, International Human Dimensions Programme on Global Environmental Change, and UNEP, 2012).
3. These terms are used interchangeably (Dasgupta, 2021, p. 4, 253, 302, 326, 359) with the latter apparently a sub-category of the former (pp. 5–6).
4. For example, why are humans the centre of his value system? Are they only of value because they are instrumental for something and if so what? His system requires a valuing agent that has value independent of his utilitarian system and is irreducible to a value in the system, e.g. human worth is not how much others are willing-to-pay to keep somebody else alive or their usefulness for others.
5. Islamo-leftism is an ill-defined pseudo concept created by the French extreme right that targets non-Islamophobic, left leaning citizens and frequently used against those critical of the current government's policies.
6. A declining long term social rate is used: 3.5% 0–30 yrs., 3% 30–75 yrs., 2.7% 76–125 yrs., 2% 126–200 yrs., 1% 201–300 yrs., and 1% 300+ yrs.
7. The original HM Treasury (2019) commission included 'identifying a range of actions that can simultaneously enhance biodiversity and deliver economic prosperity'.

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References

- Adaman, F., & Madra, Y. M. (2002). Theorizing the "third sphere": A critique of the persistence of the "economistic fallacy". *Journal of Economic Issues*, 36(4), 1045–1078. <https://doi.org/10.1080/00213624.2002.11506535>

- Agence France-Presse. (2021, January 4). La police va pouvoir ficher les convictions politiques, religieuses et syndicales. *Huffpost*. Retrieved March 6, from https://www.huffingtonpost.fr/entry/la-police-va-pouvoir-ficher-les-convictions-politiques-religieuses-et-syndicales_fr_5ff3647cc5b6fd33111018e9
- Bouleau, N. (2018). *Le Mensonge de la Finance: Les Mathématiques, le Signal-Prix et la Planète*. Les Éditions de l'Atelier.
- Business for Nature. (2021, February 2). Business for nature welcomes The Dasgupta Review. Retrieved March 6, from <https://www.businessfornature.org/news/dasgupta-review>
- Capitals Coalition. (2021, February 2). The coalition responds to the release of the Dasgupta Review. Capitals Coalition. Retrieved March 6, from <https://capitalscoalition.org/the-coalition-responds-to-the-release-of-the-dasgupta-review/>
- Cohen, A. J., & Harcourt, G. C. (2003). Retrospectives: Whatever happened to the Cambridge Capital theory controversies? *The Journal of Economic Perspectives*, 17(1), 199–214. <https://doi.org/10.1257/089533003321165010>
- Dale, G. (2020). Rule of nature or rule of capital? Physiocracy, ecological economics, and ideology. *Globalizations*, 1–18. <https://doi.org/10.1080/14747731.2020.1807838>
- Dasgupta, P. (2008). Discounting climate change. *Journal of Risk and Uncertainty*, 37(2), 141–169. <https://doi.org/10.1007/s11166-008-9049-6>
- Dasgupta, P. (2021). *The economics of biodiversity: The Dasgupta review*. HM Treasury.
- Fankhauser, S. (1995). *Valuing climate change: The economics of the greenhouse*. Earthscan.
- Finance for Biodiversity. (2021, February 10). F4B responds to the Dasgupta Review. Retrieved March 6, from <https://www.f4b-initiative.net/post/f4b-responds-to-the-dasgupta-review>
- Fletcher, R. (2021). Review of Partha Dasgupta. 2021. The economics of biodiversity: The Dasgupta Review. *Journal of Political Ecology*, 28(1), 1–5. <https://doi.org/10.2458/jpe.2289>
- Fletcher, R., & Rammelt, C. (2017). Decoupling: A key fantasy of the post-2015 sustainable development agenda. *Globalizations*, 14(3), 450–467. <https://doi.org/10.1080/14747731.2016.1263077>
- Freeman, M., Groom, B., & Spackman, M. (2018). Social discount rates for cost-benefit analysis: A report for HM treasury. Retrieved March 2, 2021, from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/935551/Social_Discount_Rates_for_Cost-Benefit_Analysis_A_Report_for_HM_Treasury.pdf
- Georgescu-Roegen, N. (1971). *The entropy Law and the economic process*. Harvard University Press.
- Gills, B., & Morgan, J. (2019). Global climate emergency: After COP24, climate science, urgency, and the threat to humanity. *Globalizations*, 1–18. <https://doi.org/10.1080/14747731.2019.1669915>
- Goodwin, N. R. (2003). Five kinds of capital: Useful concepts for sustainable development. In *GDAE working papers*. Tufts University. <https://ideas.repec.org/p/dae/daepap/03-07.html>
- Hache, F. (2019). *50 shades of Green part II: The fallacy of environmental markets*. Green Finance Observatory. <https://greenfinanceobservatory.org/wp-content/uploads/2019/05/50-shades-biodiversity-final.pdf>
- Haines-Young, R., & Potschin, M. B. (2018). *Common international classification of ecosystem services (CICES) V5.1: Guidance on the application of the revised structure*. Fabis Consulting Ltd. www.cices.eu
- Hanley, N., & Spash, C. L. (1993). *Cost-benefit analysis and the environment*. Edward Elgar.
- Hill, C. (1997). *Liberty against the law: Some seventeenth-century controversies*. Penguin Books.
- HM Treasury. (2019, September 19). *The economics of biodiversity: Advisory panel*. UK Government. Retrieved March 8, from <https://www.gov.uk/government/news/the-economics-of-biodiversity-advisory-panel>
- HM Treasury. (2021, February 2). *Nature is a blind spot in economics that we ignore at our peril, says Dasgupta Review*. UK Government. Retrieved March 5, from <https://www.gov.uk/government/news/nature-is-a-blind-spot-in-economics-that-we-ignore-at-our-peril-says-dasgupta-review>
- Jones-Lee, M., Loomes, G. (1997). Valuing health and safety: Some economic and psychological issues. In R. Nau (Ed.), *Economic and environmental risk and uncertainty: New models and methods* (pp. 3–32). Kluwer Academic.
- Jones-Lee, M. W. (1976). *The value of life*. Martin Robertson.
- Kapp, K. W. (1978). *The social costs of business enterprise* (2nd ed.). Spokesman. (Original work published 1963). Reprint, 2000.
- Keynes, J. M. (1978). *The general theory of employment, interest and money*. Macmillan. (Original work published 1936).

- Keynes, J. M. (1988). *A treatise on probability*. Macmillan and Co. (Original work published 1921).
- Knetsch, J. L. (1990). Environmental policy implications of disparities between willingness to pay and compensation demanded measures of values. *Journal of Environmental Economics and Management*, 18(3), 227–237. [https://doi.org/10.1016/0095-0696\(90\)90003-H](https://doi.org/10.1016/0095-0696(90)90003-H)
- Knetsch, J. L. (1994). Environmental valuation: Some problems of wrong questions and misleading answers. *Environmental Values*, 3(4), 351–368. <https://doi.org/10.3197/096327194776679629>
- Le Névé, S. (2021, February 17). Frédérique Vidal lance une enquête sur « l'islamo-gauchisme » à l'université. *Le Monde*. Retrieved March 6, from https://www.lemonde.fr/societe/article/2021/02/16/frederique-vidal-lance-une-enquete-sur-l-islamo-gauchisme-a-l-universite_6070195_3224.html
- Meadows, D. H., Meadows, D. L., Randers, J., & Behrens, W. W., III (1972). *The limits to growth*. Universe Books.
- Mørch, M. (2016). Bhutan's dark secret: The Lhotshampa expulsion. *The Diplomat*.
- Nordhaus, W. D. (Ed.). (1998a). *Economics and policy issues in climate change*. HB ed. Edward Elgar.
- Nordhaus, W. D. (1998b). *New estimates of the economic impacts of climate change*. Yale University.
- Nordhaus, W. D. (2018). Climate change: The ultimate challenge for economics. In *Lecture to the memory of alfred nobel*. Nobel Media AB. <https://www.nobelprize.org/uploads/2018/10/nordhaus-lecture.pdf>
- Office for National Statistics. (2020). *UK natural capital accounts: 2020*. UK Government. <https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/uknaturalcapitalaccounts/2020> (accessed 7th March 2021)
- O'Neill, J. F. (2017). Pluralism and incommensurability. In C. L. Spash (Ed.), *Routledge handbook of ecological economics: Nature and society* (pp. 227–236). Routledge.
- Pearce, D., Markandya, A., & Barbier, E. B. (1989). *Blueprint for a green economy*. Earthscan.
- Pearce, D. W., & Moran, D. (1994). *The economic value of biodiversity*. Earthscan.
- Selenite. (2020, November 4). Les universitaires et opposants politiques dans le collimateur de LREM. Mediapart. Retrieved March 6.
- Slovik, P. (2011). Market uncertainty and market instability. Initiatives to address data gaps revealed by the financial crisis Basel, November.
- Spash, C. L. (2000a). Ecosystems, contingent valuation and ethics: The case of wetlands re-creation. *Ecological Economics*, 34(2), 195–215. [https://doi.org/10.1016/S0921-8009\(00\)00158-0](https://doi.org/10.1016/S0921-8009(00)00158-0)
- Spash, C. L. (2000b). Ethical motives and charitable contributions in contingent valuation: Empirical evidence from social psychology and economics. *Environmental Values*, 9(4), 453–479. <https://doi.org/10.3197/096327100129342155>
- Spash, C. L. (2000c). Multiple value expression in contingent valuation: Economics and ethics. *Environmental Science & Technology*, 34(8), 1433–1438. <https://doi.org/10.1021/es990729b>
- Spash, C. L. (2002a). *Greenhouse economics: value and ethics*. Routledge.
- Spash, C. L. (2002b). Informing and forming preferences in environmental valuation: Coral reef biodiversity. *Journal of Economic Psychology*, 23(5), 665–687. [https://doi.org/10.1016/S0167-4870\(02\)00123-X](https://doi.org/10.1016/S0167-4870(02)00123-X)
- Spash, C. L. (2005). Methods for calculating the costs and benefits of environmental change. In K. Pushpam (Ed.), *Economics of environment & development* (pp. 109–127). Ane Books.
- Spash, C. L. (2006). Non-economic motivation for contingent values: Rights and attitudinal beliefs in the willingness to pay for environmental improvements. *Land Economics*, 82(4), 602–622. <https://doi.org/10.3368/le.82.4.602>
- Spash, C. L. (2007a). Deliberative monetary valuation (DMV): Issues in combining economic and political processes to value environmental change. *Ecological Economics*, 63(4), 690–699. <https://doi.org/10.1016/j.ecolecon.2007.02.014>
- Spash, C. L. (2007b). The economics of climate change impacts à la Stern: Novel and nuanced or rhetorically restricted? *Ecological Economics*, 63(4), 706–713. <https://doi.org/10.1016/j.ecolecon.2007.05.017>
- Spash, C. L. (2008a). Contingent valuation design and data treatment: If you can't shoot the messenger, change the message. *Environment & Planning C: Government & Policy*, 26(1), 34–53. <https://doi.org/10.1068/cav4>
- Spash, C. L. (2008b). Deliberative monetary valuation and the evidence for a new value theory. *Land Economics*, 84(3), 469–488. <https://doi.org/10.3368/le.84.3.469>
- Spash, C. L. (2008c). How much is that ecosystem in the window? The one with the bio-diverse trail. *Environmental Values*, 17(2), 259–284. <https://doi.org/10.3197/096327108X303882>

- Spash, C. L. (2015). Bulldozing biodiversity: The economics of offsets and trading-in nature. *Biological Conservation*, 192(December), 541–551. <https://doi.org/10.1016/j.biocon.2015.07.037>
- Spash, C. L. (2020). A tale of three paradigms: Realising the revolutionary potential of ecological economics. *Ecological Economics*, 169(March), 1–14. <https://doi.org/10.1016/j.ecolecon.2019.106518>
- Spash, C. L. (2021a). Apologists for growth: Passive revolutionaries in a passive revolution. *Globalizations*, 18(7), 1–26. <https://doi.org/10.1080/14747731.2020.1824864>
- Spash, C. L. (2021b). ‘The economy’ as if people mattered: Revisiting critiques of economic growth in a time of crisis. *Globalizations*, 18(7), 1–18. <https://doi.org/10.1080/14747731.2020.1761612>
- Spash, C. L., & Aslaksen, I. (2015). Re-establishing an ecological discourse in the policy debate over how to value ecosystems and biodiversity. *Journal of Environmental Management*, 159(August), 245–253. <https://doi.org/10.1016/j.jenvman.2015.04.049>
- Spash, C. L., & Hanley, N. (1995). Preferences, information and biodiversity preservation. *Ecological Economics*, 12(3), 191–208. [https://doi.org/10.1016/0921-8009\(94\)00056-2](https://doi.org/10.1016/0921-8009(94)00056-2)
- Spash, C. L., Urama, K., Burton, R., Kenyon, W., Shannon, P., & Hill, G. (2009). Motives behind willingness to pay for improving biodiversity in a water ecosystem: Economics, ethics and social psychology. *Ecological Economics*, 68(4), 955–964. <https://doi.org/10.1016/j.ecolecon.2006.09.013>
- Spash, C. L., van der Werff ten Bosch, J., Westmacott, S., & Ruitenbeek, J. (2000). Lexicographic preferences and the contingent valuation of coral reef biodiversity in curaçao and Jamaica. In K. Gustavson (Ed.), *Integrated coastal zone management of coral reefs: Decision support modeling* (pp. 97–118). World Bank.
- Stern, N. H. (2007). *The economics of climate change: The stern review*. Cambridge University Press.
- Stevenson, H. (2021). Reforming global climate governance in an age of bullshit. *Globalizations*, 18(1), 86–102. <https://doi.org/10.1080/14747731.2020.1774315>
- Stirling, A. (2017). Precautionary appraisal as a response to risk, uncertainty, ambiguity and ignorance. In C. L. Spash (Ed.), *Routledge handbook of ecological economics: Nature and society* (pp. 267–277). Routledge.
- Swanson, T. M. (1994). *The international regulation of extinction*. Macmillan.
- Taylor-Dawson, A. (2021, February 9). Commodifying the natural world. *The Ecologist*. Retrieved March 9, 2021, from <https://theecologist.org/2010/jul/14/we-scare-people-talking-about-degrowth>
- TEEB. (2010). *The economics of ecosystems and biodiversity: Mainstreaming the economics of nature - A synthesis of the approach, conclusions and recommendations of TEEB*. United Nations Environment Programme.
- The Economist. (2021, February 6). How should economists think about biodiversity? *The Economist*.
- Thompson, E. P. (1993). *Customs in common: Studies in traditional popular culture*. The New Press.
- Tyler Prize. (2020). A conversation with Sir Partha Dasgupta “Assessing the Economic Value of Biodiversity”. University of Southern California. Retrieved March 11, from <https://tylerprize.org/laureates/laureate-conversations/2020-conversation-partha-dasgupta>
- UK GCGFI. (2021). *The UK Centre for greening finance and investment*. University of Oxford. https://ukcgfi.org/wp-content/uploads/2021/02/CGFI_Outline_LowRes.pdf
- UK Government. (2020, September 24). *Plan your relationships, sex and health curriculum*. Department for Education. Retrieved March 6, from <https://www.gov.uk/guidance/plan-your-relationships-sex-and-health-curriculum#choosing-resources>
- UNEP Finance Initiative. (2010). *Demystifying materiality: Hardwiring biodiversity and ecosystem services into finance*. United Nations Environment Programme, Finance Initiative.
- UN University, International Human Dimensions Programme on Global Environmental Change and UNEP. (2012). *Inclusive wealth report 2012: Measuring progress toward sustainability*. Cambridge University Press.
- World Wildlife Fund. (2021). WWF Welcomes Publication of the Dasgupta Review on the economics of biodiversity. WWF Retrieved March 6, from <https://www.worldwildlife.org/press-releases/wwf-welcomes-publication-of-the-dasgupta-review-on-the-economics-of-biodiversity>