Quantifying natural and social capital: guidelines on valuing the invaluable

Adrian Henriques

SUSTAINABLE BUSINESS INITIATIVE – OUTSIDE INSIGHTS

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CONTEXT

The health of the natural world and society are both under threat from the demands of modern life. In response, several different credible policy options, including legislation, regulation and attempts to change the behaviours of the public, have been proposed. In addition, the roles of many different types of organisation have come under increasing scrutiny. Therefore, it is not surprising that many businesses and other organisations are seeking to justify their contribution to the world in social and environmental terms as well as economically.

As a result of this quest, there is much interest in methods to assess their wider impacts, including those on social and natural capitals (CIMA 2014), (ACCA 2014). At the level of organisational reporting, the IIRC Framework (IIRC 2013) invites organisations to describe their business model in terms of the transformations between the various capitals which its activities effect. However, the great majority of reports[1] on non-financial performance, where they have moved beyond general descriptions of sustainability challenges, only present what can be described as 'revenue accounting for sustainability'. The GRI Guidelines (GRI 2013) provide a very useful resource for doing this systematically. Of course this is important to do, but it can very rarely be described as capital accounting.

Over the last decade, this legitimate interest in organisational accounting for impact – of both revenue and capital effects – has led to increasing attention on measurement, impact indicators and their evaluation and quantification. A number of initiatives to produce standards and guidelines in this area have emerged, such as the GRI, Carbon Disclosure Project (CDP), Climate Disclosure Standards Board (CDSB), the Natural Capital Coalition and the Sustainability Accounting Standards Board (SASB). These however, are predominantly concerned with disclosure and the question of **what** should be measured and reported. There has been little attention to the underlying question of how feasible – or advisable – the project of measurability itself may be.

Moreover, the idea of measurability tends to divide opinion. Being able quantitatively to evaluate an impact should lead to a greater awareness of the impact and also result more readily in appropriate decision making and the consequent modification of business models and strategies. However, it also makes people uncomfortable as it reinforces an economic mindset that seems inappropriate when considering the 'value' of a species of animal or the 'worth' of a human life.

In December 2014, the ICAEW conference 'Rethinking capitals'[2] highlighted the diversity of views on the issues of defining and measuring non-financial capitals. However, it left unanswered the question of how an organisation should actually approach the job of measuring its effects on non-financial capitals. The response given in this paper is essentially to encourage experimentation. Yet there are also dangers in applying accounting frameworks to natural and social capital and as a result it is also vital to be transparent.

This paper, therefore, explores criteria and suggests guidelines for determining the conditions under which the quantification of measures of impact on both social and natural capital may be appropriate. It is not intended to introduce new critiques of quantification, but to summarise those that exist and to propose guidelines for their more effective use in the light of the critiques. None of this is intended to imply that quantification is the only or best route to dealing with the depletion of natural and social capital – there are no doubt many strategies that need to be pursued to that end. However, quantification is likely to be one of them and is likely to be widely used. The question is: 'how?'

1 Such reports have been produced by the majority of large public companies and major public institutions such as the NHS, often on an annual basis. They are usually characterised as a 'sustainability report' or 'CSR report'.

2 See icaew.com/en/technical/sustainability/rethinking-capitals#

The guidelines proposed in this paper should be of use both to those preparing to quantify natural and social phenomena and also to those seeking to understand or assess the quality of the various approaches to quantification. It is hoped that the guidelines will be of use not only to companies and other organisations seeking to assess their effect on natural and social capital in their non-financial reporting but also to those formulating policy that relies on quantification in some way. The guidelines may, in addition, be of some use to local communities or non-governmental organisations (NGOs) involved in assessing attempts to quantify natural and social capital.

THE NATURE OF CAPITAL

The terms 'natural capital' and 'social capital' are each confused and contested terms. For the purposes of this paper, natural capital will be taken to include ecological features, natural resources and ecosystem services. This includes both capital considered as a stock or accumulation of some kind and capital considered as a resource. For simplicity, social capital will be taken to include not only networks of trust, norms, and interaction between people, but also what is commonly designated as human capital and as intellectual capital.[3]

However, different people and organisations use these same terms for different things and others use different terms for natural capital and social capital. This matters because a lot is at stake. Natural capital is essential to our survival and social capital is critical to our well-being. Moreover, if public or business resources are to be used to preserve or increase these capitals, then uncomfortable decisions may have to be made as actions are taken to achieve this increase through diverting other resources to this end.

Part of the problem is in defining what 'natural' and 'social' mean. Often these words are assumed to be mutually exclusive: either something is social and part of the human world or it is natural and beyond it. Conversely, the point is often made that humans are the product of nature, so it follows that everything social must also be natural. Fortunately, as it is not strictly necessary to deal with this issue in order to address quantification, this paper will not try to settle this boundary dispute. Examples of helpful and unhelpful quantification will be drawn from both areas. Indeed, the issues and challenges of quantification are remarkably similar across these two, apparently different, areas.

On the other hand, it is somewhat easier to define what the term capital means. In economics, capital is a factor of production. Unlike the traditional non-financial economic categories of capital, such as buildings and equipment, natural and social capitals are not primarily produced by economic activity, but they are still very necessary to economic activity.

From an organisation's point of view, capital is a resource that it uses but does not own. The fact that the organisation does not own 'its' capital, but others do, is the source of the need to account for its use. That accounting is required by its owners and by the public in general. However, natural and social capitals are typically things that no-one owns. Nevertheless, the obligation to account for their use to the public remains. It should also be pointed out here that governments should be treated as organisations in that to achieve their ends they too make use of social and natural capital and for that reason should also account for their use to the public.

A NOTE ON TERMINOLOGY

In addition to the key terms 'natural' and 'social' discussed above, the words for the detail of capital accounting – evaluation, indicator, quantify among others – also cause confusion. To avoid this as far as possible, this paper will use such terms in the following ways:

- 'Metric' rather than 'indicator' to denote the nature of a measure. A metric for carbon dioxide emissions might be 'mass of CO_2' for example.

3 Human capital is often used to refer to people's skills and capability and intellectual capital to knowledge expressed through patents. See the IIRC Framework (IIRC 2013) for a discussion and definition of the terms 'human capital' and 'intellectual capital' as well as other forms of capital.

- ‘Measurement’ as an abstract term is the same as quantification, as defined below. But it is also used to mean a particular ‘measurement’. In this sense it is the magnitude found for a given metric in a defined situation. This is sometimes referred to as the ‘evaluation’ of an indicator. The ‘units’ used for a measurement are defined by the standard for the metric against which the measurement is made. Twenty-three tonnes of CO_2 (at a location on a date) is an example of a measurement. In this case the unit is ‘tonnes of CO_2’.
- ‘Quantification’ is the process of expressing the size of something in numbers using a metric.
- ‘Monetisation’ is the process of quantification using financial metrics. This is sometimes also called evaluation.

The word ‘value’ is highly ambiguous. ‘Valuing something’ can mean finding it important; but it can also mean putting numbers to it or quantifying it. That ambiguity, and the pressure to conflate the two senses of the term, is at the heart of the dilemmas explored in this paper.

THE STRUCTURE OF THIS PAPER

This paper first of all looks at each of the types of accounting, reviewing the particular advantages and disadvantages they bring. The following three sections take each type in turn and are summarised in the conclusions. The final section sets out a statement of guidelines for the use of accounting techniques for natural and social capital accounting.

It should be noted that the quantification issues relevant to natural capital and to social capital have not been treated separately but in the same sections, each covering both types of capital. This reinforces the focus on the methodological issues of quantification, regardless of application – although this may seem unfamiliar to some.

2. Accounting for capital

Given the obligation to account for natural and social capital highlighted above, how do you do it? There are at least three distinct approaches: narrative, quantitative and monetised.

Narrative accounts contain rich descriptive text. Here is an example from a Local Nature Partnership in the UK:

'Hertfordshire has a number of distinctive and important habitats and sites. Amongst other things, it holds a significant proportion of the world's chalk rivers, it has some sites of European importance for wetland birds and it has one of the highest densities of woodland of any county in this part of the country. Towards the south of the county, these wooded habitats are highly distinctive, characterised by the hornbeam tree and containing important remnants of acid grassland and heath habitats, reflecting our particular history and heritage in this area. Towards the north and the west of the county, we have some nationally rare and important chalk grassland sites.' (HLNP, 2013, p4)

Quantitative accounts contain measures of aspects of natural or social capital (in addition to narrative). Here is an example from the UK Office for National Statistics:

- 'Around 1 in 10 people (11%) in the UK reported feeling lonely all, most, or more than half of the time in 2011/12.
- Just over a third of people in the UK reported that they wish they could spend more time with their family (36%) and have more social contacts (36%) in 2011/12.
- Nearly 1 in 5 people (19%) in the UK reported looking after or giving special help to someone sick, disabled or elderly inside their household (7%), outside their own household (10%) or both (1%) in 2012/13.
- Nearly a fifth (19%) of people in the UK had given unpaid help or worked as a volunteer in a local, national or international organisation or charity in the last 12 months in 2012/13.
- Half of people (49%) in the UK reported being very or quite interested in politics in 2012/13.
- Around two-thirds (65%) of people in the UK thought people in their neighbourhood could be trusted in 2011/12. Nearly three-quarters of people in the UK felt people in their neighbourhood get along with each other (72%) and are willing to help each other (71%) in 2011/12.' (Siegler, 2015, p2)

Monetised accounts characterise natural (or social) capital in terms of financial measures. Here is an example from the UK Natural Capital Committee:

> '… according to a recent study, white-tailed sea eagles (Haliaeetus albicilla) are estimated to contribute £5 million per year to the economy of the Isle of Mull, supporting over 100 jobs. That figure has grown significantly in the last few years as many wildlife spotting businesses have become established. Given the population of the island is less than 3000, this is very significant. Opportunities for viewing numerous other wildlife, such as whales, sharks, otters and other birds of prey means eco-tourism is now vital to its economy.' (NCC, 2015, p45–46)

3. Narrative accounting

Strictly speaking, narratives are stories. Accounts of social capital are well suited to this mode of capture. Robert Putnam is often credited with being the most influential person in the development of the concept of social capital. This is the opening of Putnam's extended treatment of the seminal text for social capital *Bowling Alone*; it reads like the beginning of a mystery story.

> 'No one is left from the Glenn Valley, Pennsylvania, Bridge Club who can tell us precisely when or why the group broke up, even though its forty-odd members were still playing regularly as recently as 1990, just as they had done for more than half a century. The shock in the Little Rock, Arkansas, Sertoma club, however, is still painful: in the mid-1980s, nearly fifty people had attended the weekly luncheon to plan activities to help the hearing- and speech-impaired, but a decade later only seven regulars continued to show up.' (Putnam 2000, p15)

However, many narrative accounts of natural capital have less of a plot and read more like lists of habitat. Indeed Michael Jones recommends adopting precisely this listing approach as the foundation for any more developed account of natural capital. He emphasises that where a habitat is endangered, habitat and resident species lists should be an integral part of the natural capital description (Jones 2014). But what such accounts lack in plot they can make up for through insight and a wealth of detail.

In contrast, some much less formal writing on nature verges onto the spiritual and such writing seems to capture best what we find important about nature.

> 'Sometimes I rambled to pine groves, standing like temples, or like fleets at sea, full-rigged, with wavy boughs, and rippling with light, so soft, and green, and shady, that the Druids would have forsaken their oaks to worship in them; or to the cedar wood beyond Flint's Pond, where the trees, covered with hoary blueberries, spring higher and higher, are fit to stand before Valhalla, and the creeping juniper covers the ground with wreaths full of fruit; or to swamps where the usnea lichen hangs in festoons from the white-spruce trees, and toad-stools, round tables of the swamp gods, cover the ground, and more beautiful fungi adorn the stumps, like butterflies or shells, vegetable winkles; where the swamp-pink and dogwood grow, the red alderberry glows like the eyes of imps, the waxwork grooves and crushes the hardest woods in its folds, and the wild-holly berries makes the beholder forget his home with their beauty, and he is dazzled and tempted by nameless other wild forbidden fruits, too fair for mortal taste.' (Thoreau 1854, p177)

Of course, not all nature writing attains the heights of Thoreau's *Walden* – much of it is far more pedestrian and from a capital accounting perspective serves as an introduction or context to further work, sometimes of a far more prosaic kind. But it is important to realise that Thoreau's writing captures what we value in nature in the sense of finding it important. Perhaps we should therefore always ask of the more mundane accounts of nature, including those that list or measure it: 'what has been left out?'

The counterpart to the richness of narrative can be a difficulty in informing judgement and decisions concerning the corresponding natural capital. Should we value a wood less if the red alderberry didn't appear to glow like the eyes of imps, for example? For the purposes of evidence-based policy, narrative accounts can seem of limited use. However, policies and decisions can also be made based on principles or values rather than on evidence, and here narratives can be powerful. A well-known example is the decision to abandon the Isle of Harris super quarry in Scotland which was at least partly due to the powerful spiritual (narrative) testimony brought to the official inquiry (McIntosh 1995). So if narrative accounting provides insight, as I have pointed out elsewhere (Henriques 2010), there is invariably a trade-off between the level of insight and the feasibility of quantification.

4. Quantitative accounting

THE FEASIBILITY OF QUANTIFICATION

The UK Natural Capital Committee (NCC) set itself the goal of developing quantitative measures of natural capital: the subtitle of its first report was 'towards a framework for measurement and valuation'. Yet as the basis for this ambition, the first NCC report described natural capital, including both resources and services, in the following, remarkably narrative, terms.

> 'The term natural capital therefore embraces the more immediately obvious assets associated with land (such as woodlands, fields, urban parks and subsoil assets), the water environment (for example, rivers, lakes, groundwater and seas) and the atmosphere (for example, clean air, and an equable climate). However, natural capital also includes the myriad processes which underpin and generate the services which the natural environment provides (for example, the water cycle, soil fertility processes and atmospheric gas exchange). Therefore, natural capital comprises, quite literally, a wealth of component parts; parts whose sum underpins not only all economic activity but life on earth itself.' (NCC, 2013, p11)

In its third report (NCC 2015), the NCC still delivered an overwhelmingly narrative and descriptive account of the state of the UK's natural capital. The report contains little quantification despite three year's work, demonstrating that measurement, even when considered an important goal, is difficult to achieve. To its credit, what the report did deliver was a description of the state of the UK's natural capital, the pressures on it and the actual and potential advantages it brings.

One reason for the focus on quantification by the NCC and other attempts to quantify capital is that, in contrast to narrative accounting, quantitative accounting appears to provide the perfect support for evidence-based policy and decisions. And it is indeed used in precisely this way quite widely across both the natural and social capital accounting realms. However, natural systems appear to present more usefully countable features than social systems (although this can be misleading as argued below). It may be challenging to count the number of animals in a large herd of wild animals, for example, but it is possible and it certainly feels that we know what it means to have done it. In contrast, social phenomena are far less tractable. How do you assess the level of sexual discrimination in an office, or the degree to which the human right to health has been met, for example? Social phenomena seem to be elusive and inherently difficult to define, let alone quantify.

The reason that social phenomena seem so 'slippery' is that in two respects they require subjectivity and judgement.[4] Firstly, they require judgement and subjectivity on the part of the person doing the quantification. Secondly, they require that the quantification accounts for the subjective perspective of the people who make up or produce the social capital being quantified. So both the observer and the observed are active subjects. It is this very element of subjectivity, particularly in the perspective of the people who produce social capital, that make it both hard to value and also 'valuable'.

Nevertheless, there are approaches to quantification based on behavioural analysis that can capture useful elements of social phenomena in general, including social capital. However, it is clear that these approaches cannot capture all aspects of social capital, including those that appear to make the phenomena valuable in their own right.

So the actual feasibility of quantification depends on what is being counted or measured. This is as true in natural capital systems as social ones. For example, in an ecosystem you might expect that all species would be treated equally. But of course that is never the case not only because of the difficulty in identifying and enumerating some species but also because of the appeal which others may have. For example, in choosing which of *Ailuropoda melanoleuca* or *Frankia alni* to count, the former (the giant panda) wins hands down whereas the latter (a soil-dwelling nitrogen-fixing bacterium) is typically overlooked.

4 See (Henriques 2007, pp108–110) for further discussion.

ADOPTING A SYSTEMS PERSPECTIVE

In general, serious difficulties stem from ignoring a systems perspective in seeking to account quantitatively for either natural or social capital. In the 2000s the UK NHS was being managed through targets, one of which was waiting times in accident and emergency, which were deemed to be too long. Targets were therefore set for reducing waiting times, which resulted in a dramatic improvement – at least in the waiting times measure. However, hospitals gamed the system, reducing waiting times in A&E by (among other strategies) increasing them in the ambulances serving the A&E departments (Bevan and Hood 2006). So patients simply waited in the ambulances, rather than in the hospital.

Obviously the consequences of ignoring the social system in which A&E targets were embedded meant that the reactions of the people who were providing the A&E services were also ignored. But systemic consequences can be just as significant in natural systems due to the inherent complexity of the systems in question.

The story of the unexpected effect of the re-introduction of wolves in wilderness areas is one example of this kind of effect in natural capital systems (Ripple and Beschta 2011). Instead of reducing diversity through their predations, diversity actually markedly increased. The wolves changed the behaviour of their prey, causing them to spend less time foraging near water sources. In turn this allowed more plant life to flourish and support other species. Overall the introduction of wolves resulted in a greater abundance of a wide range of species. Without taking into account the eco- or social system in which a phenomenon is embedded, the consequences of counting and controlling it become unpredictable at best and at worst may move against the desired direction.

PROXIES

In the face of these practical and technical difficulties, it is unsurprising that something is rarely directly accounted for in its 'native' units which directly reflect its definition. Very often the object under study is represented by a 'proxy'. A proxy, in this sense, is something that can be counted or measured and reasonably represents or is related to what it is actually desired to quantify – but it remains actually something different. Proxies are in practice often used in accounting for both social and natural capital.

The populations of species in some habitat, for example, are not actually the same thing as the natural capital represented by that habitat. The full account of the natural capital would also capture the interrelationships between the species among other factors. However, the species distribution **may** be a good proxy for the natural capital formation in which they dwell. The same happens in accounting for social phenomena. In *Bowling Alone*, Robert Putnam uses the frequency with which people bowl in company as a proxy for social capital.

Where proxies are regarded as causally connected to the thing they are supposed to represent, then they inspire more confidence and are often not regarded as proxies at all.However, it is perhaps only in the realm of physics that there can be real confidence in the validity of the causal relation. The height of mercury in a thermometer, for example, is considered for most purposes to represent the temperature very directly. But when the relationship is not so direct or clearly causal, then the validity of the proxy may be challenged. There is a well-known set of issues in social investment, social enterprise and social development circles concerning the challenges of finding suitable indicators to measure the consequences of activities in these areas. It is much easier to measure the outputs delivered by a project to reduce malaria (eg, mosquito nets delivered) than the outcome that may in fact be sought (eg, better health). The dangers of using the number of mosquito nets delivered as a proxy for better health are obvious as it is entirely possible that most nets are not in fact used.

In order to be useful, it is therefore important to ensure that the proxy is situated at least somewhere in the map of consequences of the activity under measure. As part of that exercise it should also be appreciated that the outcome sought may also be the consequence of other factors entirely unrelated to the activity being measured. In the above example, better health can also result from the practice of covering or draining standing water so that mosquitoes cannot breed in it. These considerations are just as applicable to environmentally-focused activities, and therefore natural capital, as to social issues and social capital.

There is one very widely used proxy that is particularly dangerous: the recording of 'perceptions'. This is commonly used by companies to understand their reputation or the esteem in which they are held – this in turn is often taken as a measure of the social capital or natural capital they have generated. For example, companies may ask members of the public 'in your view, is company X environmentally responsible?' Perception as a proxy is only very tenuously related to anything other than the state of mind of the person reporting the perception at the time they are reporting it. Moreover, all the other challenges identified for proxies above are also relevant to perceptual proxies.

5. Monetised accounting

Financial units provide probably the most appealing proxy of all. They appear to provide a definitive evaluation in units that can be manipulated with ease and directly connected to economic decision making. But it should never be forgotten that financial units are proxies. Indeed, unlike other metrics, it can be argued that since money at bottom represents trust, financial units can only **ever** be proxies: the native units of money can only ever reliably measure money!

Nevertheless, in a functioning market context, financial units can be used to model human behaviour effectively. If you want to know the effect on demand of raising prices for admission to the zoo by 2%, the practice of economics has got the problem covered. The crucial phrase here is 'in a functioning market context'. Outside those confines, the use of financial units is contentious.

One such situation occurs where there is a market, but it is not functioning well. That may be due to a lack of competition on either the demand or supply side or to the presence of externalities. Since we know that there are many major environmental externalities that are unaccounted for in modern market economies, such as climate change, it follows that the use of the market for most decision making is flawed and for decisions concerning natural capital is likely to be seriously misleading.

In relation to social and natural capital, the most common situation is one in which there is no market, but an attempt is made to estimate a market price in order to make decisions using economic modelling. This is often the case when some part of the 'commons', for example an area of publicly-held land or a crowdsourced product, is brought to market. The estimation of market price is usually done by asking people to imagine that there is a market after all and given that, what sort of prices are applicable within it. This is the philosophy of the two most common methodologies, the willingness-to-pay ('how much would you be willing to pay to preserve a local wood from development?') and willingness-to-accept ('how much would you be willing to accept as compensation if the local wood is developed?') approaches to social and natural evaluations. It should also be noted that these two methods do not give the same results.

Such market-based methods are widely used in social and environmental policymaking. For example, there are well-established values for not being worried about crime, being free from depression, having good overall health and so on. These are derived from asking people about the level of compensation that might be acceptable to continue to live with these problems or without these advantages.

At least in these cases those directly involved in the generation of the capital have been involved in its valuation. However, where economic valuation methods developed in one society are employed to value natural or social capital in cultures to which they are alien then their use is far more problematic. As Dario Kenner has pointed out (Kenner 2014), in these situations their use typically implies the imposition of power on those little able to resist it. Yet even in well-functioning established markets, monetary values are a reflection of economic power. Those with more money to spend have more influence in determining market (exchange) prices and so their preferences carry more weight.

Given these challenges, is there any value in financial proxies? Despite the difficulties, what the ascription of monetary values can do is serve to focus attention on the issues involved. They may also convey a sense of the scale of the impact, even if the precision which is also conveyed is misleading.

LIMITS TO MONETISATION

What, then, are the limits to this sort of quantification? Where there is already a well-established and well-functioning market, then the use of monetisation delivers a rough sort of logic for decisions, but where either of those conditions is absent, monetisation should not be the sole basis for decision making. Where there is no pre-existing market, then there is no basis for ascribing market-derived values to the items that might be for sale if there were one. There is also little basis for assuming a coherence of preferences between the various imaginary choices as a basis for policy making.

It should be noted that it is very hard to describe a well-established, well-functioning market. Almost any concrete scenario can easily be shown to pre-suppose either an unreal absence of externalities or the unrecognised presence of market-distorting social power relations. Nevertheless, where for example someone is debating whether to buy apples at four to the pound or oranges at two to the pound, an economic analysis makes some sense. However, if the price of apples is 25p each, that price is an exchange value, not the intrinsic worth of the apple. In particular it does not follow that the intrinsic worth of oranges is twice that of apples. The economic analysis simply describes the market participants' behaviour, not the 'value' of the goods bought and sold. That becomes much clearer if we imagine a slave market – whatever the buyers of slaves pay, that is not the intrinsic worth of the human beings so traded. Nevertheless, a remarkably similar assessment of the value of lives is just what the personal accident market does as a matter of routine.

What economic studies of natural capital generally do however, is not to claim that the intrinsic value of some part of nature has been discovered, but that its value to another party – generally taken as 'the economy' – has been estimated. The white-tailed sea eagle, as was described at the start of this paper, is worth £5m per year to the economy of the island of Mull – not to the rest of us or to the eagle itself.

The reasoning behind such economic evaluations is usually to persuade people that natural capital, such as Mull's eagles, are important for Mull as a whole to preserve. But this approach is dangerous, because if the economic worth of a proposed quarry into the cliffs where the eagles nest is more than £5m (and it could quite feasibly be worth many times more than £5m to the economy of Mull) then the decision about the eagles is put in doubt. If the proposed quarry were worth £100m, then it could easily seem 'worth it' to destroy the eagles' home. In that last sentence, the intrinsic value of the eagles has been taken as their exchange value. It is very easy to take any monetised evaluation as a measure of intrinsic worth, even if that was not originally intended.

Social capital can also be for sale. An example of growing importance is the worth of our privacy or looked at from the other way round, the price for disclosing our browsing habits online. For many private companies, this is very valuable information. And in one sense it costs us nothing to give it away. However, most people feel inherently uncomfortable with this exploitation of their privacy.

This application of the logic of the market to social or natural capital is therefore one which loses information – the diversity and richness of intrinsic worth – in favour of establishing equivalences that are useful to a market. This has the potential to destroy the underlying diversity. Destroying underlying diversity is a bad thing, not only because we like variety, but because fundamentally we **need** a whole range of aspects of nature and society in order to survive and live well.

The result of this logic is that in assessing the impact of human activity, positive effects of one kind (perhaps social) can be traded off against negative effects of another kind (perhaps environmental). The expression of sustainability impacts particularly in a financially quantified form suggests that they are equivalent in kind and can be substituted for each other at our convenience. Yet they cannot: social good such as money cannot compensate for a ruined environment. It is precisely this economic view of human activity that has led us collectively to our currently unsustainable position.

6. Conclusions

Quantification is a powerful method for producing seemingly definitive accounts of natural and social capital. As such it is likely to play a major role in how humanity deals with the production and destruction of these capitals. However, its apparent definitiveness is misleading. The analysis above, while acknowledging the usefulness of quantification, has identified three main areas in which its use is problematic:

- **Balance.** Since there are aspects of what is valued in nature and society that cannot be captured successfully in quantified metrics, and fewer that can be captured in financial metrics, quantification alone will always be incomplete and give an unbalanced picture. Quantified accounts should be supplemented with narrative accounts. The requirement within the GRI Guidelines (GRI 2013) to disclose not only an indicator but also the management approach which provides the appropriate context, while not referring to the measurement of effects on capital, is an example.
- **Participation.** The derivation of metrics, especially financial metrics, is a product of existing social relationships, including those of power. To address this, those affected by quantification should be included in the derivation of the metrics the use of which may affect them. Moreover, other elements in the complex natural and social systems whose elements are quantified should also be 'consulted' or at least considered. The requirement within the SROI (social return on investment) methodology (SROI Network 2012) to involve stakeholders in the development of the indicators concerning them is an example
- **Relevance.** It is important that methods appropriate to their context of use are employed. In particular, economic methods are only appropriate within already functioning markets but not in societies, or aspects of society that are not already monetised. In addition, proxies should be used with extreme caution if there is no clear connection with the subject of quantification. The work of Dario Kenner (Kenner 2014) referred to above provides a detailed exploration of the issues.

The following, final section presents these conclusions as elements of good practice. If followed, they should increase the confidence with which quantification can be regarded. It may not often be possible to develop quantified accounts in the most balanced, participative and relevant ways suggested above, but it will always be possible to describe how it has been done and what has been considered and left out. The guidelines therefore, also contain further proposals for **transparency** about the process which has in fact been followed in any given case.

Guidelines

BALANCE

1. Ensure that a strong narrative account of social capital or natural capital accompanies attempts at quantification.
2. Support monetisation with the use of wider, non-monetised metrics.

PARTICIPATION

3. Include the people and communities affected by quantification, and especially monetisation, in discussion of the overall aims of the quantification and in the development of the chosen metrics.
4. Consider all elements of the social or natural system in the choice of the proxies to be used as metrics.

RELEVANCE

5. Use monetised methods only in relation to existing, well-functioning markets.
6. Ensure that indicators of outputs and of the resulting outcomes are used appropriately.
7. Use perceptual measures only where it can be independently shown that they are closely related to the capital under study.

TRANSPARENCY

8. Describe the rationale and methodology for the choice of metrics used.
9. Disclose the known elements of the social or natural capital systems that are not reflected in the metric chosen.
10. Where these guidelines have not been followed, the quantified or monetised findings should be presented as indicative only and the associated level of uncertainty deriving from data limitations, methodology or other sources, declared.

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