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Abstract

The literatures and debates on human development on the one hand and sustainability on the other share much in common. Human development is essentially what sustainability advocates want to sustain and without sustainability, human development is not true human development. Yet the two strands of research have largely been separate and this paper shows how they can learn from each other. I put forward a concrete proposal on how human development and its measurement in the form of the Human Development Index (HDI) can be linked with measures of both weak and strong sustainability. Weak sustainability is built on the assumption that different forms of capital are substitutable, whereas strong sustainability rejects the notion of substitutability for certain critical forms of natural capital. Empirical results over the period 1980 to 2006 show that many of the lowest performing countries on the HDI also face problems of weak unsustainability, as measured by genuine savings. Countries with high to very high HDI performance, on the other hand, typically appear to be strongly unsustainable, as measured by ecological footprints, mostly because of unsustainably large carbon dioxide emissions. Two of the biggest challenges facing mankind this century will be to break the link between high human development and strongly unsustainable damage to natural capital on the one hand, requiring a very significant and rapid decarbonisation of their economies, and assisting countries with very low human development to overcome weak unsustainability by raising their investment levels into all forms of capital on the other.

Keywords: weak sustainability, strong sustainability, Human Development Index, genuine savings, ecological footprints, climate change.

JEL classification: Q01, Q2, Q3, Q4

> "…there is no tension between human development and sustainable development. Both are based on the universalism of life claims." (UNDP 1994: 19)

1. Introduction

The literatures on human development and sustainable development, or sustainability for short, have long been separate. This is surprising. On a very fundamental level, human development is what sustainability proponents want to sustain and without sustainability, human development is not true human development. As UNDP (1994: 13) and Anand and Sen (2000: 2030) rightly emphasise, universalism, which can be traced back to Kant (1785), is at the heart of the concept of human development and universalism requires granting the same kind of attention to future generations as to the current one. If human development is about enabling people to lead long, healthy, educated and fulfilling lives, then sustainable human development is about making sure that future generations can do the same. But in some sense adding 'sustainable' as a prefix is superfluous, since human development without being sustainable cannot be true human development.[1]

It is the purpose of this background paper to the Twentieth Anniversary Human Development Report 2010 to demonstrate how research on human development can be better linked with research on sustainability. It is structured as follows: Section 2 discusses how the sustainability literature and the literature on human development can learn from each other. Section 3 puts forward a concrete proposal on how human development and its measurement in the form of the

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[1] It should be noted that sustainable human development is different from sustained human development. UNDP (1990: 44ff.) discusses whether countries have had durable progress in human development over the previous decades. But such sustained human development may still be unsustainable if past durable progress was achieved via the running down of existing capital stocks.

Human Development Index (HDI) can be linked with sustainability. Section 4 presents the results from the empirical implementation of the recommendations of section 3 and discusses policy implications following from the results. Section 5 concludes.

2. What the sustainability and the human development literatures can learn from each other

Enabling everyone to be capable and free to do things and be the person they want to be is the goal of human development (Haq 1995; Sen 1999; Nussbaum 2000; UNDP 2006: 2). As mentioned in the introduction, human development is in principle what sustainability proponents want to sustain. This may require some further explanation. After all, if the term "sustainable development" is further specified, it is usually done so as "sustainable economic development" rather than "sustainable human development". However, properly understood there is no real difference between economic development and human development. Providing people with the capabilities to fulfil their needs, wants and desires stands at the heart of true economic development. This is clear in the most commonly cited definition of sustainable development as "development that satisfies the needs of the present without compromising the ability of the future to meet their own needs" (WCED 1987: 43). However, it is also at least compatible with a definition of economic development as being sustainable "if it does not decrease the capacity to provide non-declining per capita utility for infinity" (Neumayer 2010: 7), which is a common economic definition of sustainable development. In fact, with their respective emphases on capabilities, ability and capacity, human development and sustainable development share the basic view that development is about enabling people. Since people derive utility from many things other than income, economic development must be about much more than raising per capita income (Layard 2006), covering instead items such as health, education, autonomy and freedom as well, which all contribute to human development.

Too often, however, the focus in the sustainability debate has been on simple consumption sustainability. Despite qualifications sometimes added that consumption is to be understood broadly, encompassing such items as "nonmarket environmental amenities and services"

(Nordhaus 2008, p. 34), the analytical focus on consumption is potentially dangerous if it detracts from the fact that development is about much more than consumption. Moreover, the sustainability debate at times regards essential items of human development, such as education to lead an informed and self-determined life, merely as instrumental, as capital with which future flows of utility can be produced.

The literature on human development with its emphasis on the multiple dimensions of development, acknowledging that income is an important determinant, but also going far beyond it, is very pertinent here. The same applies to its emphasis on education and health not just as instrumentally productive, but valuable and therefore desirable in their own right (UNDP 1994; Anand and Sen 2000). It serves to remind proponents of sustainability that the debate about *what* should be sustained is as important as *how* to sustain it.

Moreover, the literature on human development is very clear that people must have freedom and choices to fulfil their needs, desires and wants – or not. This is compatible with a definition of sustainable development as non-decreasing *capacity* to provide non-declining per capita utility for infinity quoted above. In other words, it is compatible with the so-called capital approach to sustainable development. However, sustainability is sometimes defined as non-declining per capita utility as such. While this appear as only a small semantic difference, human development serves to remind sustainability proponents that people are real people with freedoms and choices, not social welfare state clients who are allocated a certain amount of utility by the omnipotent social welfare planner.

Lastly, and following from the first point, the literature on human development reminds sustainability proponents that intra-generational equity is as important as inter-generational equity (UNDP 1994; Anand and Sen 2000). The Brundtland Commission was very clear about this. Directly following from its definition of sustainability quoted above, it argues that 'overriding priority' should be given to the 'essential needs of the world's poor' (WCED 1987: 43). Yet, the majority of the sustainability discourse tends to neglect, if not outright ignore intra-generational equity issues.

What then is needed is an open discussion of how intra- and inter-generational equity issues are linked with each other, complement each other, but also, at times, can conflict with each other. Does redistribution to the current poor harm the future by boosting current consumption spending and reducing investment for the future? Anand and Sen (2000: 2038) believe this is not necessarily the case if assisting the poor helps them build up human capital, which will then also benefit the future. However, not every policy will have a double benefit for both intra- and inter-generational equity. Some are worried that, for example, increased spending on reducing greenhouse gas emissions will take financial resources away from assisting the poor of today (World Bank 2010). This is a huge, largely unaddressed, research area, which needs to be tackled in the future, and no easy answers can be given here. A frank and open discussion of the links, complementarities and conflicts will also go some way in addressing the criticism of vagueness laid against the concept of sustainable human development (Nicholls 1999).

Sustainability proponents can be roughly divided, for analytical purposes, into those adhering more to a weak and those adhering more to a strong sustainability paradigm (Neumayer 2010). Weak sustainability (WS) is built on the assumption that natural and other forms of capital are essentially substitutable and that the only thing that matters is the total value of capital stock, which should be at least maintained or ideally added to for the sake of future generations. Strong sustainability (SS) rejects the notion of substitutability (of natural capital) and holds that certain forms of natural capital are critical and that their depletion cannot be compensated for by investment into other forms of capital, such as man-made (manufactured) and human capital.[2] I have argued elsewhere that existing empirical evidence appears to support the non-substitutability assumption of SS more strongly with respect to the role natural capital plays in absorbing pollution and providing direct utility in the form of environmental amenities, whereas empirical evidence appears to support the substitutability assumption of WS with respect to

[2] Natural capital encompasses everything in nature that provides human beings with well-being, from natural resources to environmental amenities and the pollution absorptive capacity of the environment. Man-made or manufactured capital refers to the physical means of production (factories, machineries etc.) and infrastructure. Human capital covers knowledge and skills.

natural capital as a resource input into the production of consumption goods (Neumayer 2010, chapter 4).

Interestingly, of the two major international agencies devoted to development, one (the World Bank) started out as a proponent of WS (World Bank 1992, 2002), but recently seems to have been converted to the SS camp, at least as far as climate change is concerned (World Bank 2010), while the other (the United Nations Development Programme (UNDP)) started out uncommitted (UNDP 1992, 1994), but seems to have tended toward a SS view earlier than the World Bank (UNDP 1998, 2006, 2007). Amartya Sen, in some sense the godfather of the human development approach, is somewhat ambiguous in his writings. Parts of Anand and Sen (2000) with its praise for Robert Solow's seminal contributions to WS read like an embracing of the substitutability assumption of WS, while other parts of Anand and Sen (2000) and some of his other writings (e.g., Sen 1982; Sen 2009: 248-252) read very much like a defense of SS.

It is the WS paradigm and its proponents that are often in need of being reminded that the question of what is to be sustained is as important as how to sustain it. With its Genuine Savings (GS) measure merely measuring the net change in the total capital stock, it tends to neglect or sometimes even ignore the many pertinent issues about what should be sustained, i.e. what use should be made of the total capital stock and how should the streams of utility generated from this total capital stock be distributed among individuals and groups of people (e.g., men versus women, urban versus rural, rich versus poor).

Strong sustainability proponents, I would submit, are more willing to actively discuss these issues, as becomes clear by looking at their preferred sustainability indicators (Index of Sustainable Economic Welfare and Genuine Progress Indicator), which explicitly include valuation items relating to human development more broadly and to distribution (Neumayer 2010). As the very term "Genuine Progress Indicator" indicates, there is an active and vibrant discussion among strong sustainability proponents of what constitutes genuine progress in human development. They are also much more willing to take intra-generational equity into account. Constantini and Monni's (2005: 332) verdict that a full integration of human and sustainable development is a difficult task since 'the utilitarian approach prevails throughout the whole literature on sustainable development' is too pessimistic and simply does not apply to the

strong sustainability paradigm. There is nevertheless insufficient understanding of what constitutes true human development and why this matters even among many strong sustainability proponents. For example, many ISEW/GPI studies subtract 50 per cent of education expenditure from their measure, arguing that these expenditures merely represent defensive expenditures with students being caught in a rat-race (I get a Diploma because everyone else gets a Diploma). This shows a most regrettable contempt for the enabling and empowering value of education.

3. How the measurement of human development and sustainability can be linked: a practical proposal

Having discussed the conceptual links between human development and sustainability, in this section I put forward a practical proposal for linking the measurement of human development with that of sustainability. There has been some effort devoted to this task — see Desai (1995), Dahme et al. (1998), Sagar and Najam (1998), Ramanathan (1999), De la Vega and Urrutia (2001), Morse (2003), Constantini and Monni (2005). Most of these studies are reviewed in Neumayer (2004, section 3). Given the breadth and complexity of the concept of human development, it is no wonder that the UNDP's effort at measuring human development with one single measure, the Human Development Index (HDI), has met its fair share of criticism (as reviewed in Neumayer 2001). This is not the place to explore the potential for an improved measure of human development. Rather, I simply take the HDI as a given and explore ways of linking it with sustainability.

In principle, there are two differing ways of trying to integrate sustainability concerns into measures of human development like the HDI. First, one can try to adjust the HDI itself and build sustainability into the measure by adding another item or revising an existing item to include sustainability. This is the strategy undertaken by, for example, Desai (1995), Dahme et al. (1998), de la Vega and Urrutia (2001) and Constantini and Monni (2005). Second, one can try to leave the HDI as it is, but add sustainability concerns as an external qualification to the indicated level of human development achieved. This is the strategy favoured by, for example, Neumayer (2001) and Morse (2003).

The first strategy is fraught with many problems, at least as concerns the few concrete proposals that have been ventured (see Neumayer 2001, 2004). One of the more interesting disadvantages of this strategy, which is generic and independent of any concrete proposal, is that it can only accommodate weak sustainability. To see this, one need only have a quick look at how the HDI is computed. The HDI consists of three components (UNDP 2008: 356). For two components a transformed variable is derived from basic data. For the income component a log transformation is applied, in effect discounting higher incomes due to supposed diminishing marginal utility. For the educational component the transformed variable consists to two thirds of the percentage rate of literate adults among all adults and to one third of the combined first-, second- and third-level educational gross enrolment ratio in per cent. The health/longevity component is directly measured by life expectancy at birth in years. For each variable a maximum and a minimum is defined. An index is then calculated as follows:

$$X\_index = \frac{(\text{actual value} - \text{minimum value})}{(\text{maximum value} - \text{minimum value})},$$

X = (Income, Longevity, Education)

This index is calculated for each variable. Since the maximum values are chosen such that they are higher than or equal to the actual value a country can possibly achieve, every country's index for each variable lies between zero and one. A country's HDI is then simply the arithmetic average of its three indexes:

$$HDI = \frac{1}{3} \cdot (Income\_index + Longevity\_index + Education\_index)$$

It follows that the HDI as well lies between zero and one and countries are ranked according to how close their HDI is to one.

Because individual items are added up to arrive at the overall HDI, substitutability among the items is assumed (Desai (1991: 356) and Sagar and Najam (1998: 251) come to the same conclusion). It is, for example, possible to compensate for relatively low per capita income with relatively good levels of education and health, as the example of Cuba shows, which ranked in

the 51st position in 2007, being classified as high human development despite a low per capita income (ranked in 95th position on income only). For the same reason it would be possible to compensate a low achievement on the sustainability component with high achievement on any of the non-sustainability components – thus in effect allowing substitutability in the spirit of the WS paradigm.

I therefore follow the second strategy here, not least because it allows me to relate the HDI to both WS and SS. I update the analysis in Neumayer (2001) to the year 2006, the latest year with available data. I extend the analysis in two ways. First, rather than providing an analysis for one single year (1998), I cover the full existing time period, for which an HDI has been computed with a consistent methodology (1980, 1985, 1990, 1995, 2000, 2005 and 2006).[3] Second, in addition to providing a WS qualification to the HDI as in Neumayer (2001), I also provide a SS qualification.

WS is typically measured by what is known as genuine savings (GS), genuine investment or adjusted net savings. The most comprehensive data on GS is provided by the World Bank (2009), covering most countries in the world from 1970 onwards. GS is computed by the World Bank as follows: net savings is gross domestic savings (including current education expenditures) minus depreciation of man-made capital; GS is net savings minus depreciation of natural capital from the depletion of natural resources minus damage caused by CO2 emissions minus, for a few mostly developed countries and more recent years, damage caused by suspended particulate matter emissions. Education expenditures, both current and investment expenditures, are used as a proxy for the increase in human capital. The method used for computing depreciation of natural capital from the depletion of natural resources is to take the price of the resource minus the average cost of extraction and multiplying this by the total

[3] To see how the HDI methodology has changed over time refer to McGillivray and White (1993, pp. 183-185) and Hicks (1997, pp. 1284-1286). For a discussion of how the HDI relates to other measures, see, for example, Doessel and Gounder (1994).

amount of the resource extracted. Resources cover oil, natural gas, hard coal, brown coal, bauxite, copper, iron, lead, nickel, zinc, phosphate, tin, gold, silver and forests.

The GS measure is not without problems. First, the method for calculating depreciation of natural capital arguably over-estimates depreciation of the natural capital stock (Neumayer 2000, 2010), but will be followed here since computing depreciation according to the competing 'El Serafy method' (El Serafy 1981) is far too data intensive, requiring information on natural reserve stocks for a cross-national time-series sample, which is almost impossible to get. Second, the coverage of non-renewable and, particularly, of renewable resources needs to be extended if enough data of sufficient quality can be established. The lack of diamonds for example is an important omission given the importance that diamond mining has in some countries such as Botswana. Forests are an important renewable resource, but not the only one. If possible, resources like water, soil, fish and, more generally, biodiversity should be included. Third, loss of natural capital due to environmental pollution is currently under-estimated since only one or two pollutants are included. Ideally, damage from emissions of, for example, sulphur oxides, nitrogen oxides, fecal coliforms and particulate matter (for non-developed countries) should also be included. That the countries with high to very high human development typically are not detected as having problems with WS is mostly to be explained by their typically high net saving rates, but their performance would no longer look quite so outstandingly good if more pollutants were taken into account. The UNDP (1998, p. 66) correctly argues that 'it is the rich who pollute more (…) who generate more waste and put more stress on nature's sink'. The World Bank's GS measure currently covers only carbon emissions for all countries, with CO_2 emissions being valued at US$20 per metric tonne of carbon, taken from Fankhauser (1995). Whilst this was a median estimate of older studies, by using this somewhat outdated estimate the Bank is likely to underestimate the damage caused by CO_2 emissions in the light of more recent scientific evidence and economic studies – see Stern (2007).

Despite these problems, the World Bank's published figures are the only ones available for a large sample of countries over a long period of time. They are therefore used here. Weak unsustainability is detected if GS is 'persistently' below zero, where the term persistently is somewhat vague, but usually meant to represent a number of years.

Contrary to WS, there is no commonly agreed upon measure of SS (Neumayer 2010). As mentioned already, the Index of Sustainable Economic Welfare (ISEW) or Genuine Progress Indicator (GPI) is quite popular, but it is very data-intensive and only available for a few countries (see Neumayer 2010). The most popular measure with good country coverage seems to be ecological footprints (EF) – despite the many methodological criticisms that can be raised against it (van den Bergh and Verbruggen 1999, Ayres 2000, IMV 2002, Grazi et al. 2007, Fiala 2008, and Neumayer 2010: 172-174). EF's objective is to translate all the ecological impact of human economic activity into the 'area required to provide the resources we use and to absorb our waste' (WWF 2008, p. 14), subject to the 'predominant management and production practices in any given year' (Wackernagel et al. 2002, p. 9266). Since the focus is on consumption, the required land area is attributed to the consumer rather than the producer since the consumer rather than the producer is deemed responsible for the impact. That is, for example, resources extracted in a developing country, but exported to a developed country, count towards the EF of the developed country. This stands in stark contrast to GS, which attributes natural capital depreciation from resource extraction to the extracting, not the consuming country according to the capital maintenance principle. Land rather than money is taken as the unit of accounting in EF since according to its proponents 'monetary analysis is misleading as it suggests substitutability, allows for the discounting of the future and focuses on marginal rather than absolute values' (Wackernagel et al. 1999, pp. 376f). Much criticism has concentrated on the energy or carbon footprint, which constitutes the main component of the EF of most countries. In particular, critics have argued that there are much less land-intensive ways of sequestering or avoiding carbon emissions than (hypothetical) afforestation (IMV 2002) and that for many countries EF tells us little else than that the country's carbon emissions are unsustainably high, i.e. go beyond the regenerative capacity of the atmosphere (Neumayer 2010). It is also arguable that by simply switching from money to land area as the measuring rod for one single overall indicator, implicitly EF also allows for substitutability at least within natural capital, which is likely to be problematic in the SS paradigm (ibid.). As an indication of strong sustainability, I follow Moran et al.'s (2008, p. 470) suggestion that 'a per capita Ecological

Footprint less than the globally available biocapacity per person' represents a minimum requirement 'for sustainable development that is globally replicable'.[4] WWF (2008) estimates this globally available biocapacity to be 2.1 global hectares per person.

Note that EFs, the measure of SS, measures a country's contribution to global strong sustainability (or rather global strong unsustainability), not how a country is affected by patterns of global unsustainability. For example, Bangladesh and many of the low-lying islands like the Maldives are likely to become major victims of the strong unsustainability of others in the future in the form of sea-level rise, increased intensity and/or frequency of storms leading to floods etc. without themselves having unsustainably high ecological footprints. What matters to these countries is whether globally there is strong unsustainability in the form of, for example, unsustainably high greenhouse gas emissions, not so much their own contribution to it. Genuine Savings, the measure of WS, similarly looks at national performance only without regard to global patterns and trends of, for example, natural resource extraction. This is less problematic, however, since according to the substitutability assumption of WS the only relevant question is whether countries sufficiently invest their proceeds from natural capital depreciation into other forms of capital, not whether other countries do so. Of course, the proceeds from natural capital depreciation are not entirely independent of the decisions of others, but countries are more autonomous in their quest for achieving WS than in their quest for achieving SS.

Both sustainability measures have trouble in properly accounting for technical progress. Such progress will be included in the GS measure if it is embodied in the value of investment in man-made capital. However, so-called autonomous or Hicks-neutral technical progress that is independent of the accumulation of man-made capital is not captured. It is therefore possible to be weakly sustainable despite negative GS rates if there is sufficient Hicks-neutral technical progress as such progress allows generating the same or even rising levels of utility from a diminishing capital stock. Note, though, that population growth, which is also not accounted for in the GS figures published by the World Bank, represents a force in the opposite direction. Even a non-declining or even rising capital stock may not guarantee weak sustainability if the capital

[4] Morse (2003) similarly discusses the idea of linking the HDI to EF.

stock needs to be shared amongst more and more people. Ecological footprints, the measure of strong sustainability, is a static measure that relies on the state of technology of today. It is not forward-looking and cannot take into account future technical progress. It thus has to be seen as indicating strong unsustainability conditional on the current state of technology.

4. Empirical Results and Policy Recommendations

Table 1 shows the development of the HDI for all countries with available data over the period 1980 to 2006, sorted according to their HDI value in 2007.[5] HDI values in bold are those, which have negative GS and are thus questionable in terms of WS. In other words, the achieved level of human development as indicated by the relevant HDI may not be sustainable, even according to the weak sustainability paradigm, which assumes full substitutability of all forms of capital. HDI values in grey shading are those, which have EF per capita above the globally available biocapacity per person and are thus questionable in terms of SS. In other words, the achieved level of human development as indicated by the relevant HDI may not be strongly sustainable, i.e. is likely to run down critical forms of natural capital. HDI values that are both bold and in grey shading are those which have both negative GS and EF above the globally available biocapacity per person. HDI values that are single underlined are those for which no GS data were available, while those with double underlining are those for which no EF data were available. When the HDI value is set in italic, then data for both GS and EF are missing.

A number of interesting observations follow from these results. First, without exception countries with very high human development are not strongly sustainable as indicated by EF. The same holds true for most countries with high human development. This is predominantly

[5] HDI data taken from UNDP 2009, GS data taken from World Bank 2009; data on ecological footprints, based on the 2008 edition of the National Footprint Account of the Global Footprint Network, kindly provided by Nic Marks from the New Economics Foundation (NEF), London, complemented by information taken from www.footprintnetwork.org and WWF (2008).

due to greenhouse emissions per capita far in excess of the natural absorptive capacity of the atmosphere. This is confirmed by a robustness test provided in table 3, which replaces EF as a measure of SS with carbon dioxide emissions per capita, where a per capita emission level above 2 metric tons, roughly consistent with an atmospheric concentration target of 450 parts per million, is taken as the unsustainability threshold.[6] While a few countries switch from strongly unsustainable to sustainable or vice versa, by and large the results are very similar, which buttresses the argument made by some critics, including this author (Neumayer 2010), that EF measures little beyond unsustainably large carbon emissions.

Second, without exception countries with very high human development do not face any problems with weak sustainability. This is because of their investment rates into man-made and human capital. Instead, weak unsustainability as indicated by GS is relatively common in countries of low and medium human development, but countries dependent on natural resource extraction with high human development also often have negative GS. In the case of Sub-Saharan Africa, from which many countries with negative GS come from, a more detailed analysis shows that even their net savings, that is before natural capital depreciation, is often already negative such that their economies are on a weakly unsustainable path quite independently of depreciation due to natural resource exploitation (Neumayer 2000). Third, unsustainably large EFs and, if much less so, unsustainably low GS are often a persistent phenomenon in the sense that unsustainability in one year is followed by unsustainability in following years.

A number of important policy conclusions follow from these results. First, one of the biggest challenges of this century will be to break the link between high and very high levels of human development and strong unsustainability. In other words, nations must find ways to achieve high and very high levels of human development without running down critical forms of natural capital. We know they can do it for some forms of natural capital, e.g. water resources (UNDP 2006), but the move to a very low carbon economy will prove one of the biggest challenges ahead (UNDP 2007; World Bank 2010).

[6] Data taken from the World Development Indicators Online Database.

Second, another big challenge for this century is to raise GS in those countries with negative GS, particularly so for the ones with low human development. The situation in the latter group of countries is nothing short of horrendous. Not only do people in these countries suffer from low income levels, lack of education, poor health and low life expectancy, but these low levels of human development may not even be sustainable into the future, even under the optimistic substitutability assumption of WS, which will often not hold in these countries (UNDP 2006, 2007; World Bank 2010). Moreover, with few exceptions, these countries also suffer from bad governance, which in turn causes low or negative GS (Dietz et al. 2007), low levels of human security and outright warfare (Collier 2007). For the vast majority of people living in these countries, life is indeed "short, nasty and brutish", as Thomas Hobbes coined it, and the future may look even more bleak, if the signal from the GS measure – that even this low level of human development is not sustainable into the future – is correct.

To raise GS, a country needs to invest more and consume less. Clearly, this is not a viable or human development compatible policy recommendation for very poor weakly unsustainable countries since this would impose the burden of achieving weak sustainability on the poor and most vulnerable – unless, of course, the resources for additional investment can be raised from outside these countries. The countries with higher human development cannot simply ignore these problems in countries with low human development. In other words, difficult as this is, countries with high human development face the double challenge of achieving strong sustainability for themselves and helping other countries, often those with low or relatively low human development, achieve at least weak sustainability in the first place and then strong sustainability eventually. This assistance needs to be designed such that policies move towards better resource management and a higher saving rate. Merely granting countries better access to foreign financing can be counter-productive, reducing rather than raising a nation's saving rate, for example if aid flows finance consumption instead of productive investments (Easterly 2006). An opening of markets toward exports from countries with low GS may help them diversify their economies away from dependence on natural resource extraction, which often drives low or negative GS rates – even though the World Bank figures are likely to over-estimate the extent to which natural resource extraction leads to weak unsustainability (Neumayer 2000). Furthermore, there is evidence that countries more open to trade have higher GS rates (De Soysa and

Neumayer 2005). However, for trade liberalization to promote human development as well as stronger forms of sustainability, it needs to be accompanied by appropriate policies to protect the poor and vulnerable as well as by environmental protection policies (Cosbey 2004).

5. Conclusions

In this background paper, I have argued that, properly understood, there is no real difference between human development and sustainable development. Yet, in much of the literature on human development on the one hand and sustainable development on the other there is little recognition of these commonalities and I have therefore put forward several areas and considerations, where the sustainability and the human development literatures can learn from each other. I have put forward a concrete and practical proposal on how the measurement of human development in the form of the Human Development Index (HDI) can be linked to both weak and strong sustainability. Adding an external sustainability qualification to the achieved level of human development, as indicated by the HDI, was argued to be superior to attempts to include sustainability considerations directly into the HDI.

If the proposal for linking the measurement of human development with sustainability put forward in this paper is to be taken seriously, then the coverage of countries for which data on genuine savings and the ecological footprints, the measures of weak and strong sustainability, are available, needs to be extended and needs to be matched with the HDI database so as to include all countries that are covered by the HDI. It will only make sense to indicate potential unsustainability of the achieved human development if this exercise is undertaken for all countries. Moreover, the many problems with both measures of unsustainability need to be addressed. But such methodological deficiencies should not distract from the main picture. Whatever the specific shortcomings of the empirical exercise, results clearly showed that, without exception, countries with very high human development as well as most countries with high human development do not achieve strong sustainability, as indicated by ecological footprints per capita. Their model of human development is therefore not to be recommended to other countries, at least not if one subscribes to the strong sustainability view that certain forms

of natural capital are non-substitutable. One of the biggest challenges of this century will be breaking the link between high to very high levels of human development and strong unsustainability, particularly in the form of unsustainably high greenhouse gas emissions.

Results also showed that countries economically dependent on the extraction of natural resources often face difficulties with achieving weak sustainability, as measured by genuine savings. Many of these countries have low to lower medium levels of human development. This raises the truly disconcerting possibility that even the relatively low levels of human development achieved in these countries are precarious and may not be sustainable into the future at current rates of (under-)investment of the proceeds from natural resource extraction into other forms of capital. Another big challenge of this century will therefore be raising genuine saving rates in these weakly unsustainable countries – a task that will often require the assistance by the countries of high to very high human development, which thus face the double challenge of achieving strong sustainability for themselves and helping others to achieve weak sustainability.

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Table 1. The HDI of countries and their WS and SS status (EF as measure of SS).

HDI rank	Country	1980	1985	1990	1995	2000	2005	2006
VERY HIGH HUMAN DEVELOPMENT								
1	Norway	0.900	0.912	0.924	0.948	0.961	0.968	0.970
2	Australia	0.871	0.883	0.902	0.938	0.954	0.967	0.968
3	Iceland	0.886	0.894	0.913	0.918	0.943	0.965	0.967
4	Canada	0.890	0.913	0.933	0.938	0.948	0.963	0.965
5	Ireland	0.840	0.855	0.879	0.903	0.936	0.961	0.964
6	Netherlands	0.889	0.903	0.917	0.938	0.950	0.958	0.961
7	Sweden	0.885	0.895	0.906	0.937	0.954	0.960	0.961
8	France	0.876	0.888	0.909	0.927	0.941	0.956	0.958
9	Switzerland	0.899	0.906	0.920	0.931	0.948	0.957	0.959
10	Japan	0.887	0.902	0.918	0.931	0.943	0.956	0.958
11	Luxembourg	..	..	..	..	..	0.956	0.959
12	Finland	0.865	0.882	0.904	0.916	0.938	0.952	0.955
13	United States	0.894	0.909	0.923	0.939	0.949	0.955	0.955
14	Austria	0.865	0.878	0.899	0.920	0.940	0.949	0.952
15	Spain	0.855	0.869	0.896	0.914	0.931	0.949	0.952
16	Denmark	0.882	0.891	0.899	0.917	0.936	0.950	0.953
17	Belgium	0.871	0.885	0.904	0.933	0.945	0.947	0.951
18	Italy	0.857	0.866	0.889	0.906	0.927	0.947	0.950
19	Liechtenstein	..	..	..	..	..	..	0.950
20	New Zealand	0.863	0.874	0.884	0.911	0.930	0.946	0.948
21	United Kingdom	0.861	0.870	0.891	0.929	0.932	0.947	0.945
22	Germany	0.869	0.877	0.896	0.919	..	0.942	0.945
23	Singapore	0.785	0.805	0.851	0.884	..	..	0.942
24	Hong Kong, China (SAR)	..	..	..	..	..	0.939	0.943
25	Greece	0.844	0.857	0.872	0.874	0.895	0.935	0.938
26	Korea (Republic of)	0.722	0.760	0.802	0.837	0.869	0.927	0.933
27	Israel	0.829	0.853	0.868	0.883	0.908	0.929	0.932
28	Andorra	..	..	..	..	..	..	0.933
29	Slovenia	..	..	0.853	0.861	0.892	0.918	0.924
30	Brunei Darussalam	0.827	0.843	0.876	0.889	0.905	0.917	0.919
31	Kuwait	0.812	0.826	..	0.851	0.874	0.915	0.912
32	Cyprus	..	..	0.849	0.866	0.897	0.908	0.911
33	Qatar	..	..	..	..	0.870	0.903	0.905
34	Portugal	0.768	0.789	0.833	0.870	0.895	0.904	0.907
35	United Arab Emirates	0.743	0.806	0.834	0.845	0.848	0.896	0.896

36	Czech Republic	..	..	0.847	0.857	0.868	0.894	0.899
37	Barbados	..	..	..	..	..	0.890	0.891
38	Malta	..	0.809	0.836	0.856	0.874	0.897	0.899
HIGH HUMAN DEVELOPMENT								
39	Bahrain	0.761	0.784	0.829	0.850	0.864	0.888	0.894
40	Estonia	..	..	0.817	0.796	**0.835**	**0.872**	**0.878**
41	Poland	..	..	0.806	0.823	0.853	0.871	0.876
42	Slovakia	..	..	..	0.827	0.840	0.867	0.873
43	Hungary	0.802	0.813	0.812	0.816	0.844	0.874	0.878
44	Chile	**0.748**	**0.762**	0.795	0.822	0.849	**0.872**	**0.874**
45	Croatia	..	..	0.817	0.811	0.837	0.862	0.867
46	Lithuania	..	..	0.828	0.791	**0.830**	0.862	0.865
47	Antigua and Barbuda	..	..	..	..	..	..	*0.860*
48	Latvia	..	..	0.803	**0.765**	0.810	0.852	0.859
49	Argentina	0.793	0.797	0.804	0.824	..	0.855	0.861
50	Uruguay	0.776	0.783	0.802	0.817	0.837	0.855	0.860
51	Cuba	..	..	..	..	..	0.839	0.856
52	Bahamas	..	..	..	..	..	0.852	0.854
53	Mexico	**0.756**	**0.768**	0.782	0.794	0.825	0.844	0.849
54	Costa Rica	0.763	0.770	0.791	0.807	0.825	0.844	0.849
55	Libyan Arab Jamahiriya	..	..	..	..	0.821	0.837	0.842
56	Oman	..	..	..	..	..	0.836	0.843
57	Seychelles	..	..	..	..	0.841	**0.838**	0.841
58	Venezuela (Bolivarian Republic of)	**0.765**	**0.765**	**0.790**	**0.793**	0.802	**0.822**	**0.833**
59	Saudi Arabia	..	..	**0.744**	**0.765**	..	0.837	0.840
60	Panama	0.759	0.769	0.765	0.784	0.811	0.829	0.834
61	Bulgaria	..	..	..	..	0.803	0.829	0.835
62	Saint Kitts and Nevis	..	..	..	..	..	*0.831*	*0.835*
63	Romania	..	..	0.786	0.780	0.788	**0.824**	**0.832**
64	Trinidad and Tobago	**0.794**	**0.791**	**0.796**	**0.797**	**0.806**	**0.825**	0.832
65	Montenegro	..	..	..	..	0.815	0.823	0.828
66	Malaysia	0.666	0.689	0.737	0.767	0.797	0.821	0.825
67	Serbia	..	..	..	..	0.797	0.817	0.821
68	Belarus	..	..	0.795	0.760	0.786	0.812	0.819
69	Saint Lucia	..	..	..	..	..	*0.817*	*0.821*
70	Albania	..	..	..	..	0.784	0.811	0.814
71	Russian Federation	..	..	0.821	0.777	..	**0.804**	**0.811**
72	Macedonia (Former Yugoslav Rep. of)	..	..	..	0.782	0.800	0.810	0.813
73	Dominica	..	..	..	..	..	*0.814*	*0.814*

74	Grenada	..	..	..	..	..	*0.812*	*0.810*
75	Brazil	0.685	0.694	0.710	0.734	0.790	0.805	0.808
76	Bosnia and Herzegovina	..	..	..	..	..	0.803	0.807
77	Colombia	0.688	0.698	0.715	0.757	**0.772**	0.795	0.800
78	Peru	0.687	0.703	0.708	0.744	0.771	0.791	**0.799**
79	Turkey	0.628	0.674	0.705	0.730	0.758	0.796	0.802
80	Ecuador	**0.709**	**0.723**	**0.744**	**0.758**	..	..	**0.805**
81	Mauritius	..	..	0.718	0.735	0.770	0.797	0.801
82	Kazakhstan	..	..	0.778	**0.730**	**0.747**	**0.794**	**0.800**
83	Lebanon	..	..	..	..	..	**0.800**	**0.800**
MEDIUM HUMAN DEVELOPMENT								
84	Armenia	..	..	0.731	**0.693**	**0.738**	0.777	0.787
85	Ukraine	..	..	..	..	**0.754**	0.783	0.789
86	Azerbaijan	..	..	..	..	..	**0.755**	**0.773**
87	Thailand	0.658	0.684	0.706	0.727	0.753	0.777	0.780
88	Iran (Islamic Republic of)	0.561	0.620	0.672	**0.712**	**0.738**	**0.773**	**0.777**
89	Georgia	..	..	..	..	0.739	0.765	**0.768**
90	Dominican Republic	0.640	0.659	0.667	0.686	0.748	0.765	0.771
91	Saint Vincent and the Grenadines	..	..	..	..	..	***0.763***	0.767
92	China	0.533	0.556	0.608	0.657	0.719	0.756	0.763
93	Belize	..	..	0.705	0.723	0.735	0.770	0.770
94	Samoa	..	0.686	0.697	0.716	0.742	0.764	0.766
95	Maldives	..	..	..	*0.683*	*0.730*	*0.755*	*0.765*
96	Jordan	0.631	0.638	0.666	0.656	0.691	0.764	0.767
97	Suriname	..	..	..	..	..	0.759	0.765
98	Tunisia	..	0.605	0.627	0.654	0.678	0.758	0.763
99	Tonga	..	..	..	..	0.759	0.765	0.767
100	Jamaica	..	..	..	..	0.750	0.765	0.768
101	Paraguay	0.677	0.677	0.711	0.726	0.737	0.754	0.757
102	Sri Lanka	0.649	0.670	0.683	0.696	0.729	0.752	0.755
103	Gabon	..	..	..	**0.748**	**0.735**	**0.747**	**0.750**
104	Algeria	..	0.628	0.647	**0.653**	**0.713**	**0.746**	**0.749**
105	Philippines	0.652	0.651	0.697	0.713	0.726	0.744	0.747
106	El Salvador	0.573	**0.585**	**0.660**	0.691	0.704	0.743	0.746
107	Syrian Arab Republic	**0.603**	0.625	**0.626**	**0.649**	**0.715**	**0.733**	**0.738**
108	Fiji	..	..	..	..	..	***0.744***	0.744
109	Turkmenistan	..	..	..	..	..	..	0.739
110	Occupied Palestinian Territories	..	..	..	..	..	0.736	0.737
111	Indonesia	0.522	0.562	0.624	0.658	0.673	0.723	0.729
112	Honduras	0.567	0.593	0.608	0.623	0.690	0.725	0.729

113	Bolivia	0.560	0.577	0.629	0.653	0.699	0.723	0.726
114	Guyana	..	..	..	..	..	0.722	0.721
115	Mongolia	..	..	..	..	0.676	0.713	0.720
116	Viet Nam	..	0.561	0.599	0.647	0.690	0.715	0.720
117	Moldova	..	..	0.735	0.682	0.683	0.712	0.718
118	Equatorial Guinea	..	..	..	..	**0.655**	**0.715**	**0.712**
119	Uzbekistan	..	..	..	..	**0.687**	**0.703**	**0.706**
120	Kyrgyzstan	..	..	..	..	0.687	0.702	**0.705**
121	Cape Verde	..	..	0.589	0.641	0.674	0.692	0.704
122	Guatemala	0.531	**0.538**	0.555	0.621	0.664	0.691	0.696
123	Egypt	0.496	0.552	**0.580**	0.631	0.665	**0.696**	**0.700**
124	Nicaragua	**0.565**	0.569	**0.573**	**0.597**	0.667	0.691	0.696
125	Botswana	0.539	0.579	0.682	0.665	0.632	0.673	0.683
126	Vanuatu	..	..	..	..	0.663	0.681	0.688
127	Tajikistan	..	..	0.707	0.636	**0.641**	0.677	0.683
128	Namibia	..	..	0.657	0.675	0.661	0.672	0.678
129	South Africa	0.658	0.680	0.698	..	0.688	0.678	**0.680**
130	Morocco	0.473	0.499	0.518	0.562	0.583	0.640	0.648
131	Sao Tome and Principe	..	..	..	..	..	0.639	0.645
132	Bhutan	..	..	..	..	..	0.602	0.608
133	Lao People's Democratic Republic	..	..	..	0.518	0.566	0.607	0.613
134	India	0.427	0.453	0.489	0.511	0.556	0.596	0.604
135	Solomon Islands	..	..	..	..	..	*0.599*	*0.604*
136	Congo	..	..	**0.597**	**0.575**	**0.536**	**0.600**	**0.603**
137	Cambodia	..	..	..	..	0.515	0.575	0.584
138	Myanmar	..	0.492	0.487	0.506	..	0.583	0.584
139	Comoros	0.447	0.461	***0.489***	*0.513*	*0.540*	*0.570*	***0.573***
140	Yemen	..	..	..	0.486	0.522	0.562	0.568
141	Pakistan	**0.402**	0.423	0.449	0.469	..	0.555	0.568
142	Swaziland	0.535	0.587	0.619	0.626	0.598	0.567	0.569
143	Angola	..	..	..	..	..	0.541	0.552
144	Nepal	0.309	0.342	0.407	0.436	0.500	0.537	0.547
145	Madagascar	..	..	..	..	0.501	0.532	0.537
146	Bangladesh	**0.328**	0.351	0.389	0.415	0.493	0.527	0.535
147	Kenya	..	..	..	..	0.522	0.530	0.535
148	Papua New Guinea	0.418	0.427	0.432	0.461	..	0.532	0.536
149	Haiti	0.433	0.442	0.462	0.483	..	..	0.526
150	Sudan	..	..	..	..	**0.491**	**0.515**	**0.526**
151	Tanzania (United Republic of)	..	..	0.436	**0.425**	0.458	0.510	0.519
152	Ghana	..	..	..	..	0.495	0.512	0.518

153	Cameroon	**0.460**	0.498	0.485	**0.457**	**0.513**	**0.520**	**0.519**
154	Mauritania	..	..	..	..	**0.495**	**0.511**	**0.519**
155	Djibouti	..	..	..	..	..	0.513	0.517
156	Lesotho	..	..	..	..	0.533	0.508	0.511
157	Uganda	..	..	**0.392**	**0.389**	**0.460**	0.494	0.505
158	Nigeria	..	..	0.438	**0.450**	**0.466**	**0.499**	**0.506**
LOW HUMAN DEVELOPMENT								
159	Togo	0.404	0.387	0.391	0.404	..	0.495	0.498
160	Malawi	..	0.379	0.390	**0.453**	**0.478**	0.476	0.484
161	Benin	**0.351**	**0.364**	0.384	0.411	0.447	0.481	0.487
162	Timor-Leste	..	..	..	..	..	0.488	0.484
163	Côte d'Ivoire	..	..	**0.463**	0.456	0.481	0.480	**0.482**
164	Zambia	..	..	**0.495**	**0.454**	**0.431**	**0.466**	**0.473**
165	Eritrea	..	..	..	..	0.431	0.466	0.467
166	Senegal	..	..	**0.390**	0.399	0.436	0.460	0.462
167	Rwanda	0.357	0.361	0.325	0.306	0.402	0.449	0.455
168	Gambia	..	..	..	..	..	0.450	0.453
169	Liberia	0.365	0.370	0.325	0.280	0.419	0.427	0.434
170	Guinea	..	..	..	..	..	**0.426**	**0.433**
171	Ethiopia	..	..	..	0.308	0.332	0.391	**0.402**
172	Mozambique	0.280	0.258	0.273	**0.310**	**0.350**	**0.390**	**0.397**
173	Guinea-Bissau	**0.256**	0.278	0.320	0.349	**0.370**	0.386	0.391
174	Burundi	0.268	0.292	0.327	**0.299**	**0.358**	**0.375**	**0.387**
175	Chad	..	..	..	0.324	0.350	**0.394**	**0.393**
176	Congo (Democratic Republic of the)	..	..	..	..	**0.353**	**0.370**	**0.371**
177	Burkina Faso	0.248	0.264	0.285	0.297	0.319	0.367	0.384
178	Mali	**0.245**	**0.239**	0.254	0.267	0.316	0.361	0.366
179	Central African Republic	**0.335**	0.344	**0.362**	0.347	0.378	0.364	0.367
180	Sierra Leone	..	..	..	..	..	0.350	0.357
181	Afghanistan	..	..	..	..	..	0.347	0.350
182	Niger	..	..	..	..	**0.258**	0.330	0.335

Note: ..: HDI data missing; bold: negative GS; grey shaded: EF per capita above global biocapacity; single underlined: GS data missing; italics: EF data missing; double underlined: GS & EF data missing

Table 3. The HDI of countries and their WS and SS status (CO_2 p.c. emissions as measure of SS).

HDI rank	Country	1980	1985	1990	1995	2000	2005	2006
VERY HIGH HUMAN DEVELOPMENT								
1	Norway	0.9	0.912	0.924	0.948	0.961	0.968	0.97
2	Australia	0.871	0.883	0.902	0.938	0.954	0.967	0.968
3	Iceland	0.886	0.894	0.913	0.918	0.943	0.965	0.967
4	Canada	0.89	0.913	0.933	0.938	0.948	0.963	0.965
5	Ireland	0.84	0.855	0.879	0.903	0.936	0.961	0.964
6	Netherlands	0.889	0.903	0.917	0.938	0.95	0.958	0.961
7	Sweden	0.885	0.895	0.906	0.937	0.954	0.96	0.961
8	France	0.876	0.888	0.909	0.927	0.941	0.956	0.958
9	Switzerland	0.899	0.906	0.92	0.931	0.948	0.957	0.959
10	Japan	0.887	0.902	0.918	0.931	0.943	0.956	0.958
11	Luxembourg	..	..	..	..	..	0.956	0.959
12	Finland	0.865	0.882	0.904	0.916	0.938	0.952	0.955
13	United States	0.894	0.909	0.923	0.939	0.949	0.955	0.955
14	Austria	0.865	0.878	0.899	0.92	0.94	0.949	0.952
15	Spain	0.855	0.869	0.896	0.914	0.931	0.949	0.952
16	Denmark	0.882	0.891	0.899	0.917	0.936	0.95	0.953
17	Belgium	0.871	0.885	0.904	0.933	0.945	0.947	0.951
18	Italy	0.857	0.866	0.889	0.906	0.927	0.947	0.95
19	Liechtenstein	..	..	..	..	..	..	0.95
20	New Zealand	0.863	0.874	0.884	0.911	0.93	0.946	0.948
21	United Kingdom	0.861	0.87	0.891	0.929	0.932	0.947	0.945
22	Germany	0.869	0.877	0.896	0.919	..	0.942	0.945
23	Singapore	0.785	0.805	0.851	0.884	..	..	0.942
24	Hong Kong, China (SAR)	..	..	..	..	..	0.939	0.943
25	Greece	0.844	0.857	0.872	0.874	0.895	0.935	0.938
26	Korea (Republic of)	0.722	0.76	0.802	0.837	0.869	0.927	0.933
27	Israel	0.829	0.853	0.868	0.883	0.908	0.929	0.932
28	Andorra	..	..	..	..	..	..	0.933
29	Slovenia	..	..	0.853	0.861	0.892	0.918	0.924
30	Brunei Darussalam	0.827	0.843	0.876	0.889	0.905	0.917	0.919
31	Kuwait	0.812	0.826	..	0.851	0.874	0.915	0.912
32	Cyprus	..	..	0.849	0.866	0.897	0.908	0.911
33	Qatar	..	..	..	..	0.87	0.903	0.905
34	Portugal	0.768	0.789	0.833	0.87	0.895	0.904	0.907

35	United Arab Emirates	0.743	0.806	0.834	0.845	0.848	0.896	0.896
36	Czech Republic	..	..	0.847	0.857	0.868	0.894	0.899
37	Barbados	..	..	..	..	..	0.89	0.891
38	Malta	..	0.809	0.836	0.856	0.874	0.897	0.899
HIGH HUMAN DEVELOPMENT								
39	Bahrain	0.761	0.784	0.829	0.85	0.864	0.888	0.894
40	Estonia	..	..	0.817	0.796	**0.835**	**0.872**	**0.878**
41	Poland	..	..	0.806	0.823	0.853	0.871	0.876
42	Slovakia	..	..	..	0.827	0.84	0.867	0.873
43	Hungary	0.802	0.813	0.812	0.816	0.844	0.874	0.878
44	Chile	**0.748**	**0.762**	0.795	0.822	0.849	**0.872**	**0.874**
45	Croatia	..	..	0.817	0.811	0.837	0.862	0.867
46	Lithuania	..	..	0.828	0.791	**0.83**	0.862	0.865
47	Antigua and Barbuda	..	..	..	..	..	..	0.86
48	Latvia	..	..	0.803	**0.765**	0.81	0.852	0.859
49	Argentina	0.793	0.797	0.804	0.824	..	0.855	0.861
50	Uruguay	0.776	0.783	0.802	0.817	0.837	0.855	0.86
51	Cuba	..	..	..	..	..	0.839	0.856
52	Bahamas	..	..	..	..	..	0.852	0.854
53	Mexico	**0.756**	**0.768**	0.782	0.794	0.825	0.844	0.849
54	Costa Rica	0.763	0.77	0.791	0.807	0.825	0.844	0.849
55	Libyan Arab Jamahiriya	..	..	..	..	0.821	0.837	0.842
56	Oman	..	..	..	..	..	0.836	0.843
57	Seychelles	..	..	..	..	0.841	**0.838**	0.841
58	Venezuela (Bolivarian Republic of)	**0.765**	**0.765**	**0.79**	**0.793**	0.802	**0.822**	**0.833**
59	Saudi Arabia	..	..	**0.744**	**0.765**	..	0.837	0.84
60	Panama	0.759	0.769	0.765	0.784	0.811	0.829	0.834
61	Bulgaria	..	..	..	..	0.803	0.829	0.835
62	Saint Kitts and Nevis	..	..	..	..	..	0.831	0.835
63	Romania	..	..	0.786	0.78	0.788	**0.824**	**0.832**
64	Trinidad and Tobago	**0.794**	**0.791**	**0.796**	**0.797**	**0.806**	**0.825**	0.832
65	Montenegro	..	..	..	..	0.815	0.823	0.828
66	Malaysia	0.666	0.689	0.737	0.767	0.797	0.821	0.825
67	Serbia	..	..	..	..	0.797	0.817	0.821
68	Belarus	..	..	0.795	0.76	0.786	0.812	0.819
69	Saint Lucia	..	..	..	..	..	0.817	0.821
70	Albania	..	..	..	..	0.784	0.811	0.814
71	Russian Federation	..	..	0.821	0.777	..	**0.804**	**0.811**
72	Macedonia (Former Yugoslav Rep. of)	..	..	..	0.782	0.8	0.81	0.813

73	Dominica	..	..	..	..	..	0.814	0.814
74	Grenada	..	..	..	..	..	0.812	0.81
75	Brazil	0.685	0.694	0.71	0.734	0.79	0.805	0.808
76	Bosnia and Herzegovina	..	..	..	..	..	0.803	0.807
77	Colombia	0.688	0.698	0.715	0.757	**0.772**	0.795	0.8
78	Peru	0.687	0.703	0.708	0.744	0.771	0.791	**0.799**
79	Turkey	0.628	0.674	0.705	0.73	0.758	0.796	0.802
80	Ecuador	**0.709**	**0.723**	**0.744**	**0.758**	..	..	**0.805**
81	Mauritius	..	..	0.718	0.735	0.77	0.797	0.801
82	Kazakhstan	..	..	0.778	**0.73**	**0.747**	**0.794**	**0.8**
83	Lebanon	..	..	..	..	..	**0.8**	**0.8**
MEDIUM HUMAN DEVELOPMENT								
84	Armenia	..	..	0.731	**0.693**	**0.738**	0.777	0.787
85	Ukraine	..	..	..	..	**0.754**	0.783	0.789
86	Azerbaijan	..	..	..	..	..	**0.755**	**0.773**
87	Thailand	0.658	0.684	0.706	0.727	0.753	0.777	0.78
88	Iran (Islamic Republic of)	0.561	0.62	0.672	**0.712**	**0.738**	**0.773**	**0.777**
89	Georgia	..	..	..	..	0.739	0.765	**0.768**
90	Dominican Republic	0.64	0.659	0.667	0.686	0.748	0.765	0.771
91	Saint Vincent and the Grenadines	..	..	..	..	..	**0.763**	0.767
92	China	0.533	0.556	0.608	0.657	0.719	0.756	0.763
93	Belize	..	..	0.705	0.723	0.735	0.77	0.77
94	Samoa	..	0.686	0.697	0.716	0.742	0.764	0.766
95	Maldives	..	..	..	0.683	0.73	0.755	0.765
96	Jordan	0.631	0.638	0.666	0.656	0.691	0.764	0.767
97	Suriname	..	..	..	..	..	0.759	0.765
98	Tunisia	..	0.605	0.627	0.654	0.678	0.758	0.763
99	Tonga	..	..	..	..	0.759	0.765	0.767
100	Jamaica	..	..	..	..	0.75	0.765	0.768
101	Paraguay	0.677	0.677	0.711	0.726	0.737	0.754	0.757
102	Sri Lanka	0.649	0.67	0.683	0.696	0.729	0.752	0.755
103	Gabon	..	..	..	**0.748**	**0.735**	**0.747**	**0.75**
104	Algeria	..	0.628	0.647	**0.653**	**0.713**	**0.746**	**0.749**
105	Philippines	0.652	0.651	0.697	0.713	0.726	0.744	0.747
106	El Salvador	0.573	**0.585**	**0.66**	0.691	0.704	0.743	0.746
107	Syrian Arab Republic	**0.603**	0.625	**0.626**	**0.649**	**0.715**	**0.733**	**0.738**
108	Fiji	..	..	..	..	..	**0.744**	0.744
109	Turkmenistan	..	..	..	..	..	..	0.739
110	Occupied Palestinian Territories	..	..	..	..	..	0.736	0.737
111	Indonesia	0.522	0.562	0.624	0.658	0.673	0.723	0.729

112	Honduras	0.567	0.593	0.608	0.623	0.69	0.725	0.729
113	Bolivia	0.56	0.577	0.629	0.653	0.699	0.723	0.726
114	Guyana	..	..	..	..	..	0.722	0.721
115	Mongolia	..	..	..	..	0.676	0.713	0.72
116	Viet Nam	..	0.561	0.599	0.647	0.69	0.715	0.72
117	Moldova	..	..	0.735	0.682	0.683	0.712	0.718
118	Equatorial Guinea	..	..	..	..	**0.655**	**0.715**	**0.712**
119	Uzbekistan	..	..	..	..	**0.687**	**0.703**	**0.706**
120	Kyrgyzstan	..	..	..	..	0.687	0.702	**0.705**
121	Cape Verde	..	..	0.589	0.641	0.674	0.692	0.704
122	Guatemala	0.531	**0.538**	0.555	0.621	0.664	0.691	0.696
123	Egypt	0.496	0.552	**0.58**	0.631	0.665	**0.696**	**0.7**
124	Nicaragua	**0.565**	0.569	**0.573**	**0.597**	0.667	0.691	0.696
125	Botswana	0.539	0.579	0.682	0.665	0.632	0.673	0.683
126	Vanuatu	..	..	..	..	0.663	0.681	0.688
127	Tajikistan	..	..	0.707	0.636	**0.641**	0.677	0.683
128	Namibia	..	..	0.657	0.675	0.661	0.672	0.678
129	South Africa	0.658	0.68	0.698	..	0.688	0.678	**0.68**
130	Morocco	0.473	0.499	0.518	0.562	0.583	0.64	0.648
131	Sao Tome and Principe	..	..	..	..	..	0.639	0.645
132	Bhutan	..	..	..	..	..	0.602	0.608
133	Lao People's Democratic Republic	..	..	..	0.518	0.566	0.607	0.613
134	India	0.427	0.453	0.489	0.511	0.556	0.596	0.604
135	Solomon Islands	..	..	..	..	..	0.599	0.604
136	Congo	..	..	**0.597**	**0.575**	**0.536**	**0.6**	**0.603**
137	Cambodia	..	..	..	..	0.515	0.575	0.584
138	Myanmar	..	0.492	0.487	0.506	..	0.583	0.584
139	Comoros	0.447	0.461	**0.489**	0.513	0.54	0.57	**0.573**
140	Yemen	..	..	..	0.486	0.522	0.562	0.568
141	Pakistan	**0.402**	0.423	0.449	0.469	..	0.555	0.568
142	Swaziland	0.535	0.587	0.619	0.626	0.598	0.567	0.569
143	Angola	..	..	..	..	..	0.541	0.552
144	Nepal	0.309	0.342	0.407	0.436	0.5	0.537	0.547
145	Madagascar	..	..	..	..	0.501	0.532	0.537
146	Bangladesh	**0.328**	0.351	0.389	0.415	0.493	0.527	0.535
147	Kenya	..	..	..	..	0.522	0.53	0.535
148	Papua New Guinea	0.418	0.427	0.432	0.461	..	0.532	0.536
149	Haiti	0.433	0.442	0.462	0.483	..	..	0.526
150	Sudan	..	..	..	..	**0.491**	**0.515**	**0.526**
151	Tanzania (United Republic of)	..	..	0.436	**0.425**	0.458	0.51	0.519

152	Ghana	..	..	..	..	0.495	0.512	0.518
153	Cameroon	**0.46**	0.498	0.485	**0.457**	**0.513**	**0.52**	**0.519**
154	Mauritania	..	..	..	..	**0.495**	**0.511**	**0.519**
155	Djibouti	..	..	..	..	..	0.513	0.517
156	Lesotho	..	..	..	..	0.533	0.508	0.511
157	Uganda	..	..	**0.392**	**0.389**	**0.46**	0.494	0.505
158	Nigeria	..	..	0.438	**0.45**	**0.466**	**0.499**	**0.506**
LOW HUMAN DEVELOPMENT								
159	Togo	0.404	0.387	0.391	0.404	..	0.495	0.498
160	Malawi	..	0.379	0.39	**0.453**	**0.478**	0.476	0.484
161	Benin	**0.351**	**0.364**	0.384	0.411	0.447	0.481	0.487
162	Timor-Leste	..	..	..	..	..	0.488	0.484
163	Côte d'Ivoire	..	..	**0.463**	0.456	0.481	0.48	**0.482**
164	Zambia	..	..	**0.495**	**0.454**	**0.431**	**0.466**	**0.473**
165	Eritrea	..	..	..	..	0.431	0.466	0.467
166	Senegal	..	..	**0.39**	0.399	0.436	0.46	0.462
167	Rwanda	0.357	0.361	0.325	0.306	0.402	0.449	0.455
168	Gambia	..	..	..	..	..	0.45	0.453
169	Liberia	0.365	0.37	0.325	0.28	0.419	0.427	0.434
170	Guinea	..	..	..	..	..	**0.426**	**0.433**
171	Ethiopia	..	..	..	0.308	0.332	0.391	**0.402**
172	Mozambique	0.28	0.258	0.273	**0.31**	**0.35**	**0.39**	**0.397**
173	Guinea-Bissau	**0.256**	0.278	0.32	0.349	**0.37**	0.386	0.391
174	Burundi	0.268	0.292	0.327	**0.299**	**0.358**	**0.375**	**0.387**
175	Chad	..	..	..	0.324	0.35	**0.394**	**0.393**
176	Congo (Democratic Republic of the)	..	..	..	..	**0.353**	**0.37**	**0.371**
177	Burkina Faso	0.248	0.264	0.285	0.297	0.319	0.367	0.384
178	Mali	**0.245**	**0.239**	0.254	0.267	0.316	0.361	0.366
179	Central African Republic	**0.335**	0.344	**0.362**	0.347	0.378	0.364	0.367
180	Sierra Leone	..	..	..	..	..	0.35	0.357
181	Afghanistan	..	..	..	..	..	0.347	0.35
182	Niger	..	..	..	..	**0.258**	0.33	0.335

Note: ..: HDI data missing; bold: negative GS; grey shaded: CO_2 per capita emissions above two metric tons; single underlined: GS data missing