A measure of net well-being that incorporates the effect of housing environmental impacts

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Abstract

This paper presents a new method of measuring well-being which incorporates environmental performance. Existing data on well-being data and the environmental performance of UK social housing are used to demonstrate how the measure could be used. It is intended that the measure be used to maximise human well-being whilst ensuring that resource use remains within environmental constraints. The demonstration shows that at least eight different research themes are required to completely enable this measure.

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Introduction

The purpose of this paper is to present a measure of well-being that can be used to steer government policy. The background section will explain why this is necessary. The overall concept will then be introduced in the well-being measure section. Finally a worked example, complete with methodology, relating to the environmental impacts of social housing will be presented to illustrate the concept. It should be noted that the proposed well-being measure is not restricted to environmental impacts or social housing. This particular example has been chosen because the effect of environmental impacts on wide scale well-being (i.e. on people other than building occupiers) is rarely explored.

Background

There are no universally accepted definitions of well-being. Those definitions that do exist assess only the well-being of a particular group without incorporating negative impacts on others' well-being. Furthermore, government policy tends to convert well-being and environmental data into financial measures, in order to inform policy.

This section will give two examples of how well-being and environmental measures are converted to financial measures in order to inform government policy. It will then show why well-being ought to be the indicator of government success and how financial and environmental measures can be converted into well-being measures.

Example 1. The benefits of good quality housing is beginning to be documented in the UK. For instance HACT (2013) indicates that good quality housing is "worth" £5,642 of well-being. Another example is NCH, (2012), where well-being is reported as health benefits which lead to potential health care savings (~£700,000 per year). In both cases the well-being is "converted" into a financial metric, which is used to influence government policy on well-being.

Example 2. The environmental impacts of UK housing are understood to the level that environmental standards, such as the Code for Sustainable Homes (CLG, 2010), have been introduced. Chief amongst these is the carbon emissions arising from homes which amount to 68 million tonnes (Defra, 2013). Treasury has made an attempt to convert carbon emissions into a financial figure, currently £28/tonne (Defra, 2007), for policy purposes.

From the above, it can be seen that well-being and environmental metrics are converted into financial metrics in order to steer government policy. This can lead to perversions where well-being actions are not carried out because of cost. However, world governments recognise that they need to maximize well-being as decreed in the OECD Istanbul Declaration, to which the European Commission is a signatory (OECD, 2007). Evidently, a direct measure of well-being is needed into which financial and environmental metrics can be converted. The means to do this is presented in the next section.

Proposed well-being measure

The proposed measure is this: "the degree to which human needs are met (%)".

Expanding on this idea will clarify it.

Firstly, what are human needs? For this measure it is proposed that human needs, as described by Maslow (1943), are used. These have been widely accepted and briefly are: basic needs; security needs; social needs; esteem needs and self-actualisation needs.

So, for example, if 100% of the world's population had 100% of their needs met, then this would be a measure of complete success for the world's governments. Similarly, if 30% of the world's population had 100% of their needs met, with the remaining 70% only have 50% of them met, then it can be clearly seen that global efforts should be directed towards improving the lot of the unfulfilled 70% of the population.

Now to expand on how environmental impacts can be incorporated into this measure of well-being. Humans depend on their environment to survive and thrive. Over-exploitation of resources will deprive people of the means to meet their basic needs such as food and water (Hassan, 2005). Similarly pollution, particularly greenhouse gases, will deny other people the means to provide for their basic needs through drought or flooding. Unfortunately, those that are set to suffer from environmental over-exploitation or pollution are not necessarily those that cause it. Closer to home (UK), water security is becoming a pressing issue (Environment Agency, 2009), as is fuel security (DECC, 2012). The Millennium Assessment (Hassan, 2005) as well as KJell (2011), recognise the ability of the natural world to satisfy other higher well-being needs. In short, the environment in which we live provides satisfaction of many needs. It is therefore vital that the extent to which these needs are satisfied by the natural world are quantified in terms of the well-being they bring and thus, are managed accordingly.

A short note on wealth and finance. Amongst others, Helliwell (2013) identified that wealth and well-being correlate to an extent. Beyond that extent, increased wealth does not necessarily bring increased well-being. Thus, it is proposed that wealth and finance be used as one tool amongst many to achieve 100% well-being, rather than serving as the default measure.

There are distinct advantages of using the proposed well-being measure. Firstly it is scalable and can be used for any size group of humans: from the individual level to the macro - organisation, project, local authority, national government, even the entire planet. It is an objective, quantitative measure: it is not value based, therefore it is non-judgemental and is not biased towards any particular culture. It enables management of the environment for the long-term benefit of humans and not for its own sake.

The main disadvantage is that the methodology is in its infancy. Much work needs to be done to develop the measure into a credible and workable methodology. The areas of research necessary are listed in the further research section. However, this should not be a detriment to

its development because 100% well-being is a stated aim of the OECD Istanbul Declaration signatories.

Despite its infancy the subject area is not entirely unexplored. For example, WWF (2012) reference environmental impacts against human development and well-being. Clarke (2004) used Maslow's ideas to measure well-being and Brundtland (UNWCED, 1987) clearly explains the connection between needs and sustainable development. The novel aspect of this paper is to provide a universal measure of well-being.

Methodology of a worked example

Firstly, data from the Office of National Statistics (ONS) and well-being were analysed to find data that would fit into the proposed well-being measure.

Secondly, detail on environmental impacts of social housing was taken from the SHIFT data set (Sustainable Homes, 2012). This dataset is collected bi-annually from social landlords wishing to benchmark and improve the environmental performance of their stock.

Thirdly, data was sought which would enable conversion of environmental impacts. This was not necessarily a rigorous search as data in the correct format was not always available. The intention was to provide figures which could be used to illustrate the concept.

Results

Categorisation of the ONS well-being data set into the extent to which they describe how the populations needs (as described by Maslow) are met are shown in table 1 below.

Table 1

Need	ONS data
Basic	No specific data, but it has been assumed that 100% of UK inhabitants have their basic needs (food, water, etc) satisfied
Security	No specific mention of security of supply of basic needs. However, it is assumed for this work that supply is 100% secure for the UK. Separately, crime rates against the person were quoted as 76 out of 1,000, equating to 92.4 % security.
Social	70% were satisfied with their social life.
Esteem	80.7% gave a medium/high rating of how worthwhile the things they do are, which has been interpreted as high self-esteem for this work
Self-actualisation	60.9% somewhat, mostly or completely satisfied with their amount of leisure time. For this paper it has been assumed that time to pursue leisure correlates with levels of self-actualisation

Using the Maslow well-being approach, the well-being of home occupiers can be calculated as follows:

Occupiers well-being:

100% of basic needs met x weighting* (0.5) =	100 x 0.5 =	50.0
92.4% of security needs met x weighting (0.25) =	92.4 x 0.25 =	23.1
70% of social needs met x weighting (0.1) =	70 x 0.1 =	7.0
80.7% of esteem needs met x weighting (0.1) =	80.7 x 0.1 =	8.7
60.9% of self-actualisation needs met x weighting (0.05) =	61.0 x 0.05 =	3.1
Total =		91.9

*Weightings are introduced because some of the levels of needs are more important than others in proportion to the increase in well-being. Clarke (Clarke,2004) felt that the weightings were value judgements. However, a simple study by this author found that these are measurable and produced these weightings. The topic is an area of suggested further research.

91.9% is the average level of well-being per person in the study group.

The SHIFT data represented 522,000 thousand homes throughout the UK, roughly 1,250,000 people at 2.4 people per home. The environmental impacts for this SHIFT group were found to be those listed in table 2 below.

Table 2

Environmental impact	Measure
Carbon emissions from homes	SAP is a measure of energy efficiency of a home. Average SAP rating was 71. The SAP rating is loosely correlated to carbon emissions and a figure of 4.1 tonnes per homes per year has been used for this illustration = 2,140,200 tonnes (author's work).
Water usage due to installed water fittings	145 litres per person per day (lpd)
Household recycling rate (dependent on installed internal recycling bins)	8.8% of homes had internal recycling bins. WRAP (WRAP, 2008) data suggests that recycling rates improve by 19% where internal recycling bins are present. This would imply that homes represented by the SHIFT process recycle 8.8 x 19 more than the average UK waste rate of 42.8% (ONS, 2013) = 44.47% recycling. Average waste arisings is 423 kgs per person (Defra, 2013). 52% of UK purchases are ethical (http://www.utalkmarketing.com/pages/article.aspx?ArticleID=19124). So assuming that waste arisings are the same as purchases, then 48%, (203kg) is unethical. 44.47% of this is recycled leaving 113 kgs of unethically purchased and wasted materials per person =41,250 tonnes for this study. Assume 100% of eaten food is eventually recycled at sewage treatment.
Ecological enhancement	7.7 % of homes had some sort of ecological enhancement.
Carbon due to transport	1.7 tonnes per capita (Decc, 2013), so 2,125,000 tonnes for this population.

Table 3 below shows how the environmental impacts can be converted into well-being impacts and the rationale for doing so. These are in terms of the most basic impacts only, but future versions of this methodology could also include how higher needs are affected. For example destruction of a rainforest may reduce the ability of humans to satisfy their self-actualisation needs if they find these forests inspirational.

Table 3

Conversion	Rationale
Carbon	50 million environmental refugees predicted by 2020 (Huffington Post article http://www.huffingtonpost.com/2011/02/22/environmental-refugees-50_n_826488.html) 30x 10^9 tonnes of global carbon emissions in 2010 (OECD, http://www.oecd-ilibrary.org/sites/factbook-2013-en/09/02/01/index.html?itemId=/content/chapter/factbook-2013-70-en) Therefore each 600 tonnes of carbon emitted causes 1 environmental refugee
Water	The Environment Agency (Environment Agency, 2009) has calculated that domestic water consumption needs to be 130 lpd by 2030 in order to cope with projected lower rainfalls. Therefore, for this work, each 130 lpd over 130 lpd denies 1 person sufficient water in the UK.
Waste	Assuming that violent conflicts are essentially struggles for resources, analysis of these two sources (http://tonto.eia.doe.gov/country/index.cfm , http://users.erols.com/mwhite28/war-1900.htm) indicates that for every 10,000 tonnes of materials unethically purchased and then wasted there is 1 person denied their basic needs.
Biodiversity	Living planet report shows that the average biocapacity available to humans is contained within 1.8 hectares of land per person http://wwf.panda.org/about_our_earth/all_publications/living_planet_report/2012_lpr/ A very loose interpretation of the Millenium Assessment indicates that around 75% of the worlds ecosystems are used to provide basic services for humans. This means that 25% ought to be left as biodiverse areas for the benefit of humans http://www.maweb.org/documents/document.301.aspx.pdf There should therefore be 0.45ha (25% of 1.8 ha) of biodiversity in the housing stock for every person. Gardens may be around 80m2 each which means each 0.45ha is equivalent to 56 gardens. For every 56 gardens with no biodiversity, 1 other person is being deprived of this necessity. In the case of the SHIFT there are 522,000 homes with only 7.7% of these with ecological enhancement. This leaves 481,806 with no biodiversity. Divided by 56 leaves 8,604 people denied basic needs offered by bio-diversity.

Combining the information from tables 2 and 3 we can see that:

Impact	No. of people denied basic needs
Carbon (home and transport) emissions potentially cause 4,265,200 / 600	7,109
Water emissions potentially cause (145-130)/130 x 1,250,000	144,231
Wasted materials potentially cause (141,250 tonnes/10,000 tonnes)	14
Biodiversity	8,604
Total	**159,958**

According to Maslow, in general, people must satisfy basic needs before they can satisfy higher needs, so if basic needs are not met, no other needs can be met and hence 100% of well-being is denied.

So, for the SHIFT population we can say:

1,250,000 occupiers people have 91.9% well-being, but in so doing they deny 159,958 non-occupiers 100% of well-being. Therefore the net well-being is 1,250,000 *0.919 – 159,958 * 1.00 = 988,792 Normalised for the number of people = 79.1% net well-being for this population.

In order to achieve 100% net well-being, people must be encouraged to satisfy their higher needs, whilst their environmental impacts on others must be reduced or compensated for.

To some extent the conclusion above seems obvious. However, it is a conclusion that is not arrived at by measuring financial or environmental outcomes alone. In addition, the well-being measure allows policy makers to quantify and hence manage well-being directly.

Further research

The proposed methodology is novel and many areas of research present themselves. For instance, as shown in the ONS data above, not all the required data is collected. Suggested data for each level of need are listed below in order to present ideas for further research:

Basic – calorie intake, clean water availability, air cleanliness, nutritious diet

Security –means to ensure sufficient basic needs are met for the entire lifetime of humans, crime rates, threat of invasion

Social – how many people individuals are in contact with regularly

Esteem – educational and/or vocational qualifications, competition winning or simply surveying people what they feel about their own self-esteem

Self-actualisation – hours in a day available to pursue meaningful interests – most likely survey questions

The weightings between levels also need to be established. Maslow stated that these are human needs, valid for all humans regardless of culture or values. It is therefore proposed that the weightings must also be constant for humans. It is suggested that cross-cultural sociological studies are conducted to establish these weightings.

Clearly there is also vast scope for research to convert environmental impacts into human well-being impacts.

Finances will be an issue, so economic research should be carried out to design systems such that the measure is incentivised throughout the world.

Conclusion

A new method of measuring well-being is presented. It converts detrimental environmental impacts into effects on well-being for people other than the occupiers of building. Hence, it unifies social and environmental factors, thus allowing holistic policy making and well-being management.

How the measure can be used for the built environment has also been demonstrated.

This measure should be adopted at highest levels in order for the human race to thrive within the constraints of the world's resources.

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