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**DRAFT REPORT OF THE JOINT  
UNECE/OECD/EUROSTAT WORKING GROUP ON  
STATISTICS FOR SUSTAINABLE DEVELOPMENT**

**A FRAMEWORK FOR SUSTAINABLE DEVELOPMENT  
INDICATORS (SDI)**



# **Statistics for Sustainable Development:**

## **A Framework for Sustainable Development Indicators (SDI)**

*Report of the Joint UNECE/OECD/Eurostat Working Group  
on Statistics for Sustainable Development  
(WGSSD)*

*“Many important social processes take a long time – sometimes an extremely long time – to unfold. ... In choosing what we seek to explain and in searching for explanations we focus on the immediate – we look for causes and outcomes that are both temporally contiguous and rapidly unfolding. In the process, we miss a lot (Kitschelt 1999; Goldstone 1998).”*

*From: Pierson (2003).*



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## **O Executive summary**

*(To be written.)*

### **0.1 Outline of the report**

1. The first chapter provides the background for this report, outlining the purpose of the report and the targeted audience. Furthermore, the report discusses some definitions of central concepts (e.g. what do we mean by development, sustainable development, weak and strong sustainability) and provides arguments for the need for a conceptual approach when measuring sustainable development.

2. Chapter 2 gives an overview of some of the existing approaches to measuring sustainable development and extracts some commonalities among these. Some of the existing indicator sets have a degree of commonalities concerning the issues covered, although there is a great variety with regard to the number and choice of indicators. Still, some more conceptually based approaches have been established with a foundation in the capital theory of development, i.e. what is called the capital approach. Examples are work carried out in the World Bank, Canada and Norway.

3. Chapter 3 describes the capital approach to measuring sustainable development, based on the notion that sustainable development entails a non-declining social well-being over time and that this has the potential to be realised only if the total resource base, or total national wealth, is preserved over time. Practical difficulties in implementing the approach are discussed.

4. Chapter 4 provides an outline of how a practical set of indicators based on the capital approach can be constructed, some policy implications of the capital approach and what kind of statistics and data systems (measurement framework) are needed in order to support a capital-based measurement framework.

5. Chapter 5 compares some of the existing approaches with the capital approach and comes up with both a menu of sustainable development indicators and a smaller set of indicators that may become a core set for international comparisons.

6. Finally, Chapter 6 concludes with a description of some of the challenges likely to be associated with setting up an indicator system based on the capital approach, elements of a future research agenda and – last but not least – provides a brief set of recommendations to countries.

### **0.2 Acknowledgements**

7. The UNECE provided secretariat support to the Joint UNECE/OECD/Eurostat Working Group on Statistics for Sustainable Development. The OECD and Eurostat also supported the work of the Group. Statistics Norway and the Norwegian Ministry of Finance have given financial support to research papers and to the editor. The names of the authors who contributed papers in the course of the work of the Working Group are presented in Appendix 1 - Names of the authors who contributed papers in the course of the work of the Working Group. The list of members of the Working Group that attended the meetings is presented in Appendix 2 - List of members of the Working Group that attended the meetings.

## **1. Introduction**

### **1.1 Background for the working group and the report**

#### **1.1.1 Mandate of the working group**

8. Sustainable development indicators (SDIs) are used by more and more national governments and international agencies for monitoring progress towards sustainability goals set by national governments as well as comparing performance among countries. The Joint UNECE/OECD/Eurostat Working Group on Statistics for Sustainable Development, henceforth WGSSD, was established by the Conference of European Statisticians (CES) in 2005 in order to provide a theoretical and conceptual framework and to better structure the work on indicators. A framework in this context is a practical set of principles and rules that allow the selection of a limited set of sustainable development indicators in a coherent and consistent manner.

9. More specifically, the group was given the mandate to identify good concepts and practices in order to assist national governments and international organizations in the design of sustainable development indicator sets and in the development of supporting official statistics in the area (see Appendix 3 for the full mandate).

10. Furthermore, the mandate says that the Working Group should:

- articulate a broad conceptual framework for sustainable development measurement with the concept of capital at its centre;
- consider other approaches to the extent the capital approach is found insufficient from a conceptual standpoint;
- identify the broad domains that good indicator sets should span;
- develop a menu of good sustainable development indicators in order to help governments and international organizations when they are designing indicator sets;
- identify a small set of indicators from the menu that might become the core set for international comparisons;
- identify basic data systems necessary for a small set of indicators and identify their possible sources (existing or new statistical surveys, administrative records, information derived from environmental monitoring systems);
- discuss the relationship between integrated environmental and economic accounts and sustainable development indicators.

11. In October 2006, the Bureau of the Conference of the European Statisticians (CES) provided, at the request of the working group, further clarification on the mandate of the Working Group:

- the WGSSD was encouraged to thoroughly explore the approach based on the four types of capital - economic, natural, human, and social capital, as the basis for the measurement of sustainability. However, in each of the four capital areas, the WGSSD was encouraged to go only as far as it can in a conceptually sound manner;
- the WGSSD should limit its work to looking at existing practices in countries that have adopted policy-based approaches to the measurement of sustainable development in order to reveal commonalities, and also commonalities with the capital approaches. The group should only highlight the commonalities rather than develop recommendations.

12. The Working Group provided progress reports to the Bureau of the Conference of European Statisticians, the 2007 plenary session of the Conference and the OECD Annual Meetings of Sustainable Development Experts.

### **1.1.2 Composition of the Working group**

13. The group has been open to participants from the national statistical offices and other Government bodies of all countries that are members of the UNECE and OECD. Normally around fifty participants have attended each meeting.

14. Robert B. Smith from Statistics Canada has been the Chair of the working group. Tone Smith, paid by Statistics Norway, provided secretarial support in 2006. From February 2007, Knut H. Alfsen from Statistics Norway, with support from the Ministry of Finance of Norway and Statistics Norway, has been assigned the role of editor of the report and has participated in the meetings of the Steering Committee.

### **1.1.3 Organization of the work**

15. The Bureau of the CES established a Steering Committee (SC) in order to guide the work of the Working Group. A more detailed Terms of Reference for the Steering Committee is presented in Appendix 4.

16. Members of the Steering Committee include Robert B. Smith (Statistics Canada), Stephen Hall (Defra, UK), Thorvald Moe (Ministry of Finance, Norway), Viveka Palm (Statistics Sweden), Andrea Scheller (Swiss Federal Statistical Office), Joachim Thomas (Federal Statistical Office of Germany), Lidia Bratanova, Vania Etropolska (UNECE), Enrico Giovanini, Tone Smith (OECD), Kirk Hamilton (World Bank), Pascal Wolff, and Laure Ledoux, (Eurostat). The editor, Knut H. Alfsen from Statistics Norway, participated in the Steering Committee meetings since the beginning of 2007.

17. The Joint UNECE/Eurostat/OECD Working Group had five meetings in preparation of the report: Luxembourg, 3-4 April 2006; Oslo, 15-16 November 2006; Geneva, 19-20 April 2007; Bucharest, 8-9 November 2007; and Lisbon, 5-6 March 2008. The Steering Committee met seven times during the period April 2006 - March 2008 (OECD – 4 times; DEFRA, London; UNECE, Geneva; Statistics Canada, Ottawa).

18. Finally, two sub-groups on existing approaches and the capital approach, respectively, were established within the Joint UNECE/Eurostat/OECD Working Group. They had meetings in Geneva during the Third Meeting of the Working Group, and in Luxembourg in May 2007 (the sub-group on existing approaches only).

19. The rationale for the establishment of the two sub-groups was the different views within the Working Group concerning the concept of sustainable development. The first of these views, which is called here the *holistic view*, holds that the focus of sustainable development is the current well-being and its future determinants. In a world of limited resources, the main issue is to reconcile present and future needs. That is, two forms of distributional justice have to be put to rights: the inter-generational and the intra-generational. Justice between generations is about securing freedom and options to exist and develop for the generations to come, justice within a

generation about securing freedom and options to exist and evolve for today's world population. One should not be achieved to the detriment of the other.

20. In the holistic view, it is therefore logical that a framework for measuring sustainable development has to be able to illustrate – in a perspective of both time and space – whether and for whom the degree of freedom is increasing or declining, how access and appropriation of resources are distributed, how negative aspects of using resources are distributed and to what extent capital is used in a responsible manner with regard to meeting current and future needs. That is, the measurement of sustainable development must focus on both the options of the current generation and on the prospects for those yet to come.

21. This group finds legitimacy for its view, among other arguments, in the widely adopted definition of sustainable development put forth by the Brundtland Commission (WCED, 1987): “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

22. The proponents of this view argue that it is the very value added of the sustainable development concept to bring these two forms of distributional justice together. For decades, development, social exclusion and poverty theories on the one hand, and resource conservation theories and resource economics on the other hand, have followed separate paths. It is the achievement of the sustainable development idea to bring the short-term and the long-term together and to put up the necessary, though admittedly non-trivial, challenge to look at them at the same time. A new separation of the two issues is regarded as a backslide into the years before the World Summit on Environment and Development in 1992.

23. From a policy standpoint, the most valuable information is a concise set of indicators which monitors changes in stocks of capital, which shape the opportunities of generations to come, as well as the changes in access and appropriation of these stocks of capital, which shape the opportunities of the now living. A dual perspective on sustainable development is the order of the day.

24. The second view of sustainable development among the Working Group members is called here *the long-term view*. It holds that the focus of sustainable development discourse must be ensuring that the creation of well-being today does not come at the expense of future generations.

25. Those who take the long-term view of sustainable development argue that concern for current well-being is best thought of under the heading of *development*, while the question of the long-term prospects for well-being is the proper focus for the debate around *sustainable development*. It is only by limiting the scope of sustainable development in this way, they argue, that the concept is made tractable.

26. The long-term proponents note that on the practical front, there are massive and long-standing efforts on the part of governments, communities and individuals to promote development in the short-term. Equally, much of present statistics is focused on measurement of the success of these efforts to promote development in the short-term. However, they argue that the same is not true of efforts to ensure that development is sustainable in the long-term. These efforts are much less the focus of policy and even less so the focus of statistical measurement.

Thus, the long-term view of sustainable development allows the focus to be put directly where the relative need for policy and measurement is greater.

27. The final point made in favour of the long-term view is that there exists a conceptually robust and well-documented body of thought that can guide the measurement of long-term sustainable development. The measurement of current well-being, in contrast, remains a more controversial domain where no single viewpoint exists. Devising a conceptually sound set of indicators for the long-term view is, then, much easier than doing so for the holistic view. The measurement approach taken for the long-term view, that of capital, is treated in considerable detail in this report.

28. The proponents of the two views recognize that their perspectives are not entirely independent of each other. It is clear that there are links between current well-being and the prospects for long-term well-being. If pollution is high today and well-being lower as a result, this is relevant in many ways to the prospects for future well-being. But our understanding of how current well-being is linked to future well-being is highly imperfect, with a few exceptions like poverty. If it were better, proposing a conceptually robust set of indicators for the holistic view would be easier.

29. Both sub-groups agree that sustainable development must concern itself with prospects for long-term well-being and therefore current policies and statistics should pay more attention to these prospects. The proponents of the long-term view say it is best to stop here for practical and logical reasons, while the proponents for the holistic view say that the fundamentals of the concept demand that the well-being of those alive today should be included in sustainable development. The former claims that sustainable development is most powerful when interpreted from a rigorous conceptual standpoint, while the latter claims that its power comes from the space it opens for simultaneous discussion of both the intra- and the intergenerational aspects of well-being, and its use as an overarching principle to which all policies should contribute.

30. The report does not resolve the above-mentioned debate. Indeed, the Working Group did not even try to do so. Rather, the report acknowledges that the debate exists and moves on with its mandate to explore the commonalities between existing national and international indicators of sustainable development, most of which are founded on the holistic view, and the indicators that fall out of the capital approach, which is closely aligned with the long-term view. The results of this exploration, which are discussed in Chapter 5, show that there are lots of commonalities between the approaches. Inevitably, many of the existing indicators focused on measurement of current well-being drop out in the comparison.

31. Many of the existing approaches to developing sustainable development indicators have favoured the holistic view, as documented in Chapter 2, to support existing sustainable development policies. The long-term view puts more emphasis on the inter-generational development of social well-being, and considers intra-generational issues, e.g. questions relating to the concerns of present needs, not to be key to the sustainable development issues. Therefore, the proponents of the long-term view consider the capital approach to be more natural as a framework for developing sustainable development indicators. However, a number of the holistic view adherents think that the capital approach doesn't automatically and conceptually exclude distributional aspects of the present generation.

32. To sum up: this report has the task of discussing the pertinence of the capital approach for measuring sustainable development. As shown above, with the capital approach it is easier to illustrate inter-generational issues than intra-generational. Mostly for practical reasons, the Working Group has therefore decided to focus in this report on the longer term. At the same time, it acknowledges the limits of the selected approach: focusing on assets implies that only scant attention is paid to measures of current well-being. This choice of the Working Group does not imply that the latter task is irrelevant for sustainable development discussion, it simply recognizes that progress is best achieved “one step at a time”.

#### **1.1.4 Intended audience of the report**

33. A report on indicators and statistics for sustainable development can be targeted at several different audiences; from statisticians in need of better technical manuals to policy makers and the public at large in need of a clear understanding of what sustainable development entails in terms of concrete politics and measurements. Although formally reporting to the Conference of European Statisticians and the OECD Annual Meeting of Sustainable Development Experts, this report is also geared towards national policy makers and those interested in explaining the rationale for choice of individual sustainable development indicators. This is done by establishing a common understanding of the main forces driving long-term development and the main threats to its sustainability, and by establishing core principles for the measurement of such development.

#### **1.2 Definitions of some basic concepts**

34. The concept of “sustainable development” was popularised as a normative goal for long-term policy by the World Commission on Environment and Development (WCED)<sup>1</sup> in their report to the General Assembly of the United Nations “Our common future” from 1987 (WCED, 1987). There, sustainable development was defined as a development that “meets the needs of the present without compromising the ability of future generations to meet their own needs”<sup>2</sup>. This definition balances two concerns: one has to do with present needs, or intra-generational equity or justice issues. The other has to do with future generations, i.e. development over time. There exist various opinions on whether the two concerns should have equal weight when considering sustainable development. Basically, one part of the working group wanted to emphasise the inter-generational dimension, i.e. sustainable development should be understood as a mainly temporal concept. Another part of the working group would put equal emphasis on both intra- and inter-generational issues when judging whether a development is sustainable or not as it was put forward by the World Commission on Environment and Development (WCED, 1987). This report explores the insights that the capital approach can bring with respect to both these interpretations of sustainable development.

35. While imprecise, the definition agrees with the intuition that, since the term sustainable means “never-ending” or “lasting”, sustainable development is development that lasts. Since “sustaining” in itself has no intrinsic value (hardly anybody is interested in sustaining a dictatorship), the focus is more on what shall be maintained in the future and that is

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<sup>1</sup> The commission is commonly referred to as the Brundtland Commission after the chairperson, then Prime Minister of Norway, Gro Harlem Brundtland.

<sup>2</sup> A great number of alternative definitions of sustainable development exist.

development. In other words, the challenge of the concept of “sustainable development” is perhaps not so much with the word “sustainable”, but rather with the term “development” (cf. Pearce and Warford, 1993, p. 42). Thus, to understand and define sustainable development with some precision, it is important to first understand development and the longer term forces that drive it. This is done in section 0 below followed by a discussion of what may make longer term development sustainable in section 0.

### 1.2.1 What do we understand by development?

36. Development in the context of sustainable development is a term with a positive connotation. However, whether a given development is regarded as good or bad involves value judgements. It may be difficult to come to an agreement, not least because what we consider to be good or bad changes over time are also subject to different interpretations according to differences in perspectives. UNDP (1994) defines development as a process that increases people’s opportunity of choice. Ecologists will emphasise the functioning of ecosystems and any development threatening their robustness will be termed negative.

37. Traditionally, economists have tended to measure development in terms of per capita income<sup>3</sup>. However, at least since the publication of “The limits to growth” in 1972 (Meadows et al., 1972), economists have explored – inter alia – the threat to long-term development posed by the depletion of (non-renewable) natural resources below critical levels, see e.g. Dasgupta and Heal (1979), Dasgupta (1982) and Baumol and Oates (1975) and the review volumes Oates (Ed.)(1992) and Dorfman and Dorfman (Eds.) (1977). But what if the distribution of income is skewed and the poor part of the population is getting poorer even while the average income increases? Some people will hesitate in calling this (a positive) development.

38. Others will highlight the state of education and health in the society as important factors in meeting basic needs. Furthermore, education and research provide creation of knowledge, skills and capabilities allowing greater individual choice and freedom and as such are an important part of (a positive) development. Finally, institutional arrangements and state of governance have important ramifications for individual freedom and choice as well as longer term development in general, and should, according to some, be an essential part whereby the nature of development should be judged.

### 1.2.2 Welfare and well-being

39. What this diversity of perspectives reflects is that individuals and societies differ when it comes to defining welfare or well-being. *Welfare* is here understood to be the value someone attaches to his or her personal circumstances in a particular social state. A social state includes in its description the allocation of resources (who gets what, when, where and why) and anything else deemed to be relevant for personal or social choice. A person’s well-being is a wider notion than welfare, including as it does welfare, but also including for instance fundamental rights (Dasgupta, 2001).

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<sup>3</sup> Although earlier economists like Kuznets, Tobin, Nordhaus and Eisner all have stressed the importance of extending the national accounts to be more “welfare-centric”, see e.g. Nordhaus and Tobin (1973), Eisner (1999).

40. The distinction between welfare and well-being is not of high importance in this report, and we will tend to use the latter term. While it is easy to agree that a positive development is a change over time that somehow increases the well-being, the precise definition of what constitutes a positive development is harder to identify. However, despite different perspectives, norms and viewpoints, it is fruitful to ask the question where the well-being comes from, and what drives development.

41. One step in such an analysis is to recognize that well-being can – especially with regard to the capital approach – be considered as the outcome of consumption or rent from assets, understood in a comprehensive manner. This consumption consists of consumption of both goods and services that are produced and traded in markets (food, housing, bicycles and cars, cinema tickets, professional health care, etc.) as well as goods and services that are produced in households for own consumption or directly harvested from nature and thus non-marketed (some recreational services, air, etc. are some examples). The next step is to ask how these consumption goods and services are produced – in other words what is the basis for well-being and the development of the services that are its basis.

42. Whether the goods and services we consume are produced by financial and produced capital together with labour, or gathered or extracted from natural resources, it is reasonable to view them as stemming from a total *resource or capital base*. Even fundamental rights can be viewed as coming from social capital. A common definition of capital in this connection is that capital is any resource that has to be reserved in advance, so that production may take place that will only bear fruits later. Often it is nature itself that has reserved the capital in the form of natural resources. Additionally, produced capital is created by saving and investments (Marshall, 1961).

### 1.2.3 Definition of capital

43. The capital base that is considered in this report must be understood in a broad sense. It is composed of both *produced capital* in the form of machinery, buildings, telecommunications and other types of infrastructure, of *natural capital* in the form of renewable and non-renewable material resources, as well as ecosystems providing services like waste absorption or provider of scenery, etc. In addition we receive the benefit of our own labour and our competencies and skills. This is part of *human capital* and is therefore also an important part of societies' resource base. In addition, our societies are more than the sum of the individuals living together, with their network of social relations, their institutional structure and their rule of law and other governmental services ("good governance"). It can thus be argued that *social capital* is important for development.

44. The *total national wealth* thus consists of financial, produced, natural, human and social capital. Managing the total national wealth in a manner that sustains it over time, measured per capita, allows us to potentially secure long-term and positive development. Technological change is also an important determinant of longer term development, and to what extent it can be sustained over time. Within the capital approach this can best be seen in relation to human and social capital.

45. One may of course fail in utilising the resource base effectively and instead waste the resources on wars or conflicts, but without a stable or increasing resource base, development will

**Comment [kal1]:** Kirk Hamilton suggests to replace this text with: "The economic concept of *wellbeing* is more or less identical to the definition in a dictionary – wellbeing is the state of happiness or contentment. Economists assume that there is a mapping between a bundle of goods (and bads) that an individual 'consumes' (footnote: Consumption is here in quotes because it may not involve any using up or depreciation of a good – enjoying a beautiful view, for example) and the level of wellbeing that they enjoy – this is captured in the concept of a utility function. Wellbeing measures a current state, and therefore may not be sustained if the ultimate sources of wellbeing are being damaged or depleted. Economists therefore use the term *welfare* to capture intertemporal aspects of wellbeing: welfare is equal to the present discounted value of future wellbeing, where the discount rate is the 'rate of time preference' or 'rate of impatience.' If it is the wellbeing of a society as a whole that is being summed and discounted into the future, this is generally termed *social welfare*."

Note that Netherlands and others have suggested different definitions for the terms welfare and well-being. I suggest to retain the current text.

**Comment [kal2]:** Comment from Kirk: You include institutions as a type of social capital, which strikes me as important, and something we want to include whenever social capital is discussed in the document.

**Comment [KAL3]:** OECD: The report discusses extensively and in several places the notional of "*social capital*". But a definition is only provided on paragraph 138; and until then it is not clear how the term is used. Paragraph 35 talks of "*institutional or social capital*", without clarifying if the two are identical or complementary constructs. Paragraph 105 suggests that the term "*social capital*" as used in the report is broader than the OECD/CERI definition; this should be stated clearly (and early) to avoid confusion. Paragraph 103 relates distributional issue to social capital but the message is confused. Ye... [1]

**Comment [KAL4]:** OECD: Paragraph 36 argues that "*Within the capital approach, (technological change) can best be seen as a manifestation of human and social capital*". This statement reflects the accounting practice of measuring human and social capital as the difference between GNI and the returns of other types of (measured) capital stocks but it is not what most people understand as technology (much of it is embedded in new capital goods). Technology is mentioned several times but never comprehensively discussed; this is a weak point o... [2]



in the long run deteriorate and sustainable development will not be possible. This observation opens up an interesting avenue when it comes to measuring sustainable development, described in Chapter 0.

#### 1.2.4 Theories of economic development

46. The interpretation and explanation of forces of development in well-being is a close parallel to classical and neoclassical theories of economic development. According to John Hicks (Hicks, 1965, ch. 4), the first simple growth models were constructed by the fathers of classical economics: Adam Smith and David Ricardo. The notion of capital as a framework for, or cause of, development goes back to the seminal work of Adam Smith from 1776 (Smith, 1776) who recognised that saving and investments are keys to economic development. It is fundamental that one has to save in order to have a surplus in which to invest in maintaining or enhancing the capital stock. Probably the first systematic and rigorous treatment of this topic is found in Ramsey (1928).

47. Later, economic Nobel Prize winner Robert Solow revived interest in the classical growth theory in the 1950s, and he sums up his work on neoclassical growth theory in his book: “Growth Theory: An Exposition” formalising production functions or growth equations, explaining the forces driving economic development (Solow, 1988).

48. The notion of human capital was introduced in the literature by T.W. Schultze and Gary Becker in the 1960s, see Becker (1964). In Romer’s models of endogenous growth of the 1980s and 1990s (Romer, 1987, 1990, 1994), human capital was seen as an important element in understanding development, as was (endogenous) technological change. The OECD Growth Study (2003) documents empirically (inter alia through regression analyses) the importance of education and human capital for (economic) development. The state of art has been summed up in a paper written as a contribution to the work of WGSSD (Greaker, 2007).

49. The role of natural resources or natural capital has perhaps been intuitively understood for a long time. Land figured prominently as a factor of production in Ricardo’s works. In neoclassical development theory it was perhaps (implicitly) assumed that natural resources were not limited, and/or could be substituted by other forms of capital, or could be preserved (above critical levels) by technological improvements.

#### 1.2.5 National wealth

50. There exists a large literature discussing the theoretical foundations of national wealth accounting. The report is limited to a few central contributions.

51. The book “The limits to growth” (Meadows et al., 1972) initiated the early literature on national wealth. The authors predicted that the world will run out of non-renewable resources, and that the world population may collapse through famine and other disasters.

52. A large response in a number of important research papers followed, see for instance Nordhaus (1974), Hartwick (1977) and Dasgupta and Heal (1979). Solow (1986) shows formally

**Comment [kal5]:** Reference missing. Thorvald to provide? Or is it Solow (1988)

that Hartwick's rule<sup>4</sup> implies the maintenance of aggregate national wealth or "some appropriate defined stock of capital..." at a constant level over time. Thus, in brief this rule states that for a broad class of neoclassical growth models in which natural resources contribute to the production of market goods and/or the provisioning of environmental amenities, the economy will maintain a constant or increasing level of per capita utility only if investments in manufactured capital exceed the monetary value of natural resource depletion on an economy-wide basis (Howarth, 2007).

### 1.2.6 Genuine savings

53. Pearce and Atkinson (1993) applied sustainability criteria to national accounting numbers. They calculated net investment corrected for resource depletion or, as it has come to be called, genuine savings and investments, in 18 different countries. The genuine saving indicator is related to Hartwick's rule. Hartwick showed that if genuine saving is precisely 0 everywhere along a development path, then consumption can be sustained at a constant level forever, even in the face of fixed technology and exhaustible resources, as long as the elasticity of substitution between capital and resources is unity. Applying this rule strictly would imply that none of the natural resource rents should be consumed. Rather it should be re-invested in other types of capital. Later contributions to this research are Hanley et al. (1999) and The World Bank (2005), to mention just a few. The main point from this research is that a necessary, but not sufficient, condition for longer term development to be sustained is that genuine savings – a broader measure of savings including exploitation of natural resources – must be positive measured in real terms and per capita. For a survey of development of this research, see Atkinson, et al. (1997). The World Bank now publishes genuine saving estimates for some 140 countries, and finds generally that the level of genuine savings is positive for developed countries, but not for all developing countries<sup>5</sup>.

54. In conclusion, there exist theories and explanations for (economic) development going back several hundred years in time. They are all focused on the capital base of societies as the main force behind development. Access to assets is therefore a main issue in understanding development. What has changed over time is a growing recognition of the fact that the capital base consists of more than money and produced capital. Thus, human, natural and social capital have in turn been included as important factors in explaining development<sup>6</sup>. That they also should be important in determining whether a development is sustainable or not is therefore hardly surprising.

### 1.2.7 What do we understand by sustainable development?

55. It seems reasonable to interpret sustainable development as development that can continue "for ever" or at least until the end of a politically relevant time horizon, e.g. the next

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<sup>4</sup> Hartwick's rule – often abbreviated as "invest resource rents" – requires that a nation invest all rent earned from exhaustible resources currently extracted, where "rent" is defined along paths that maximize returns to owners of the resource stock. The rule extends to the case of many types of capital goods, including a vector of stocks of natural capital. ([http://en.wikipedia.org/wiki/Hartwick%27s\\_Rule](http://en.wikipedia.org/wiki/Hartwick%27s_Rule))

<sup>5</sup> It should be noted though, that the World Bank's estimates, by its own admission, fail to include several important sources of potential unsustainability.

<sup>6</sup> For an analysis of the link between wealth and social welfare, and useful insights into why we need to care about measures of (national) wealth, see P. Samuelson (1961) and P. Dasgupta (2001).

generation considered by long-term policy. Sustainable development is maintaining social well-being *over time*. Thus, the time dimension is crucial; sustainable development is a dynamic concept. It is a development *path* that is or isn't sustainable. Any given single situation located in time may be difficult to characterise as being sustainable or not. The reason is that several alternative development paths may follow from a single situation. Some of these paths may be sustainable, that is continued indefinitely, and others may not. However, as we have seen, indefinite continuation is not the only criterion that matters for sustainable development. It is also about which path a society wants to follow and this depends on what it defines at present as development or well-being. Thus, "sustainable development" is a normative concept or in other words like other positive and open-ended terms (e.g. freedom) a regulative idea, which can only be defined in a provisional and hypothetical manner. Measuring single situations over time gives evidence of whether the current development is in line with the desired development and hence worthy of being sustained or not.

56. For instance, the disparity between the rich and the poor in today's world is clearly a problem that is not to be sustained in the future, not more or less than for example the over-consumption of resources, which is a threat to future generations. Thus, the key issue is how poverty can be eradicated while at the same time ensuring inter-generational justice, independently of whether one regards both as sustainable development matters or the latter only.

57. Societies clearly have preferences for equity or distributional issues both within and between nations. The distribution of assets<sup>7</sup> across societies will therefore have an effect on the social well-being and thus be a relevant issue when it comes to determining whether a development can be characterised as sustainable or not.

### 1.2.8 Weak versus strong sustainability

58. Pearce and Atkinson introduced more precision and rigour by defining the concept of *weak and strong sustainability* in an article from 1993 (Pearce and Atkinson, 1993).

59. *Weak sustainability* specifies that the overall capital stock per capita, or total national wealth per capita, should not decline over time in real terms. Substitution between the various stocks of capital is possible in this definition of sustainable development. The depletion of one stock of capital, e.g. by petroleum extraction, can be compensated by investing in another stock, e.g. produced or human capital. Technological progress, whereby we manage to get the same service out of less material resources, is thus an example of substituting natural resources by human, and perhaps social, resources.

60. Strong sustainability, on the other hand, assumes that such substitution is limited, and that there is at least a minimum requirement for maintenance of each type of capital stock. In particular, the strong sustainability view maintains that today's societies are more dependent on ecosystem services than is commonly recognised. Food production is an obvious example where loss of biodiversity makes the whole system steadily more vulnerable. A relatively stable climate is another 'service' that tends to be taken for granted, but which is hardly substitutable by any other type of capital.

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<sup>7</sup> The distribution of assets is clearly more relevant to sustainability than distribution of income.

61. The distinction between the two types of sustainability may seem clear-cut. However, in reality it is more a matter of degree than of absolutes. The issue is further discussed below in section 0, in relation to the value in terms of well-being (the so-called accounting prices) stemming from the various components of the resource base. Thus, strong sustainability requires that, for instance, natural capital is not reduced below minimum or irreversible levels.

### **1.3 Measuring sustainable development: on the need for a conceptual approach**

62. Defining and measuring sustainable development are two different things. Difficult as it has proven to be to agree on a precise and unique definition of sustainable development, it should come as no surprise that it has proven just as hard to agree on a method to measure the degree to which a certain development is sustainable or not. The quest for sustainable development indicators should be viewed in light of this.

63. As the name implies, indicators should be concrete rather than giving comprehensive information about all aspects of the object under study (in this case sustainable development). As such, the main task of the indicators should be to provide and communicate signals of potentially unfavourable developments or future threats. The indicators are usually based on statistical information of one type or another, but the pursuit for comprehensiveness or even representativeness need not be fulfilled to the same degree that one would expect from statistics or accounting systems<sup>8</sup>. Indicators do not stand alone, but should be seen as part of the overall information system constituting official statistics. The overall system should come much closer to providing all that is known about an issue than the indicators themselves will be able to do.

64. The indicators need to be based on a sound theoretical footing. As indicated by Dasgupta (2001):

“It is necessary to have a tight, analytically sound framework from which to proceed to practical decisions. Along the way, corners will have to be cut and qualitative judgements have to be made. But having the correct framework at the back of one’s practical mind is good practice. It enables the evaluator to recognize when a corner has to be cut and it forces him to search for good ways to do it. The danger is to dismiss the framework with the shrug of one’s practical shoulders. If one does that, all sorts of ad hoc considerations can be expected to creep in, such as the interests of powerful groups in society.”  
(Dasgupta, 2001, p. 178)

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<sup>8</sup> The linkages between indicators, accounting and statistics are discussed in more detail in Chapter 0.

### 1.3.1 Agenda 21 and the call for sustainable development indicators

65. While indicators of sustainable development were discussed in the environmental economics literature as early as the 1970's, a renewed call for such indicators was formulated in one of the main documents coming out of the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992: Agenda 21.

66. The Agenda 21 was adopted by 183 governments at the Rio de Janeiro meeting in 1992. The full implementation of Agenda 21, the Programme for Further Implementation of Agenda 21 and the Commitments to the Rio principles were later strongly reaffirmed at the World Summit on Sustainable Development (WSSD) held in Johannesburg, South Africa in 2002, ten years after the Rio de Janeiro conference.

67. On the need for new indicators the Agenda 21 states that (cf. paragraph 40.4):  
“Commonly used indicators such as the gross national product (GNP) and measurements of individual resource or pollution flows do not provide adequate indications of sustainability. Methods for assessing interactions between different sectoral environmental, demographic, social and developmental parameters are not sufficiently developed or applied. Indicators of sustainable development need to be developed to provide solid bases for decision-making at all levels and to contribute to a self-regulating sustainability of integrated environment and development systems.”

68. Further on, Agenda 21 calls for (cf. paragraphs 40.6-7):

- “a) Development of indicators of sustainable development  
Countries at the national level and international governmental and non-governmental organizations at the international level should develop the concept of indicators of sustainable development in order to identify such indicators. In order to promote the increasing use of some of those indicators in satellite accounts, and eventually in national accounts, the development of indicators needs to be pursued by the Statistical Office of the United Nations Secretariat, as it draws upon evolving experience in this regard.
- b) Promotion of global use of indicators of sustainable development  
Relevant organs and organizations of the United Nations system, in cooperation with other international governmental, intergovernmental and non-governmental organizations, should use a suitable set of sustainable development indicators and indicators related to areas outside of national jurisdiction, such as the high seas, the upper atmosphere and outer space. The organs and organizations of the United Nations system, in coordination with other relevant international organizations, could provide recommendations for harmonized development of indicators at the national, regional and global levels, and for incorporation of a suitable set of these indicators in common, regularly updated, and widely accessible reports and databases, for use at the international level, subject to national sovereignty considerations.”  
(see: UN, 1992)

69. Since 1992, several nations and intergovernmental organizations have answered the call of Agenda 21 and developed sets of indicators of sustainable development. Some have even done so in several versions. A description of many of these sets and their commonalities are discussed

in Chapter 0. Here, it is only noted that the result has been a profusion of different indicator sets and insufficient progress when it comes to improving international comparability, i.e. convergence and harmonisation of approaches. Hence, there has been a request for developing a conceptual approach to the topic of sustainable development indicators that could give coherence to the work and provide a means for greater harmonisation in the international effort in developing sustainable development indicators (SDIs).

70. A conceptual framework like the capital approach provides an added dimension to the interpretation of the indicators by giving a wider meaning to the individual indicator. The development of a conceptual basis for sustainable development indicators is indeed the central element of the mandate of the working group. A benchmarking of countries with regard to their sustainability, and not only on short-term measures like GDP per capita, could also provide a sound shift in focus to more long-term structural issues in each country, and thus help to secure policy formulations taking longer term constraints to development into account. This forms the background and rationale for this report.

### **1.3.2 Characteristics of indicators as part of official statistics**

71. While National Statistical Institutes have usually been involved in the development of sustainable development indicators, the compilation and publication of the indicators in many countries and international organizations is the responsibility of environmental ministries and departments or other bodies outside the statistical community. The indicators are habitually based on official statistics as their sources, but often also different kinds of unofficial information are utilised.

72. There are good reasons why sustainable development indicators should be seen as a proper part of official statistics. Measuring sustainable development by statistical means, in particular by use of indicators, should ideally bear the same “hallmarks” as other official statistical information, that is the sustainable development indicators should follow the UN fundamental principles and code of practice of official statistics. These include for example the following:

- ...the statistical agencies need to decide according to strictly professional considerations, including scientific principles and professional ethics, on the methods and procedures for the collection, processing, storage and presentation of statistical data;
- to facilitate a correct interpretation of the data, the statistical agencies are to present information according to scientific standards on the sources, methods and procedures of the statistics;
- the use by statistical agencies in each country of international concepts, classifications and methods promotes the consistency and efficiency of statistical systems at all official levels.

73. Thus, by including sustainable development indicators in official statistics one can expect that:

- they are objective in informing long-term policies, e.g. national strategies for sustainable development;
- they have a theoretical underpinning;
- consistency over time and national boundaries are secured;

- they are consistent with a pre-defined set of quality standards.

74. In particular, indicators should provide information that directs attention to potential challenging, long-term issues, more than providing complete data for analysis of the problems. In fact, by identifying sets of indicators of interest for the long-term development, it could point to areas where the existing statistical system has deficits today and is in need of further development. The aim should be that the overall system should come much closer to providing all that is known about an issue than the indicators alone. Use of the indicators themselves should therefore be seen as more of a mode of communication of changes than a provider of all that is known about an issue, e.g. why changes are taking place. In doing this, indicators should still adhere to certain norms peculiar to them:

- the indicators should be transparent. That is, the statistical basis for the indicator should be easy to explain; preferably the indicators should be based directly on available observational data or statistics in order to avoid methodological discussions about weighting or other computational algorithms for construction of indicators;
- the indicators should as far as possible be comparable across nations/regions in order to facilitate comparisons and identifications of good practices in policy areas of relevance to sustainable development;
- the indicators seen as a set should as far as possible be able to communicate a total picture with regard to whether the development is sustainable or not. This implies that the indicator set should not be too large. Changes in single indicators that are part of large indicator sets may sometimes be difficult to interpret and, therefore, can lose their relevance;
- the indicator set should reflect the impact of policies, e.g. the indicators should as far as possible within the framework of the indicator set be related to concrete long-term policy targets, pointing out achievements and deficits in specific policy areas when this takes place.

75. Finally, it is worth noting that relatively large resources in today's industrialised societies are used to analyse and, where possible, understand development in short-term trends. News in all media reports on day-to-day fluctuations in market conditions, and statistical offices publish and comment on monthly, quarterly and annual statistics. A fair number of consultancy firms and research institutes make a living from describing and explaining short-term movements in a range of mostly economic indicators. An important objective when we talk about sustainable development is to redirect some of the attention of policy makers to longer term trends and developments of crucial importance when we are concerned with the long-term viability of our societies.

#### **1.4 On the geographical scale for sustainable development indicators**

76. We need to confront the question of what geographical unit or scale is relevant when trying to build an indicator set for sustainable development. It is true, of course, that a sub-global geographical unit cannot be said to be sustainable if the globe as a whole is deeply unsustainable. While partial improvements are possible in selected areas, in the long run everybody will have to be aboard the 'development ship' if the trip is to last for a long time, i.e. be sustainable. On the other hand, political actions and the potential to change course is predominantly a regional, national or even local privilege. For this reason it makes sense to try to measure whether they, as

a region (e.g. EU), nations or local provinces, are behaving in a manner that supports or detracts from the sustainability of the globe. This is then the twin aim of the regional, national or local sustainable indicator sets; to show whether or not they are managing their own territories in a sustainable manner and whether they contribute or not to global sustainability.

77. Thus, the capital approach as a conceptual basis for sustainable development indicators has the advantage of being applicable on several geographic levels. In addition to the global and the national levels, it is also possible to envisage the capital approach applied to the local level.

## **1.5 A summary of policy implications of the capital approach**

78. Measuring sustainable development by indicators based on the capital approach will have potential policy implications, e.g. it can have potential impacts on how policies for a sustainable development are formulated. Among the general policy implications of the capital approach, the most noteworthy are perhaps listed below.

a) The capital approach emphasizes more strongly than most existing approaches the need to focus on the long-term determinants of development. That is, by focusing on the development of the total resource base of our societies, underlying structures determining the longer term development are emphasised.

b) Indicators based on the capital approach ideally reveal more clearly the distinction between current income and capital consumption. This is of special importance in natural resource dependent countries.

c) The capital approach also encourages broader thinking about the concept of investments. In particular, the beneficial effects of investment in natural, human and social capital will be more focused.

d) Finally, the capital approach encourages policies that simultaneously attempt to maximize current welfare and to ensure that its capital basis is maintained over the long term.

79. Overall, one of the stronger points in favour of the capital approach is that it provides a stable framework for discussing and measuring the long term trends and developments of modern societies.

80. It is also worth reiterating that the conceptual framework of the capital approach can be employed both at the national and the local level, imposing a common structure to sustainable development at many levels within a society.

## **2. Overview of existing approaches to measuring sustainable development**

### **2.1 Introduction and brief history of existing indicators history**

81. The 1992 UN Conference on Environment and Development was a major impetus behind efforts to develop indicators for measuring progress towards sustainable development. After this conference, the United Nations Commission on Sustainable Development (UNCSD) was



established - with one of its tasks being to monitor countries' efforts in developing and using sustainable development indicators.

82. UNCSO developed a set of sustainable development indicators and a number of countries and Eurostat tested the proposed methodologies, the results of which led to revisions to the indicator set.

83. Approximately 22 countries started by testing the SDIs proposed by the UNCSO (UN 1996), including countries in Africa (Ghana, Kenya, Morocco, South Africa, Tunisia), Asia and the Pacific (China, Maldives, Pakistan, Philippines), Europe (Austria, Belgium, Czech Republic, Finland, France, Germany, United Kingdom) and the Americas and the Caribbean (Barbados, Bolivia, Brazil, Costa Rica, Mexico, Venezuela) (UN 2001). This work often showed that some of the proposed indicators were not that well oriented to national needs. One result was that countries started developing their own sustainable development indicator sets. Switzerland, the United Kingdom, Germany, Sweden, and Belgium, to name a few in Europe, were some of the countries to establish indicator sets in the late 1990s. Since then the regular publication and revision of these sets in connection with national sustainable development strategies has been part of these countries' monitoring of national sustainability. The United Kingdom has perhaps had some of the longest experience with indicator sets connected to policies, the first being in 1996, the second in 1999 and the third in 2005, since when updates have been published annually.

84. The OECD also looked at how to measure sustainable development and focused on integrated economic, environmental and social frameworks that could be used for statistical development of indicators for sustainability (OECD 2004). Eurostat established a Task Force of national experts in 2001 to develop a set of sustainable development indicators to support the EU sustainable development strategy. A first set of indicators was adopted in 2005, and subsequently reviewed in 2007. A monitoring report based on the indicators is now produced biennially (Eurostat 2005, 2007).

85. In addition to these international efforts, many countries have developed their own sets of indicators for measuring progress towards sustainable development. The 2002 UN Summit on Sustainable Development in Johannesburg was an important milestone since a number of countries developed their own sustainable development strategies and related indicator sets in preparation for this summit meeting. Increasingly, sets of indicators have been established to be used to assess progress towards goals in national plans or strategies for sustainable development.

86. It has not been necessarily the national statistical institutions taking the lead in the development and evaluation of sustainable development indicators. In many countries, the lead organization has been a government ministry or agency, or indeed a non-governmental organization. However, the indicators have often been strongly dependent on the outputs of the national statistical institutions, have involved engagement with the institutions and the indicators are themselves regarded as official statistics. In many cases, the indicators have been established through wide consultation and engagement to ensure the different perspectives of stakeholders are taken into account.

87. Few countries have explicitly developed indicator sets based around the concept of capital. However, preceding most of the indicator development by ten years or more, there have

been development theories emphasising investment and saving. An important contribution was 'The Limits to Growth' in 1972 (Meadows et al., 1972) which emphasised the need to monitor the use of non-renewable resources. Natural resource accounts were developed for Norway in 1978 leading to capital-based sustainable development indicators established by the World Bank, Canada and Norway based on resources, national wealth and genuine savings.

## **2.2 'Policy-based indicators' – the predominant approach**

88. The establishment of sustainable development indicators has arguably been for many countries and institutions a key opportunity to bring environmental issues higher up the policy agenda, to set them alongside economic and social issues. The sustainable development indicators have also been instrumental in promoting the concept of sustainable development in a much clearer way than can be achieved through the expression of sustainable development strategies alone.

89. In many cases, the relationship between indicators and policy is very strong – with the policy framework in effect determining the indicators. Whilst there may be concerns about having indicators closely aligned with policy documents, their very strength has been their relationship with policy in that policy makers have seen them as being relevant and useful and effective for communication.

90. Behind the policy frameworks there has often been intensive, rigorous and consultative consideration given to how sustainable development should be defined and how it might be structured. In turn, the indicators themselves have often been open to consultation and scrutiny by stakeholders.

91. In several countries and institutions, the indicators are presented as an integral part of a sustainable development strategy, whether identified explicitly or generically. Commitments are made to report regularly on the indicators, and in some instances commitments go as far as taking action if the indicators are not reporting favourable trends.

92. With the indicators dependent on a policy framework, there is perhaps less transparency than if the indicators were defined as an independent exercise. There are very few examples of where countries or institutions have provided a full and detailed explanation of how they have elaborated and selected their indicators. Instead the indicators are seen to some extent as simply falling out of the policy framework. However, in reality behind the choice of indicators has been extensive consideration of available data and concerns about how best to present the indicator so as to communicate the issue behind the policy effectively. This does mean, however, that in most cases it is difficult to identify a framework designed specifically for the indicators. In particular this means that, owing to data availability, it may be impractical to develop certain indicators and their absence from the indicator set may give the impression that a particular issue has been overlooked. In some cases this is overcome by having 'indicators to be developed' that are included in the indicator set but for which there are currently no data, but this approach is not used universally in existing indicator sets.

93. Where a framework has been expressed explicitly, it may be very strictly based on the policy objectives in the national strategy, or it may take the form of the 'Pillars' approach, where the pillars are usually 'economic', 'social' and 'environmental', or it may be influenced by the

Pressure-State-Response (PSR) approach developed by the OECD<sup>9</sup> as a means of breaking down issues. In a very few cases, the framework may be explicitly based on the capital concept, but ideas of stocks and flows are at least implicit in the thinking behind some 'policy-based' indicators (Hall, 2006)<sup>10</sup>.

94. An obvious drawback to the indicators being so strongly aligned with policy is that if the policy framework changes then the indicators may have to follow suit. This is particularly illustrated by the UK example, where there have been three sustainable development strategies and three associated indicator sets. However, the reality is that in such cases the changes to the indicator sets may be on the periphery and at the core there is reasonable consistency between the different generations of indicators. In addition, it would be wrong to set the indicators in stone, when refinements would be beneficial in terms of coverage or understanding.

95. Hitherto there has been only minor consideration given to international comparability in the development of national indicator sets. This is perhaps inevitable both in terms of differing priorities between countries and pragmatically in terms of data available at the national level. Nevertheless, there is a debate to be had in terms of the need for and the benefits of having international comparability across sustainable development indicators. For the issues that are of global or regional importance, the indicators are likely to be broadly consistent without external coordination (for example most if not all sustainable development indicators sets will include an indicator on greenhouse gas emissions). For other national issues related to the economy, the environment or social spheres, it would still be valuable to be able to compare across nations or regions.

96. Within the EU there is inevitably some convergence in the indicators used. This is for two reasons: firstly - and more obviously - as newer Member States develop their indicator systems, they are likely to be influenced by the indicators adopted by the EU. Secondly and less obviously, the indicators used by the EU have been developed through engagement with Member States and those with well-established national indicator sets have been influential in the direction taken to establish the EU indicator set.

### **2.3 Status, themes and commonalities in existing indicator sets**

97. In assessing the commonalities in existing indicators, it has been beneficial to make use of a Eurostat commissioned study 'Improvement of Structural and Sustainable Development Indicators', which includes an analysis of national sustainable development strategies, national indicators and the relationship with indicators established for EU. Results of a Netherlands study of existing indicators [reference] have also been used as a basis for the assessment. Whilst both studies are predominantly limited to EU countries it is considered that the results provide a sufficiently representative picture of indicator approaches to negate the need for in depth analysis of indicator sets developed elsewhere. However, it is recognised that examples of sustainable development indicator are not limited to Europe.

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<sup>9</sup> Later extended to Driver-Pressure-State-Impact-Response (DPSIR), adopted by UNDP in 1997 and used by EEA.

<sup>10</sup> Presentation on frameworks behind UK sustainable development indicators given to 1<sup>st</sup> meeting of WGSSD, Luxembourg, April 2006

98. The objectives of the study include:

- systematic analysis of the coverage of the priorities set by the national sustainable development strategies through indicators;
- systematic comparison of the use of sustainable development indicators between Member States with the priorities and indicators used at the EU level;
- identification of trends in the use of indicators by Member States.

99. The study covers analysis of the then 25 Member States and additionally acceding, candidate and European Economic Area countries. Particular challenges for this study include determining when a national document is a sustainable development strategy and when a set of indicators are sustainable development indicators. The size of indicator sets also varies considerably between countries, and a number of countries have both a 'headline' set and a wider 'core' set of indicators. In addition, the declared number of indicators may be an understatement, where individual indicators consist of several independent component indicators. All these issues make comparative analysis difficult and it has not been possible to include all countries in all the analyses.

100. The study found that the number of national sustainable development indicators ranged from 12 in France to 190 in Italy, if component indicators were taken into account.

**Table 2.1 Number of indicators in selected national sustainable development indicator sets**

	Total
Austria	95
Belgium	45
Czech Republic	100
Denmark	119
Estonia	95
Finland	35
France	12
Germany	28
Greece	70
Iceland	56
Ireland	36
Italy	190
Latvia	187
Lithuania	75
Luxembourg	27
Malta	24
Netherlands	32
Norway	16
Romania	13
Slovakia	71
Slovenia	71
Sweden	91
Switzerland	163
United Kingdom	147

101. Analysis has been undertaken to identify commonalities both in terms of the themes in national indicator sets and specifically in terms of indicators. Based on analysis of indicator sets from 15 countries, including countries outside Europe, and international organizations (for which comprehensive analysis was possible) and the EU set, there are eleven broad themes that are clearly most commonly used as a basis for the indicator sets, see Table 2.2 (the number of national and EU indicator sets including these themes are shown in the last column).

**Table 2.2 Most common themes in selected indicators sets**

Rank	Themes	Number of indicators sets*
1)	Management of natural resources	16
2)	Sustainable consumption and production	15
3)	Climate change and energy	15
4)	Transport	14
5)	Social inclusion	14
6)	Education	14
7)	Research & Development, Innovation	14
8)	Socio-economic development	13
9)	Public health	13
10)	Good governance	13
11)	Global dimension	12

\*based on themes where 10 or more countries reflect them in their indicator sets.

102. There are a further 12 broad themes evident in various sets, although they are not so commonly used.

103. Analysis of the commonalities in indicators is also made difficult because indicators that essentially cover the same issue may be expressed in different ways (e.g. as growth rates, per capita, per land area, etc.) but could be essentially covering the same thing. As far as possible, the Eurostat study has attempted to clarify the extent to which indicators are commonly used. This analysis has been undertaken comprehensively for 17 countries, combined with the EU and United Nations sustainable development indicators. The indicators have only been identified in terms of their broad commonality and not necessarily in the specifics of how they have been expressed. The most commonly used broad indicators are listed below Table 2.3 (the number of countries and institutions using the indicators are shown in the last column).

**Table 2.3 Most common broad indicators in national and institutional indicators sets**

Rank	Broad indicators	Number of indicator sets*
1)	GDP per capita	18
2)	Emissions of greenhouse gases	17
3)	Education attainment	16
4)	Municipal waste collected and its disposal	15
5)	Official Development Assistance	14
6)	Unemployment rate	14
7)	Life expectancy	14
8)	Biodiversity and number of protected species (birds, trees)	14
9)	Share of energy from renewable sources	13
10)	General government gross net debt	12
11)	Research & Development expenditure	12
12)	Risk of poverty	12
13)	Air pollution	12
14)	Emission of ozone precursors	12
15)	Employment rate	11
16)	Organic farming	11
17)	Mortality due to selected key illnesses	11
18)	Energy consumption by sectors	11
19)	Energy use and intensity	11
20)	Water quality	11
21)	Investment share of GDP	10
22)	Freight transport by mode	10
23)	Area of protected land	10
24)	Fishing stock within safe biological limits	10
25)	Intensity of water use	10

\*based on indicators where 10 or more countries or institutions have adopted them.

## 2.4 Examples of indicators sets

### 2.4.1 Eurostat's 'Indicators to measure progress in the EU sustainable development strategy'

a) A brief history on SDS and SDI; ii) Main features of the current set (framework, hierarchy, number of SDIs, ...); iii) List of Headlines SDIs.

### 2.4.2 UK sustainable development indicators

i) A brief history on SDS and SDI; ii) Main features of the current set (framework, hierarchy, number of SDIs, ...). iii) List of Headlines SDIs.

### 2.4.3 Switzerland sustainable development indicators 'MONET'

i) A brief history on SDS and SDI; ii) Main features of the current set (framework, hierarchy, number of SDIs, ...); iii) List of Headlines SDIs.

## 2.5 Assessment and conclusions

104. There is a wide range of experience in the development and use of sustainable development indicators across countries. With some exceptions, the indicators have been established to support a national strategy and to that extent at least are policy-related indicators. Data availability also probably have influenced the choice of actual indicators. A statistically-driven framework is usually not explicitly expressed.

105. However, behind the policy development there has often been a great deal of consultation and theorising as to how to frame sustainable development for each country or institution.

106. The number of sustainable development indicators and the approaches used by each country vary considerably, which makes identifying commonalities in approaches difficult. Furthermore, certain issues may not be covered by existing indicators sets, not through a lack of appreciation that the issue should be covered but owing to a lack of available data. This will inevitably affect comparisons with indicators identified using a capital-based approach, where data availability has not yet been concerned. Conversely there are issues that may not be sufficiently large in scale at present to feature in a capital-based framework, but which are often included in sustainable development indicators sets as issues that stakeholders want to see developing and contributing to sustainable development e.g. organic farming or use of renewable energy resources.

**Comment [kal6]:** From Eurostat: I am not sure what 'scale' refers to here. If the capital approach is conceptually based, the scale of the issue should not matter as long as an indicator is a flow or a stock that is relevant.

107. However there are some broad themes and indicators that are most commonly used, which may provide a basis for comparison with a framework and a set of indicators developed explicitly using a capital-based approach.

References: to be added by Stephen Hall

## 3. An analytical approach to sustainable development: the capital framework

### 3.1 A theoretical outline of the capital approach to measuring sustainable development

108. Within the framework of the United Nations, the European Commission, the International Monetary Fund, OECD and the World Bank, there have for a long time been discussions on how to complement and extend the economically oriented national accounts to better capture the importance of natural resources and the environment. Some industrialised countries took the lead on this in the 1990s and organised the so-called London group<sup>11</sup>. One of the results so far is the UN handbook on System for Environmental and Economic Accounts (SEEA, 2003). Though the SEEA was not conceived primarily as a framework for measuring sustainable development, the handbook notes this as one possible application of the system. Three different conceptions of sustainable development are described in the handbook, with the capital approach noted as the one to which the SEEA is best suited. Sustainable development from a capital approach is characterised as follows in the handbook:

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<sup>11</sup> See: <http://millenniumindicators.un.org/unsd/envaccounting/londongroup/default.asp>

*“Sustainable development is development that ensures non-declining per capita national wealth by replacing or conserving the sources of that wealth; that is, stocks of produced, human, social and natural capital.” (SEEA, 2003, p. 4)*

The rationale for this definition can be found in economic growth theory as outlined in Chapter 0.

109. Classical development theory, briefly mentioned in Section 0, is strongly focused on investment and capital as central determining factors for economic growth. While traditionally restricted to economic markets and productive assets, it has recently been extended and broadened in such a way that it is made relevant also for the question of how to secure a sustainable development according to the SEEA definition quoted above.

110. Sustainable development implies non-declining per capita well-being over time. Well-being in turn, while difficult to observe and measure with objectivity and precision, is generally viewed to be a function of consumption. Here, consumption must be understood in a broad sense, i.e. covering both consumption of marketed as well as non-marketed goods and services. Even well-being derived from the knowledge alone that certain assets (e.g. threatened species of some kind) exists, should be counted as consumption in this broad sense<sup>12</sup>. All of these goods and services can in turn be viewed as being produced from resources or capital. Production (and hence consumption) can therefore be seen as a function of capital and the way to choose to allocate the capital through the working of societies institutions (Dasgupta, 2001). Well-being is therefore, indirectly, also a function of how assets are distributed. In this context, distributional rules and outcomes can be viewed as a manifestation of social capital.

111. Some argue that capital is perhaps not the most appropriate term when we talk about the resource base of a nation (Czesany, 2007). Given its long history in economics, it may give a misleading connotation since some forms of capital (human and social) cannot be treated in complete analogy with physical or financial capital. For instance, human capital in its current meaning is what used to be called human potential or human resources, while social capital resembles the notion of social cohesion and social institutions.

112. There are at least three important reasons why we still find the capital concept useful. First, it has proved to initiate interdisciplinary discussion of development and has brought together scientists and policy analysts from various areas. Thus, it provides a common ground for balancing economic, social, and environment objectives. Second, the capital conceptualization gives an important insight in that the development of society is not entirely stochastic or random. Furthermore, it explicitly states that if there is an “investment” in capital formation instead of current consumption, it is more likely to enhance the well-being in the future. In other words, if we use too much capital for current consumption, we may seriously diminish the level of future well-being. And third, there is a long-standing research literature presenting us with a rigorous analytical framework based on the concept of capital.

113. It can be argued that distributional or equity issues related to today’s generation (e.g. intra-generational issues) should be included separately at this point as these are seemingly not easily captured by the capital approach. Social capital is, however, strongly influenced by the current degree of fairness in the distribution of resources. After all, social well-being is not only

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<sup>12</sup> Thus, not only consumption, but also assets enter the utility function of individuals.



determined by the total capital base of a society, but also by how this wealth is distributed among the members of the society and who have control of the assets. This follows from the fact that societies care about equity or distributional issues. An unfair distribution of resources can deteriorate trust, institutions and other aspects often associated with social capital and essential for a well-functioning and welfare generating society. The question of equity or justice thus relates to social capital.

114. The concept of a nation's total resource or capital base is sometimes termed the *total* or *comprehensive national wealth* of the nation. Care should be taken in using this concept, however, as national wealth is sometimes also used for a monetary valuation of the productive assets in an economy. In this report the term *total national wealth* is used in a broader sense, as a term designating the total capital base of a nation, including tangible as well as non-tangible capital; including all types of capital giving rise to consumption possibilities that in turn gives rise to social welfare, or well-being of people. It should be stressed that it is the effect on well-being of a particular type of capital that gives that particular capital asset a value. The (marginal) value of a unit of extra capital is what is called the *accounting price* of that particular type of capital (Dasgupta, 2001).

115. Traditional types of capital like financial assets and produced capital in the form of machinery, buildings and other physical man-made infrastructure, are included in the national wealth. Similarly, the natural resources we use, whether renewable or non-renewable, are included in the concept of national wealth. Less tangible types of natural capital not sold in markets must also be included however, as is now the case in modern theories of environmental economics. This is partly related to nature's provision of environmental services like absorption of our wastes and provider of recreational services. In addition, services related to our competencies and skills (often termed human capital) must be part of the total capital base or our national wealth. Finally, our societies are more than the sum of individuals. Thus, we have created laws, institutions and governmental structures regulating our lives, and a myriad of networks that link and regulate our interactions with others in ways that clearly enhance our well-being. This highly intangible type of infrastructure in civilized societies giving rise to allocation rules is what is termed social capital.

116. Summarising, we may partition the wealth of a nation into components consisting of:

- financial and produced capital;
- natural capital;
- human capital;
- social capital.

117. Put in symbolic terms we thus have:

$$TNW = pRR + pNN + pHH + pSS$$

where  $TNW$  denotes total national wealth,  $R$ ,  $N$ ,  $H$  and  $S$  is produced, natural, human and social capital, respectively, and the  $p$ 's are associated theoretical *accounting prices*, or shadow prices, which are defined as the well-being effects of a marginal change in the corresponding types of capital. The accounting prices should in theory reflect the scarcity of the various resources, but also the degree of substitutability among the various types of capital as well as distributional and institutional arrangement affecting the well-being derived from the resources. Thus, a fishing

boat (a piece of produced capital) is not worth much without fish in the sea (part of natural capital). Another example could be unspoiled nature. The accounting price for this type of asset is the amount of well-being an additional unit (e.g. a hectare) of shielded area provides. If development projects infringe on such areas reducing the amount of protected nature, the accounting price (the value measured in term of our well-being) is likely to increase. This will give a clear signal that it might be well-being enhancing to invest in more protected areas compared to other types of investment or consumption. Finally, it should be noted that the value of a resource quite frequently depends on the location of the resource. A fish pond may have widely different values in a developing and a developed country, for instance. Thus, a lot of information of importance to sustainable development is conveyed by the accounting prices, if we only knew how to determine them!

118. Fortunately, economic theory tells us that, under certain (stringent) conditions, observed market prices are fair estimates of the theoretical accounting prices. That is, market prices of a number of assets reflect the well-being effects of the same assets. This includes cases where the assets are bought and sold in free markets where nobody has undue market power, where the external effects of the assets are negligible, etc. While these conditions are seldom perfectly fulfilled, the market price can probably serve as a good estimate of the accounting price in most cases where the asset in question is traded.

119. However, much, if not most, of our total national wealth consists of assets that are not traded. Then other solutions will have to be found. We will return to this in e.g. section 0. Here, we only note that from a purely conceptual point of view, real changes in total national wealth (TNW) per capita is a very good candidate for being a sustainable development indicator (Hamilton and Clemens 1999, Dasgupta and Mäler 2000, Dasgupta 2001). This is really not very surprising given the definition of the accounting prices. The total national wealth indicator is actually constructed to capture (changes in) in society's potential to provide social well-being.

120. What is achieved by focusing on the capital base or total national wealth per capita when it comes to measuring sustainable development? Five points seem worth putting forward (in addition to the more general points mentioned in paragraph 112).

121. First, a capital based approach to sustainable development is built on well developed theories of economic development. This provides for a stable theoretical foundation for the approach.

122. Second, while well-being is difficult to measure with objectivity and precision, the national wealth may be simpler to quantify (although, as we will see, not without problems). What we lose by this change in focus is of course the direct link to sustainable development; preservation of the national wealth is not enough in itself to secure a preservation of well-being, although it could be argued that it is a necessary condition.

123. Third, by framing the question of sustainable development as a question of preserving the total national wealth, we have created a finite 'universe' which we want to measure. Therefore, by following the capital approach it is possible to assess whether the indicators for sustainable measurement leave out or not important and relevant issues (i.e. are all relevant types of capital captured by the indicator set?). This would be very much more difficult to assess without an all-encompassing framework limiting the issues that would treat sustainable development.

124. Fourth, by focusing on capital, or rather its development over time, a long-term focus in policy making is perhaps more likely to be assured. This is because management of capital stocks is by nature a long-term issue. While many flows may be turned on and off over relatively short periods, it takes time to change a stock. Politicians are thus by this approach invited to consider long-term structural changes in our societies as these are the phenomena that may threaten the sustainability of the development.

125. Fifth and final, the capital approach is ‘scalable’ in the sense that it may work on several different geographical scales (see also section 0). It makes sense at on global, regional and national scale to measure or indicate the status of the total (national) wealth and to follow this over time. However, also on a local scale (e.g. the EU NUTS 2 level), communities can ask questions of how their ‘local wealth’ (i.e. capital base) is composed and whether or not it is managed in a way that may secure (partial) sustainable development on this scale. A stronger focus on the well-being generating basis of a community may make it easier to formulate a long-term strategy for securing sustainable development for the community. However, the smaller the scale, the more open will the unit under consideration be, complicating the measurement of sustainability. The capital approach nevertheless represents a viable and useful conceptual framework for sustainable development indicators at many levels.

126. In the reasoning above, we have translated and simplified the question of sustainable development to a question of whether we manage the total capital base – the total national wealth – measured per capita in a way that secures its maintenance over time. Thereby, the focus in the sustainability debate has been sharpened since the issue of sustainable development has been put into more concrete terms, i.e. a question whether our real, natural, human and social capital measured per capita increases or declines over time. Furthermore, if one wealth component, e.g. petroleum wealth, declines, is this being offset by growth of other components such as human capital? This last question touches on a difficult point of whether, and to what extent, the various wealth components can be expected to substitute for each other as far as well-being effects are concerned. This question is further discussed after a brief description of the various types of capital that constitute total national wealth.

### **3.2 Description of types of capital**

127. As mentioned, the capital basis of our societies can be decomposed into produced, natural, human and social capital. The value or usefulness of the capital resides in its potential to create well-being, either directly or indirectly through the use of the capital as a production factor. This valuation is difficult to observe for several reasons. A useful way to illustrate this is shown in Table. Here, a taxonomy of the benefits of an asset is depicted. The private economic benefits (quadrant I) is what is usually traded and captured by observable market prices. Public economic benefits (or damages, see quadrant II) are external effects where the asset gives benefit or dis-benefits to persons not involved in the economic transaction. The wider social benefits of assets are those well-being effects stemming from assets that are not captured by markets and therefore not traded. These could be private (quadrant III) or public (quadrant IV). An example of this taxonomy for a privately owned forest could for instance involve the following: the timber of the forest represents the private economic benefit of the asset. However, due to difficulties in excluding other people from the forest, and because the forest also usually provides habitats for animals that can be hunted, for berries that can be picked, etc., the asset provides public economic benefits. The wider social benefits to the owner and the general public

could involve the provision of beautiful scenery or the pleasure of knowing that plants and animals are given habitats and shelter in the forest.

128. All the types of capital will usually provide all of these benefits, however, to a smaller or larger degree depending on capital type. Thus, benefits from produced capital will probably reside mainly in quadrant I, while social capital perhaps provides most benefits of type IV.

**Table 3.1 Taxonomy of capital benefits**

	Private benefits	Public benefits
Economic benefits	I	II
Wider social benefits	III	IV

### 3.2.1 Produced (real) capital

129. Real or produced capital refers to produced machinery, buildings and infrastructure like roads, harbours and airports, etc. Financial capital, e.g. 'money in the bank' or other assets that can be converted into goods and services on short notice, is usually included in the concept of produced capital as it is often converted to ownership of such capital. Net financial assets in an open economy represent net claims on foreign produced assets.

130. The value of the produced capital is recorded in the national accounts, and it is a common assumption that the observed price of this type of capital is a fair reflection of the well-being effects or the accounting price of produced capital. In practice there are of course uncertainties in the reported numbers.

### 3.2.2 Natural capital

131. Natural capital refers to the earth's natural resources, land and the ecological systems that provide life-support services to society and all living things. In its discussion of the capital approach, the SEEA (2003) characterises natural capital as follows:

“Natural capital is generally considered to comprise three principal categories: natural resource stocks, land and ecosystems. All are considered essential to the long-term sustainability of development for their provision of ‘functions’ to the economy, as well as to mankind outside the economy and other living beings.”

132. Thus, this broad category of natural capital therefore covers both material non-renewable natural resources like land, coal, oil and gas, minerals, sand and gravel etc. and conditionally renewable resources like forest, fish, water falls used for hydro power production and wind, to mention but a few. These are all resources exploited mostly for sale on markets, and their valuation in monetary terms is therefore a relatively straightforward exercise in resource rent valuation.

133. In addition, natural capital covers ecosystems and other natural systems able to provide various services to mankind. Borrowing the classification scheme used in the Millennium Ecosystem Assessment (2005), natural capital may be divided into the following categories:

- Provisioning (food, fresh water, wood and fiber, fuels, minerals,...);
- Regulating (climate, flooding, disease, cleaning of water, air and soil,...);

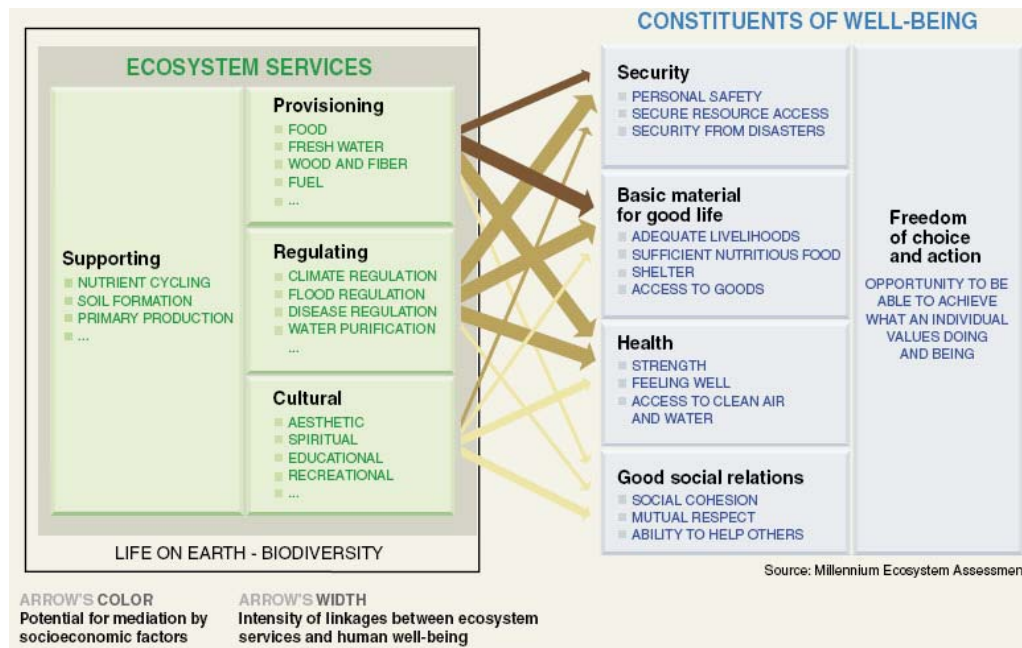
- Cultural (aesthetic, spiritual, educational, recreational, ...).

134. Material resources like minerals, timber, fish, hydropower, etc., belong to the Provisioning category above.

135. When it comes to the Regulating category, it covers services like absorption of unwanted by-products from production and consumption; exhaust gases from combustion or chemical processing, water used to clean products or people, discarded packaging and goods no longer wanted, etc.

136. Cultural services are sometimes called amenity functions and affect mankind only (or at least are the only ones measurable to us in human terms).

137. The Millennium ecosystem assessment (2005) illustrated the many linkages between ecosystem services and human well-being as in Figure 3.1.



**Figure 3.1 Classification scheme from the Millennium Ecosystem Assessment (2005)**

The figure depicts the strength of linkages between categories of ecosystem services and components of human well-being that are commonly encountered, and includes indications of the extent to which it is possible for socioeconomic factors to mediate the linkage. (For example, if it is possible to purchase a substitute for a degraded ecosystem service, then there is a high potential for mediation.) The strength of the linkages and the potential for mediation differ in different ecosystems and regions. In addition to the influence of ecosystem services on human well-being depicted here, other factors—including other environmental factors as well as economic, social, technological and cultural factors—influence human well-being, and ecosystems are in turn affected by changes in human well-being.

138. Examples of services are nature's absorptive capacity for waste products that otherwise would cause pollution damages, e.g. providing sinks for greenhouse gases like CO<sub>2</sub>, and recreational services of many kinds.

139. Some of the environmental services are monetized in other asset values – beachfront property, for example, is expensive because of the service provided by a beautiful view. Hotels and lodges capitalize some of the value of other natural assets. Farmland values capitalize the value of pollination services provided by nature. Natural assimilation of pollutants means that pollution controls do not need to be as stringent (and costly) as they would otherwise be, etc. What is not captured in asset values is some sort of pure option or existence values that people may have for some assets, and maybe the services that assimilate very long-lived pollutants such as carbon dioxide. Perhaps most importantly are the services provided by ecosystems allowing food to be produced. This depends on, among a lot of factors, a minimum amount of biodiversity in the ecosystems, a factor which therefore is an essential part of the natural capital. The valuation of these kinds of services is often extremely difficult, and for this and other reasons is seldom captured in a monetarised aggregated natural capital indicator.

140. The problems of valuing natural capital (e.g. determining the accounting prices) are as varied as the resources themselves. For most of the material resources, market prices exist. However, they seldom reflect negative externalities emerging from the exploitation of the resources. For instance, timber extraction often comes at the expense of biodiversity preservation, soil protection and other environmental services provided by the same trees that give us timber. To arrive at the accounting price, the market prices will have to be corrected for these kinds of negative impacts. The sinks and service functions of the natural capital is often un-priced in the market. Here, special methodologies must be employed, like contingent valuation or hedonic pricing, in order to be able to estimate the accounting prices. Finally, in a fair number of cases it turns out to be practically impossible to find reliable and objective accounting prices. The many dimensional services of biodiversity may be such a case. In view of the difficulties of determining the accounting prices, other measures of the assets must be sought. Thus, some of the non-market parts of the natural capital could be measured by a few additional indicators in physical terms.

141. Although we can measure many natural assets and we know how to measure other assets but lack data, there are other cases (e.g. biodiversity) where there are large conceptual as well as measurement issues. Overall it is fair to say that accounting for natural capital is not yet operational in the way that produced and financial capital are<sup>13</sup>.

### 3.2.3 Human capital

142. Human capital is sometimes defined as an individual's collection of human resources, including personal abilities, knowledge, skills, time, and energy. Human capital is thus about capital residing in individuals. Some define it as "the stock of economically productive human capabilities" (Bahrman and Taubman in World Bank, 2006, p.89) highlighting the economic market value of these capabilities. Others define the concept as "the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being." (OECD, 2001 p.18), thus placing more weight on the well-

**Comment [kal7]:** Note from France: There are many sides to this question. The individual/collective dimension is one. The quantity/quality is another (it seems by the way that there are no demographic consideration at all, the Human Capital being thus a quality property). The measurement aspects are not dealt with here, and they are at the root of many paradoxes, especially when human skills or even life are valued on the base of summing future benefits.

<sup>13</sup> See Vemuri and Costanza (2006) for a brave effort in measuring the impact of various types of capital on social welfare.

being aspect. We should also note that some element of creating human capital is a consumption good – we enjoy learning in and of itself. Gary Becker, who was among the first ones to use the term “human capital,” viewed education, on-the-job training and health as components of human capital with consequences for earnings and economic productivity (Becker, 1993). Becker’s book *Human capital* (Becker, 1964) became a standard reference for many years<sup>14</sup>.

143. Today, the economic importance of knowledge and skills is widely recognised both within labour economics (for individuals’ income), growth theory and business. At the same time, many see the personal well-being effects and social effects of learning as being as important as the economic effects. The literature on human capital, therefore, focuses on several different economic aspects, as well as its contribution to society in general and aspects of individual well-being.

144. One could distinguish between the economic and the wider social benefits on the one side and between the private and the public benefits of human capital enhancement on the other, see Table (Czesany, 2007).

145. The private economic benefits are at the core of the original human capital theory (quadrant I in the table). It is a well-supported thesis that better-educated people are more likely to be at work, and if economically active, are less likely to be unemployed. Several studies indicate that an additional year of schooling is associated with, on average, between 5 and 15 per cent higher earnings, though the variations among countries may be quite high. Similarly, data from IALS (OECD and Statistics Canada, 2000) show that education, literacy, experience, parents’ education and the use of native language account for between 20 to 50 percent of the total variations in the labour market earnings.

146. In addition to the benefits captured by individuals, investment in human capital may yield benefits to the economy at large (quadrant II). The collective economic impact should, in principle, be identifiable in the rate of economic growth, but in practice the impact has been difficult to confirm and quantify. According to a recent OECD work:

“the improvement in human capital has been one of the key factors behind the growth process of the past decades in all OECD countries, but especially so in Germany (mainly in the 1980s), Italy, Greece, the Netherlands and Spain where the increase in human capital accounted for more than half a percentage acceleration in growth with respect to the previous decade” (OECD, 2000).

147. For OECD countries as a whole, the implication is that one extra year of full-time education (corresponding to a rise in human capital by about 10 per cent) leads, on average and in the long run, to an increase in output per capita of between 4 and 7 per cent (OECD, 2001). Such conclusions are, nevertheless, inevitably questioned. For instance, Korea has seen a dramatic increase in the educational attainment of the labour force. Yet this dramatic expansion has not been translated into an equally dramatic effect on the growth rate of the economy. Still, it can be argued that the potential for development may have increased. In any case, the micro based evidence of returns to education is well documented. It is the macro based evidence that is questioned.

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<sup>14</sup> Becker won the 1992 Nobel Prize in economics for extending economic theory to aspects of human behaviour which had previously been dealt with only by other social sciences.

148. Thus, during the last ten years or so, growth researchers have bounced from identifying quite dramatic effects of education on economic growth to calling into question the existence of any effect at all. Recent research is placed somewhere in between these two extremes, but perhaps leaning closer to the findings that education has a major impact.

149. In addition, there is a wide range of non-market benefits of human capital. Using controls for income, race, social status and other variables, the research has shown that education tends to be correlated with:

- better health;
- lower crime and delinquency rates;
- higher civic participation, volunteering and charity giving;
- promotion of education to next generation;
- higher rates of self-reported happiness.

### 3.2.4 Social capital

150. The notion of social capital is the most recent addition to the capital approach. As social capital has its origins in sociology, the focus has been identifying the positive elements of society to be conserved and further developed. This has led to a number of theoretical approaches for conceptualising social capital being proposed. These are highly overlapping, and range from the distribution of basic goods, to the maintenance of social peace, to social protection and constitutional goals, to networks and associated norms.

151. Although there has been a considerable amount of research and attention devoted to social capital in recent years, there remains a lack of agreement around a precise definition of the concept. However, there is a growing consensus around the idea that it is social networks and their associated norms that generate benefits. The most commonly adopted definition in this conceptualisation of social capital is the OECD definition: “networks, together with shared norms, values and understandings which facilitate co-operation within or among groups” (OECD, 2001).

152. Like other forms of capital, social capital generates benefits that improve welfare. The benefits can be described as institutional, such as the rule of law, universal suffrage, transparency of political process, legal systems, and international conventions and agreements, and as cultural, such as language, culture, religion, sports and arguably fashion. Although similarly intangible, human and social capital refer to different concepts, as where human capital is conceived as individual, social capital focuses on features of social organization and institutions.

153. Social capital, defined in terms of networks, was described independently by sociologists Pierre Bourdieu and James Coleman in the 1980s. Bourdieu (1986) defined social capital as an individual asset, focusing on the benefits accruing to individuals by virtue of participation in groups. Coleman (1988 and 1990) focused on the more collective characteristics of networks, emphasising social capital as the collective benefit derived from social interaction. Although social capital has its roots in sociology, it has also become an important topic for political scientists and economists (Putnam 1983 and 1995, Fukuyama 1995). In the late 1990s, the concept became more reputable than previously, with the World Bank devoting a research



programme to it and with its currency in Robert Putnam's book, *Bowling Alone* (2000), which traced the decline of group membership in the USA.

154. In thinking about social capital, the following simple model can be asserted. There are sources, assets and outcomes associated with social capital. The sources are individuals, groups and institutions. The assets are the networks and associated norms, such as shared understandings and informal rules that influence behaviour. Networks link individuals, groups and institutions. They occur in a variety of different modes and forums, including from face-to-face meetings, to legislation, to technology-assisted transmission of information. The outcomes are the positive and negative effects that come from social capital and can include identity and sense of belonging, increased knowledge and understanding, community resilience, lowering of transaction costs, conflict resolution, social exclusion or intolerance of difference, reduced family functioning and corruption.

155. It is widely considered that social networks serve an important purpose in generating welfare. The creation of social networks may have a direct welfare effect as individuals who are strongly embedded in societal networks tend to be happier and more satisfied with life than those who are less well integrated in society. Also, social capital can produce increases in other types of capital, for example, the importance of social networks in the search for new jobs, or the stimulation of innovation when there are strong knowledge networks. Finally, the effects of network externalities such as trust may lead to general increases in efficiency and a decline in transaction costs. Generalised trust and the creation of commonly shared norms result in informal checks on behaviour which are far less costly than formally institutionalised transactions based on contracts, formal sanctions and legal systems.

156. Social network analysis is not a recent arrival in the sphere of sociology or other disciplines. The composition, density and connectedness of various networks are thought to constitute important characteristics of social interaction with implications for society at large (Granovetter, 1973). In fact, network analysis is an area of research that is well rooted in theory and uses research techniques and measurement tools that have been proven particularly useful in the study of social capital. (Franke, 2005)

157. As social capital plays a role in generating welfare, it is an important component of sustainable development. In the same way that it can be argued that there is a critical level of natural capital needed to support and maintain human existence, it can be argued that a critical level of social capital is essential in order to maintain society and human existence in the long-term. The partial or complete destruction of social networks and their associated norms significantly undermines the capacity of communities to meet both short-term and long-term needs. In order to meet broader long-term goals than human existence, society requires networks and associated norms which can support this. Social capital creates the environment within which a longer-term view can be sustained.

**Comment [ka18]:** New text from Rachel et al. Need references.

**Box: Some definitions of Social capital**

“...features of social organisation, such as trust, norms (or reciprocity), and networks (of civil engagement), that can improve the efficiency of society by facilitating co-ordinated actions.”

Putnam, Leonardi and Nanetti (1993) *Making Democracy Work: Civic Traditions in Modern Italy*, Princeton University Press, Princeton, USA.

“...the institutions, relationships, and norms that shape the quality and quantity of a society’s social interactions.”

World Bank (2000) *What is Social Capital?* from [www.worldbank.org/poverty](http://www.worldbank.org/poverty)

“...the rules, norms, obligations, reciprocity and trust embedded in social relations, social structures and society’s institutional arrangements which enable members to achieve their individual and community objectives.”

Narayan (1997) *Voices of the Poor: Poverty and Social Capital in Tanzania*, World Bank, Washington D.C., USA.

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Source: Graham Hobbs (2000): What is Social Capital? A Brief Literature Overview, Downloaded from [http://www.caledonia.org.uk/soc\\_cap.htm](http://www.caledonia.org.uk/soc_cap.htm) 29.3.2007

### 3.3 Practical limitations to the ideal approach

158. Given that the total national wealth consists of the four types of capital discussed above, the question arises as to how to quantify the stocks and whether it is possible to aggregate these measures into an overarching measure of total national wealth, for instance measured in monetary terms. For a fairly recent survey of the literature, see Atkinson et al. (1997).

159. If substitution possibilities among the capital types are high<sup>15</sup> and the accounting prices of the various capital stocks are available or possible to estimate, a very convenient and intuitively understandable indicator for sustainable development would be change in total national wealth per capita. This quantity is often denoted as genuine investment or genuine saving. The change in total national wealth (net saving) measures the change in social well-being and as such is a one-sided indicator of sustainability. Positive net saving indicates that social welfare is increasing, a good thing in and of itself, but not equivalent to sustainability. Negative net saving indicates that social welfare is falling and, by implication, that the development path is not sustainable. Thus, a clear recommendation is that whenever feasible, capital assets should be valued in utilitarian or monetary terms<sup>16</sup>.

160. Unfortunately, there are several reasons why this is infeasible and impractical in general, some of which were hinted at in the previous section. As is argued below, there are clear-cut cases where substitution can be denied on technical grounds. Also, if the impact of economic development on e.g. the environment is becoming less and less marginal, as a number of scientists believe, then that clearly limits the scope for substitution. And since our economic and

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<sup>15</sup> In technical terms the elasticity of substitution should be higher than 1. If this elasticity is less than 1 (notionally, it is ‘difficult’ to substitute one asset for another) and some assets are finite and essential for production, then sustainable development is impossible without an appropriate rate of technological change to supplement the productivity of the economy.

<sup>16</sup> This is also in accordance with the recommendation from the National research Council of the National Academies in the USA, see Abraham and Mackie (editors) (2005).

scientific knowledge is limited, not only total aggregated national wealth and its long-term prospects need to be monitored – but also the key capital components.

### 3.3.1 Critical resources

161. It is recognized that the various components of national wealth cannot without difficulty and of necessity be replaced each other. In other words, the services our societies receive from the environment, which may be considered as dividends of the natural capital, cannot without difficulty be replaced by increased income, i.e. the dividend of other wealth components such as financial, real or human capital. As an important example, one may consider a fundamental asset such as a reasonably stable climate. If the climate is destabilised by increased greenhouse gas emissions, the basis for our civilisation in the long run may be threatened in a fundamental sense, almost irrespective of our material wealth. Getting to grips with the challenge of climate change is therefore a fundamental prerequisite for sustainable development *regardless* of what is happening to other types of capital and the indicator for economic wealth in particular, see section 0. Similarly, we now know that biological diversity is a fundamental condition for the maintenance of several central ecosystems' production of services for the benefit of all. Without a minimum of biological diversity, the services of central ecosystems may be significantly reduced with very adverse consequences for *inter alia* food production. Social cohesion is also essential and related to what we loosely associate with social capital. A global destabilisation of civilisations as we know it, perhaps because of nuclear conflicts, would certainly destroy all hopes of development.

162. However, the existence of critical (or essential) resources with limited possibilities of being substituted by other resources is itself not an absolute argument against using total national wealth as an indicator for sustainable development. The reason is as follows. As outlined in section 0, total national wealth is composed by:

$$\text{Total national wealth} = \sum_i p_i K_i$$

( $i$  = Produced capital, Natural capital, Human capital, Social capital)

where  $p_i$  are the *accounting prices* reflecting the well-being effects of an additional unit of capital type  $i$ . These accounting prices are not constants, and will increase for capital types that are essential and getting scarcer, while they will decline for other resources. It will therefore be increasingly difficult to compensate for the use of critical resources. In a similar way, the limited substitutability of a resource will make it difficult, and even impossible, to compensate for the use of this resource after a while. The dynamics of the accounting prices thus capture both the aspects of criticality and substitutability. In theory, therefore, total national wealth is a valid indicator for sustainable development even when the capital base consists of critical and non-substitutable capital types (Mäler, 2007).

163. The practical problem is, however, how to measure or estimate the correct accounting prices. This requires an understanding of how access to additional capital of various types affects the well-being of individuals and how this can be translated into a measure of social well-being. This is important knowledge to acquire and as such should be high on the research priority list. We must admit, however, that much remains to be ascertained today (see section 0). Left with this lack of knowledge, a reasonable course is to supplement the wealth indicator with specific, physically based indicators for those types of capital for which we lack a quantifiable valuation,

e.g. accounting prices. These indicators could either reflect changes in physical accessible resources or changes in the accounting prices.

### 3.3.2 Ethical considerations

164. There is in addition an ethical consideration. Certain observers put a question mark on the right of human beings to exploit nature and the environment in a destructive manner, even if this, at least in the short run, may increase total national wealth.

165. We shall not pursue this matter here, but only note that for some (perhaps many), nature has an intrinsic value outside and in addition to the direct well-being that use of natural resources may generate. If this is not captured in the accounting process of the assets, this will be an important reason why it is not sufficient to ensure that *total* national wealth is being maintained. We also have to maintain certain components of total national wealth at or above certain minimum levels for it to be possible to secure sustainable development. It is therefore necessary to monitor the development of key resources and the main individual components of national wealth separately.

### 3.3.3 System complexity

166. This point is further strengthened by the fact that we still have limited understanding of how economic activity depends on and influences environment and social relations. The complexity of the climate system, for example, means that it is only with considerable uncertainty that we are able to assess the effects of climate changes. Due to hysteresis effects in the climate system like melting of the northern tundra with release of large quantities of methane – a strong greenhouse gas – there probably exists so-called tipping points above which it will be very difficult to reverse further global warming. The exact position of those tipping points is however not known today. In the words of Arrow et al. (2004):

“Nonlinearities in ecosystem dynamics imply the presence of serious downside risks related to the losses of natural capital. Central estimates of the shadow prices for natural capital are likely to be too low if one only considers central cases rather than the entire distribution of potential outcomes from losses of natural capital.”

167. Similarly, the multitude of man-made chemicals that escape into the environment is so large that we, with our limited present knowledge, are unable to predict all their effects, either on nature or on human beings more directly. An important aspect of conservation of biological diversity is the fact that many characteristics and potential values related to diversity still are little known. Nevertheless, as already noted, most of the services of the eco-system that we benefit from depend on the existence of a minimum of biological diversity in these systems. It will therefore be important to maintain ecosystems and biodiversity even if today we are unable to foresee how deficient ecosystem services will affect the economy or our national well-being.

168. These forms of incomplete knowledge mean that estimated accounting prices are not always sufficient to provide signals of unsustainable development, and provide an additional reason why key individual elements of the national wealth, and not only the total value, are important.

### 3.3.4 Practical problems in valuation

169. Even though (rough) estimates of national wealth are now sometimes produced by some national statistical agencies in OECD countries, it is well known that there are many practical problems associated with this. One is the limited scope of many of the estimates, most often covering only produced and financial capital. Another problem, more acute when the estimates are broadened to also include for instance natural capital, is related to the fact that in order to add the various components of national wealth, they have to be expressed in a common unit of measurement, usually in the form of money. Ideally, the value of a unit of national wealth (the accounting price) should reflect how the relevant element could contribute to the well-being. However, it is difficult to estimate these so-called accounting prices, especially if the services are not traded in reasonably functioning or relatively undistorted markets. Perfect markets never exist in reality, depending as they do on the following very strict conditions<sup>17</sup>.

- i) Atomicity: an atomic market is one in which there are a large number of small producers and consumers on a given market, each so small that its actions have no significant impact on others. Firms are price takers, meaning that the market sets the price that they must choose.
- ii) Homogeneity: goods and services are perfect substitutes; that is, there is no product differentiation. (All firms sell an identical product).
- iii) Perfect and complete information: all firms and consumers know the prices set by all firms (see perfect information and complete information).
- iv) Equal access: all firms have access to production technologies, and resources are perfectly mobile.
- v) Free entry: any firm may enter or exit the market as it wishes (see barriers to entry).
- vi) Individual buyers and sellers act independently: the market is such that there is no scope for groups of buyers and/or sellers to come together with a view to changing the market price (collusion and cartels are not possible under this market structure).

170. The question is then to what extent deviations from these conditions are likely to distort the observed prices too much to make them useless in valuing assets. Chapter 7 of the SEEA 2003 provides an overview of valuation methods and problems related to the different methodologies proposed in the valuation of natural capital.

## 4. Indicators based on the capital approach

### 4.1 Measuring sustainable development based on the capital approach

171. In chapter 0 we argued that changes in total national wealth (TNW), valued in accounting prices and per capita, in theory is a good indicator for measuring sustainable development. The following sections, section 0 in particular, showed why there are numerous *practical difficulties*

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<sup>17</sup> [http://en.wikipedia.org/wiki/Perfect\\_Competition](http://en.wikipedia.org/wiki/Perfect_Competition)

in actually measuring the accounting prices. These were associated with problems like non-substitutability, criticality, complexity and ethical issues, to mention the most important.

172. Confronted with a situation where the ideal, i.e. changes in total national wealth as the sustainable development indicator, for practical reasons is unreachable, the question is: Can we in any way find an approximate solution based on the capital approach?

173. One option would in a sense be to admit defeat and to concentrate on finding physical indicators reflecting the quantity and quality (where relevant) of each of the capital assets (for instance length of roads of various qualities as indicators of road infrastructure, etc.). This can then be termed a physical system of indicators based on the capital approach.

174. There is an alternative, however, based on the fact that many of the capital assets are in fact valued in the market today. For this valuation to reflect the asset's effect on social well-being (i.e. the accounting prices) requires some perhaps heroic assumptions, assumptions nevertheless quite common within the economic science. Among many issues, it is assumed that we as citizens behave as rational agents maximizing our welfare. Furthermore, the goods and services stemming from the relevant capital assets are assumed to be traded in perfect markets. As described in the previous chapter, this includes for instance assuming away any monopolistic behaviour in the market, and assuming perfect foresight by all agents involved. While these assumptions no doubt can be falsified in many concrete examples, they still serve as an indication that observed market prices in a fair number of circumstances actually reflect the usefulness of the goods and services. Based on market prices, we are thus able to estimate the value of some of the assets in terms of social well-being.

175. The assets covered by this approach are those that directly produce goods and services traded in fairly ideal markets. The well-being generated from the assets in question can then be estimated by the market price of what they produce, production costs and a physical measure of abundance, if necessary classified by production cost classes.

176. Thus, extending the monetarisation and aggregation of components of the total national wealth as far as possible into an indicator of market based *economic wealth* is an important statistical task. It is, however, essential to make clear the distinction between the conceptual indicator Total national wealth (TNW) based on a complete set of assets and accounting prices, and the practical indicator, let us call it *economic wealth* (EW), based on estimates of only some of the assets and accounting prices. For instance, non-marketed goods like good companionship or the pleasure of an aesthetically well constructed city-scape are all well beyond what is included in the narrower and mostly market based economic calculation of our wealth.

177. Even though the practical indicator Economic wealth (EW) can only partially cover what properly belongs to Total national wealth (TNW), and although the estimated accounting prices will be imperfect, clearly an indicator like EW belongs to a set of indicators of sustainable development based on the capital approach. The shortcomings of EW relative to TNW will, however, make it necessary to supplement with other indicators in order to be able to give a reasonable picture of the total national wealth. These additional indicators should be selected in such a way that they indicate the expected well-being effects of changes in key components of national wealth. The strategy should therefore be to choose additional indicators that best reflect

the value, defined as the well-being effects, (measured per capita) of the various components of total national wealth.

#### 4.1.1 Economic wealth (EW)

178. Economic wealth (EW) is equal to the present economic value of the returns from each of the assets: produced, natural, human and social capital. On the other hand, economic theory, see e.g. Hamilton and Hartwick (2005), tells us that economic wealth is equal to the present value of future income, where income equals what we spend on consumption and net investment in various types of capital (genuine savings), which also equals the present value of future consumption. This is a useful result because our ability to value all the assets of an economy is limited. So taking the present value of consumption (with suitable choice of a path for future consumption and discount rate) gives a potential upper limit for economic wealth. Fortunately, we also have some reasonably robust ways of measuring natural, produced, financial and human capital, see e.g. Greaker (2007). The difference between the present value of consumption and the sum of individual asset values, what is often referred to as 'the residual', is a measure of our ignorance about what actually constitutes national wealth. This residual encompasses what is referred to as social capital elsewhere in this report. It also comprises all kinds of positive or negative externalities between capital, technology and labour with effects in the market; in particular, it will pick up all the growth in income that cannot be explained by increased factor usage.

179. Clearly, economic wealth accounting as described above has many shortcomings. First and foremost, EW is a measure only of the capital base that contributes to market-based income. While market income is an important contributor to social well-being, it is far from the only way in which it is created. Well-being is also created by “consuming” flows of goods and services from non-market assets, such as breathtaking scenery on a smog-free day, positive relations with one’s loved ones and friends and the personal ability to pursue self-fulfilling hobbies or sports. We need measures of these non-market assets both because they are important in and of themselves, but also because we want to be sure that in the pursuit of market income we are not eroding the capital base from which we derive non-market well-being. To the extent that this is true, gains in market income could be misleading in isolation as an indicator of sustainable development.

180. The second reason why changes in EW are insufficient as a measure of sustainable development is that it makes a rather strong assumption about the substitutability among different forms of capital. If EW were to stand alone as an indicator of sustainable development, society would have to be indifferent to the mix of capital assets it possessed. People would have to be convinced that they were as well off with very little natural capital but a lot of human and produced capital as with a lot of natural capital and little human or produced capital, assuming that the total value of the asset portfolio was the same in both cases. Such indifference would hold only if there was perfect substitutability between different forms of capital. While perfect substitutability may exist between some forms of capital at the margin, it mainly does not apply in the limit (i.e., complete loss of a certain category of capital assets is nearly certain to lead to well-being losses) and it does not even apply at the margin for some critical forms of assets.

181. Thirdly, the estimate of EW is sensitive to assumptions about future prices. This may seemingly make EW unsuitable as an indicator of sustainable development and as a part of

official statistics. In fact, all asset prices represent an implicit or explicit valuation of a future stream of benefits. In the case of an exhaustible resource, this is the present discounted value of resource rents (which are a function of future quantities extracted, costs of extraction and market prices). In the case of a car, it represents one's willingness to pay for a future stream of transport services. So all asset values are implicitly the discounted value of uncertain future flows of benefits – this is as true of bicycles as it is of forest plots.

182. Thus, despite the obvious shortcomings, an estimate and description of economic wealth is clearly a key indicator for sustainable development. In fact, the main value of EW as such an indicator resides in the possibility of making it clearer where the economic wealth of a region, a nation or even a smaller area, is coming from. That is, how much do the various capital types contribute to the economic wealth, and are there signs of mismanagement of some (or all) of these assets. This allows decision makers to focus on key capital components of importance to economic wealth. In addition, developments of the capital components over time may show whether economic development is taken place at the expense of a deterioration of parts of the resource base. Furthermore, EW captures an important part of the total national wealth, and gives signals of which parts of the economic wealth contribute the most to the national wealth. Usually, human capital turns out to be dominating, see e.g. World Bank (2005), while we could legitimately ask whether some of this belongs to the category of social capital. Thus, the World Bank estimates that approximately half of the residual in the decomposition of the national income can be attributed to institutions, which is clearly part of social capital (World Bank, 2005). This implies that management of these resources is particularly important in securing sustainable development, and hence should be covered in more detail by including further indicators on these types of resource.

#### 4.1.2 Additional indicators to EW

183. Because aggregate per capita economic wealth suffers from the above shortcomings, it must be complemented with other indicators in a complete set of sustainable development indicators. The first obvious extension is to complement EW with indicators of the wealth associated with each of the four main categories of capital; that is, to compile separate measures of produced capital, human capital, natural capital and social capital. It should be noted that while monetary measures of stocks of produced, human and natural capital are all, to varying degrees, empirically feasible today (with limitations), such a measure seems not to be feasible for social capital. So, in practical terms, the set of five monetary indicators is really a set of four plus one place-holder for social capital. Extending the indicator set to include separate measures for each of the main capital categories takes care of the concern about the non-substitutability of capital stocks in the limit.

184. The next extension of the indicator set is necessary to take care of the fact that some capital assets are “critical” to development and, therefore, cannot even be substituted at the margin.

185. The main category in which critical assets are found is natural capital, as it is here where the assets that are essential for basic life support reside. Although there remain scientific debates as to just which environmental assets are critical and which are not, there is reasonable consensus that the following are all very important if not essential:

- a reasonably stable and predictable climate;

Comment [ka19]: Rob to provide references



- air that is safe to breath;
- high-quality water in sufficient quantities;
- areas of intact natural landscapes;
- a diversity of plant and animal life;
- productive soil.

**Comment [ka110]:** From Kirk:  
Why is productive soil on this list?  
– I would have thought that yields  
and associated land rents provide  
quite a robust way to value soils.

186. Some of the assets on the list can in fact be valued in monetary terms, although this is usually done in some articles in the research literature and more seldom in connection with wealth accounting. For example, it is difficult to put a reasonable value on the stock of clean air, but we can put a value on the quantity of particulates in the air because we can value the associated health damages in the exposed population (and similarly for water pollutants, although here the question of exposure is more complicated). Intact natural landscapes can be valued in terms of the value of the environmental services they provide to other assets and in terms of our willingness to pay to enjoy them (or simply to know that they exist) – not easy to value, but we know broadly how to do it. However, until that is done, there remains the need for physical indicators.

187. The sustainable development indicator set should, then, be extended to include an indicator in each of the above six areas, bringing the total number of indicators at this point to 11. These indicators of critical natural capital will be measured in appropriate physical units, since valuation of critical (non-substitutable) assets is not appropriate.

188. The final extension to the indicator set is that which is necessary to account for the fact that some capital assets contribute to social well-being outside of the market place. While this is not a concern for produced capital, it is of concern for human, natural and social capital.

189. Natural capital contributes to well-being outside the market mainly when humans experience nature directly (e.g. when camping) or when they derive pleasure from the knowledge that nature continues to exist. In principle, the social well-being associated with this use of natural capital can be valued in monetary terms. To the extent that this is the case, a monetary indicator of the non-market value of natural capital would be worthwhile. In practice, however, the scope for actually estimating such values is limited and any such monetary indicator would likely underestimate the true social well-being of non-market enjoyment of nature. Physical indicators are therefore called for in practice.

190. Since many of the same features of the environment that are critical to development are also those from which humans would derive non-market well-being, it is proposed that the same set of physical indicators listed above serve also as the indicators of non-market natural capital. The list therefore remains at 11 indicators.

191. Human capital also contributes to well-being outside the market place. In the same way that education and good health make us better workers, they also allow us to be better parents, to be finer members of society, to better enjoy the arts and to find deeper personal fulfilment. Again, though in principle it would be possible to estimate the non-market social well-being associated with human capital in monetary terms, in practice the scope for doing so is limited. Once again, then, physical indicators are recommended. In this case, an indicator is needed for

each of the two core dimensions of human capital: educational achievement and health status. These two bring the total number of indicators to 13.

192. The last item that requires discussion is the contribution of social capital to non-market well-being. As with human and natural capital, it seems reasonable to suggest that social capital makes a contribution to non-market well-being. And, as with its contribution to market well-being, the scope for valuing social capital's contribution to non-market well-being appears small at this time. Unlike for human and natural capital, though, there are no obvious physical indicators of social capital that might be postulated as representative of its contribution to non-market well-being. In particular among economists, social capital is viewed as an ill-defined concept. How do you invest in social capital? How do you conceive it as a stock? Dasgupta (2001) in particular seems to favour that the concept of institutions, i.e. rules governing how capital is moved and allocated, is a better description of what others prefer to denote as social capital.

193. Although the measurement of social capital is difficult, measurement instruments are being intensively developed (Czesany, 2007). For instance, based on experience with a multitude of social capital indicators in case studies, Grootaert and van Bastelaer (2002: 31-32) suggest that the focus should be on three types of proxy indicators of social capital: membership in local associations and networks, indicators of trust and adherence to norms, and an indicator of collective action.

- **Membership in local associations and networks:** using membership in local associations as an indicator of structural social capital consists of counting the associations and their members and measuring various aspects of membership (such as internal heterogeneity) and institutional functioning (such as the extent of democratic decision making). Which associations to include in the indicators are culture-specific: agrarian syndicates could be relevant in one country, rotating credit and savings associations in another, parent-teacher associations in yet another. In the case of networks, which are less formal, the key information is the scope of the network and the internal diversity of membership.
- **Indicators of trust and adherence to norms:** measuring trust and adherence to norms (cognitive social capital) requires asking respondents about their expectations and experiences with behaviour requiring trust. Key questions relate to the extent to which households received or would receive assistance from members of their community or network in case of various emergencies (loss of income, illness).
- **Collective action:** the provision of many services requires a collective action by a group of individuals. The extent to which this collective action occurs can be measured and is an indicator of underlying social cohesion (at least to the extent that the cooperation is not imposed by an external force, such as the government).

194. As proxies, these three types of indicators measure social capital from different vantage points. Membership in local associations and networks is clearly an input indicator since the associations and networks are the vehicles through which social capital can be acquired. This indicator resembles perhaps most closely the use of years of schooling as a proxy for human capital. Trust can be seen as an input or an output indicator or even as a direct measure of social capital depending on one's conceptual approach. Collective action is clearly an output indicator.

195. However it is termed, OECD reviewed evidence suggesting that a close integration in society within a network of trust and cooperation is important for well-being, health and job search activities. Still, it is impractical at this stage to try to quantify these linkages in the form of true accounting prices for social capital. Because of the difficulty of pinning down exactly what constitutes social capital, the concept of social capital remains too ill-defined at the moment for practical indicator suggestions to be made. Still, we retain a placeholder for a physical indicator on social capital.

196. The final list of sustainable development indicators then contains 14 elements, see Table 4.1. It should be recognized, however, that what is referred to as an indicator in the table can be represented in many different ways. The stock of an asset can for instance be broken down to different scales (local municipalities for instance) or presented according to which social groups control the assets, thus capturing a distributional dimension of national wealth. Furthermore, it can be argued that both stock and flow aspects of an asset should be indicated where possible, see Table 4.2 for a possible organisational scheme. Table 4.1 therefore represents a minimal set, which would need to be expanded to include distributional aspects, the global scale, and flows, to provide the information necessary for sustainable decision-making.

**Table 4.1 Suggested indicators based on the capital approach**

real per capita economic wealth (EW) decomposed on:
real per capita produced capital
real per capita human capital
real per capita natural capital
real per capita social capital (place holder)
a physical indicator of climate
a physical indicator of air quality
a physical indicator of water quantity/quality
a physical indicator of ecological integrity
a physical indicator of biological diversity
a physical indicator of soil productivity
a physical indicator of educational attainment
a physical indicator of health status
a physical indicator for non-market benefits of social capital
a physical indicator on social capital (place holder)

**Comment [kal11]:** From Eurostat: Do we need an additional indicator specifically on on-market benefits of social capital? One physical indicator on social capital should capture these non-market benefits ...

**Table 4.2 Stock and flow indicators in the capital approach**

Stock indicators	Produced capital(1)			Financial capital(2)	Human capital(3)	Natural capital(4)			Social capital(5)
	Fixed assets	Inventories	Valuables			Natural resources	Land and surface water	Ecosystems	
Value									
Quantity									
Flow indicators									
Additions									
Value									
Quantity									
Withdrawals									
Value									
Quantity									
Depletion/depreciation									
Value									
Quantity									
Revaluation									
Value									

**Notes:**  
 1. The SNA divides produced capital into the three subcategories shown.  
 2. According to the SNA, Financial capital has 8 subcategories. These have not been listed here for the sake of brevity.  
 3. In principle, human capital would have subcategories. Greaker suggests breaking it down by degree of educational attainment (primary, secondary, post-secondary). Another possibility would be to break it down by employment group (non-skilled labour, skilled labour, professionals).  
 4. The SEEA divides natural capital into the three subcategories shown.  
 5. In principle, social capital would have subcategories, but I admit to no special insight into what they should be.

Green cells represent indicators that can be compiled with existing data and methods.  
 Yellow cells represent indicators that can be compiled in principle but for which data and methods are not readily available.  
 Grey cells represent indicators that can be compiled in principle, but would be of limited use in practice.

**Comment [ka112]:** From Eurostat: [LL] I think this tables really helps and should be retained. How about splitting human capital into education and health. The categories suggested in the note don't encompass health.

## 4.2 Policy implications of the capital approach

197. Among the general policy implications of the capital approach, the most noteworthy are perhaps that the approach:

- a) emphasizes the need to focus on the long-term determinants of development;
- b) reveals the distinction between current income and capital consumption. This is of special importance in natural resource dependent countries;
- c) encourages broader thinking about the concept of investment;
- d) encourages policies that simultaneously attempt to maximize current well-being and to ensure that its capital basis is maintained over the long term.

We will discuss these items in turn.

### 4.2.1 Focus on the long-term determinants of development

198. Current economic and social policy making in most countries is focused primarily on maximizing well-being for the present generation or even shorter time periods. This focus is driven by the short time horizon of democratic governments, by time preferences of individuals (i.e. the fact that most people discount the future), and by the information that is produced in order to support policy making and assess its effectiveness.

199. The question of information and its impact on policy making is central to the debate surrounding sustainable development indicators. Given that information is an important factor in shaping policy, the question is, "What information on sustainable development is best suited to ensuring that policy makers focus on the long-term determinants of well-being?"

200. The capital approach, rooted as it is in well-established development theory, provides a defensible and understandable argument for introducing greater balance in policy making between ensuring the well-being of the current generation and ensuring that the basis for generating well-being in the future (capital) is maintained over time.

201. The capital approach, because it is rooted in theory and not in political deliberation, is less subject to manipulation by successive governments than are indicators sets that are closely

linked to policy processes. This means that indicators derived from the capital approach should stand the test of time, allowing – indeed forcing – successive governments to invest the time and effort in learning how to shape policies to arrive at truly sustainable development. On the other hand, indicators derived from the capital approach could clash with or at least only partly cover the priorities of existing sustainable development policies and take the risk of being perceived as not really adequate.

**Comment [LL13]:** It is not the indicators that are determined through political negotiations, but policy priorities. Statisticians usually select indicators that are best to measure the policy priorities. Once determined conceptually, the capital-based indicators are as much subject to political manipulation as existing indicators, if they enter the political negotiation arena.

#### 4.2.2 The distinction between current income and capital consumption

202. With its emphasis on the maintenance of stocks of capital as the basis for long-term well-being, the capital approach should lead governments to pay greater attention to the distinction between current income and capital consumption.

203. Current income is the maximum amount that could be consumed while leaving an individual ‘as well off’ in terms of assets – i.e. consumption plus genuine saving (Hicks, 1965). It is this income – and only this – that the nation can spend on current well-being-enhancing consumption (consumption again being broadly interpreted to include market and non-market sources) without impoverishing itself over time.

204. Capital consumption is the drawing down of stocks of capital, either by using them up (in the case of natural resources or money in the bank) or by degrading them so that they are less able in the future to produce well-being-enhancing flows of goods and services. Capital consumption can also be a means of supporting consumption in the current period, but it is not “income” in the true sense, because consumption cannot be supported indefinitely on the basis of capital consumption.

205. With the distinction between current income and capital consumption clearly laid out within the capital approach, governments will have at hand information that will reveal when current well-being is being supported by the drawing down of capital stocks rather than by the income generated by the society. This information should put pressure on them to design policies that eliminate reliance on capital consumption to support current consumption. If they do not do so, the capital-based sustainable development indicators will reveal that the society is not on a sustainable development path. This sort of information will be of particular value in natural resource-dependent countries, where resource management policies have a significant impact on the long-term development prospects for the nation. It will show how nations that reinvest the returns from depleting natural resource capital in other forms of productive capital will, in the long term, enjoy a higher standard of living (i.e. greater current well-being) than those that use these returns to finance current consumption. Nations that are less resource dependent will also benefit from information that reveals whether their overall capital portfolios are being sustainably managed or not.

#### 4.2.3 Broader thinking about the concept of investment

206. Traditionally, governments and enterprises have thought of investment in terms of increasing their stocks of produced capital (buildings, machinery, etc.) and financial capital (stocks, bonds, etc.). More recently, the notion of investment has been extended to include investment in knowledge through research and development and investment in workers through education, training and health care.

207. The traditional view of investment served nations well in the past, as it focused surplus resources (i.e. savings) into increasing stocks of capital that were the limiting factors on economic development. Increasingly though, this traditional focus is inadequate as other factors, notably the environment, emerge as limiting factors on development.

208. By extending the traditional view of capital to include natural capital, human capital (explicitly, as opposed to on an ad hoc basis) and social capital, the capital approach makes it clear that the notion of investment can no longer be restricted to its traditional domain. Governments must begin to think not only about investing surplus resources in the maintenance and expansion of the traditional forms of capital, but also about investing in increasingly scarce natural, human and social capital.

209. This new focus for investment has many implications for policy making. Environmental policy, for example, is no longer seen as necessary mainly to protect endangered species or to address issues of local environmental degradation, but as a means of strategically investing in the long-term well-being generating capacity of the society. Such is the case for investments in human and social capital.

210. Understanding where the greatest return on investment can be had in natural, human and social capital will take time. But by providing a coherent and stable set of indicators that can be monitored by governments and citizens over time, the capital approach will facilitate the development of effective policies to achieve this goal of long-term sustainability.

#### **4.2.4 Maximize current well-being while ensuring that its basis in capital is maintained over the long term**

211. As noted above, governments have focused for most of the post-World War II period on ensuring growth of current welfare. It is becoming increasingly apparent, particularly with respect to the environment, that this narrow focus has come at the expense of loss of important parts of the capital basis that supports development in the long term. If the success that has been achieved (in developed countries at least) in increasing overall living standards is to be maintained in the future, it is clear that governments must begin to pay attention simultaneously to ensuring current well-being and to ensuring the maintenance of its basis in capital.

212. By providing indicators that reflect the evolution of capital over time, the capital approach will provide an incentive for governments to begin this rebalancing of their policy portfolios.

#### **4.2.5 Summarizing**

213. Thus, the capital approach to indicators for sustainable development leads generally to policy implications of two sorts: policies to optimize the social well-being associated with a given stock of capital assets; and policies to limit or reverse the depletion/degradation/depreciation of capital stocks through investments of savings. These general implications translate into myriad specific implications for each of the different capital types.

214. Regarding the first type of recommendations (obtaining more social well-being for a given capital stock), they may for instance be based on international comparisons – a sort of benchmarking among countries with enough similarities to make comparisons meaningful.

215. The second type of recommendation is a question of managing the total national wealth in the best possible manner. This is not primarily about maximizing the size of each of the wealth components, but more about highlighting the opportunity costs related to investment in and use of different types of capital. The capital approach thus invites a debate on the values of different types of capital and thus seeks to balance concern for economic development with a preservation of other stocks giving rise to well-being in society.

216. A separate and final point is the ‘scaleability’ of the capital approach, i.e. possibility of defining regional/global as well as local wealth components (capital stocks), which will give interesting signals to policies at the various levels, e.g. with regard to management of local wealth. Making local communities aware of their local wealth (size and composition) highlights the comparative advantages of the community and thus directs their management skills towards preserving the most important assets for the community, be it natural resources, human capital or social capital. Again, inter-comparison between different but similar communities should make best practice guidance more available.

**Comment [kal14]:** From Eurostat: More emphasis on the global dimension would be useful here.

### 4.3 A capital-based measurement framework

217. Indicators based on the capital approach will of course have to be based on a set of data or measurement frameworks. A measurement framework in this context is a practical set of data and organizational rules that translate a conceptual framework (e.g. the capital approach) into policy relevant information in the form of a sustainable development indicator set. The national account (NA) is an example of a measurement framework supporting the widespread short-term economic indicator Gross Domestic Product (GDP). In this section, we outline a measurement framework for the expanded notion of capital that has been presented in the previous sections and chapters.

218. The most obvious candidate for a measurement framework is a set of national accounts suitably expanded to consider environmental and social elements relevant for the sustainability of longer term developments in addition to economic forces driving development, notably savings and investments. The extension of the Standards for National Accounts (SNA) to cover natural resources is done in the Systems of Environmental and Economic Accounting (SEEA) (UN et al., 2003). A similar recommendation for social issues, including human capital, does not exist, but part of human capital can be estimated with data from the national accounts, see Greaker (2007).

#### 4.3.1 A framework for natural capital

219. The Systems of Environmental and Economic Accounting (SEEA) comprises four areas or categories of accounts.

- Flow accounts for pollution, energy and materials (Chapters 3 and 4 of the SEEA). These accounts provide information in physical terms at the industry level about the use of energy and materials as inputs to production and the generation of pollutants and solid waste.

- Environmental protection and resource management expenditure accounts (Chapters 5 and 6). These accounts identify expenditures incurred by industry, government and households to protect the environment or to manage natural resources. They take those elements of the existing SNA which are relevant to the good management of the environment and show how the environment-related transactions can be made more explicit.
- Natural resource asset accounts (Chapters 7 and 8). These accounts, again kept in physical terms, record stocks and changes in stocks of natural resources such as land, fish, forest, water and minerals. Some of the assets are also recorded in value terms.
- Finally, valuation of non-market flow and environmentally adjusted aggregates are covered in Chapters 9 and 10 of the SEEA. This component presents non-market valuation techniques and their applicability in answering specific policy questions. It discusses the calculation of several macroeconomic aggregates adjusted for depletion and degradation costs and their advantages and disadvantages. It also considers adjustments concerning the so-called defensive expenditures. When these adjustments are applied to GDP, the result is an environmentally adjusted domestic product – EDP – or more commonly referred to as green GDP.

220. Sometimes more or less subjective judgements are needed in making valuation of non-marketed goods and services as well as classifying certain activities as defensive expenditures. It is therefore of paramount importance for the acceptability of a sustainable development indicator set that the indicators should be transparent, in order to avoid discussions about methodological choices which may take focus away from the issues meant to be highlighted by the indicators. Better then to identify indicators based more directly on observable data that can shed light on the non-valued part of the natural capital.

#### **4.3.2 A framework for human capital**

221. Human capital has been given many definitions, and a good account of some of those is given in Stroombergen, Rose and Nana (2002). One example is the definition of OECD (2001): *Human capital is the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being.* This definition points to the crucial fact that human capital is embodied in humans. Human capital is therefore not, unlike physical capital, traded separately in markets.

222. In the literature, human capital is sometimes decomposed *into raw labour, education and skills*. Others decompose human capital into classes such as generic skills, firm specific skills and task specific skills (Gibbons and Waldman, 2004). Moreover, in the same literature the notion of human capital is mostly only connected to *education and skills*. Furthermore, the value of the human capital component has been calculated for at least three different purposes other than evaluating sustainable development (see e.g. Stroombergen, Rose and Nana, 2002):

- to evaluate education policy;
- to evaluate what determines employment;
- to understand economic growth.



223. Many methods for estimating human capital have been developed; see again Stroombergen, Rose and Nana (2002) or Le et al. (2003) for excellent surveys. Basically, the methods for estimating human capital can be categorized in the following way:

- the cost based method that estimates human capital from the input side;
- the revenue generating method that estimates human capital from the output side;
- the current stock characteristics method.

224. When estimating human capital from the input side, all expenses that contribute to human capital formation are summed. The most obvious expenses are public and private direct expenses to education and foregone income while under education. But other expenses should also ideally be included, for instance expenses to on-job training and employer financed outside job courses. The measure should also include depreciation, since knowledge may become obsolete, or people may become ill and unable to function at previous levels, all of which implies a reduction of the human capital component.

225. When estimating human capital from the output side, it is from an economic point of view the expected wage obtained in the future labour market that matters. This method is much used in the growth literature, and is elaborated further below. Two points are worth mentioning here: firstly, the method doesn't separate well between social capital and human capital. To the extent that the level of social capital is high in a country, it would presumably increase the wages obtained in the labour market in general. Secondly, it does not measure the benefits from human capital that is not paid for in markets. Clearly, a higher education can yield benefits that are intangible, and therefore resistant, to measurement.

226. Finally, one could also construct a proxy measure for the current state of the human capital component. Such a measure would, among other things, include average years of schooling in the population, the extent of literacy, and the health status of the population. Clearly, it is difficult to translate such a characterization of the stock of human capital into a money measure.

227. In an ideal world the three measures should yield the same result. That is, total investments in human capital should equal the discounted sum of expected returns, which again should equal the estimated value based on current characteristics. Clearly, there are many reasons why this is not the case, one of which is that many benefits from education are not valued in markets. The strand of literature in which sustainable development has been the point of departure has seemingly mostly used the input based approach while, as mentioned, the economic growth literature has used the output based approach (sometimes combined with the input based approach).

#### 4.3.2.1 Approaches to estimation of human capital in the economic growth literature

228. While the sustainability literature has mostly tracked changes in the value of human capital from the input side, that is expenditures on education, wages to teachers etc., the growth literature has also measured human capital from the output side (Greaker, 2007). In the book by Becker (1975, 1993), he calculates rates of return to education by looking at wage differentials between workers with different levels of education. Jorgenson and Fraumeni take Becker's approach a step further, and in a series of contributions they both calculate the human capital component of the US and explain their method (see Jorgenson and Fraumeni 1989 and 1992). On

**Comment [ka15]:** From Eurostat: We need to go back to the conclusions of the previous chapter, which concludes that some physical indicators are necessary in any case to capture the non-market benefits of education, health, etc. So we need a combination of the methods described. We also need to actually discuss what the measurement framework would look like, drawing a parallel with the SEEA: it would include monetary/non monetary indicators, stocks and flows etc. (see matrix presented earlier).

the other hand, as far as we know, the approach followed by Jorgenson and Fraumeni has not been applied by the literature on indicators for sustainable development. Very broadly their approach follows the following steps:

- construct a database containing the economic value of labour market activities for various categories of people. The database should at least include wage rates and labour market participation cross-classified with sex, education attainment and age. The database should ideally comprise all persons aged 16 to 75;
- program an algorithm calculating the lifetime income for each person in the database. That is, assume that each person in the future will obtain the same wage rate and have the same labour market participation rates as older persons with the same characteristics currently living. The sum of the lifetime incomes will be equal to the total human capital stock;
- update the database periodically, ideally each year, so that all changes in human capital due to changes in education attainment, labour market participation, demographic development etc. can be traced. Thus, the change in human capital stock from period to period is viewed as the sum of human capital formation, net of depreciation and revaluation. Human capital formation itself comes from population growth (both new babies and immigration) and increments to lifetime incomes due to investment in formal education. Depreciation on human capital arises from ageing, deaths and emigration. Net human capital formation is the difference between gross formation and depreciation. Revaluation on human capital comes from changes in lifetime labour incomes over time for each age/sex/education groups.

229. Note that Jorgenson and Fraumeni also included the value of leisure (by the after tax marginal wage rate of the person in question). The method of Jorgenson and Fraumeni has been applied to countries other than the United States, see for instance an application to Australia by Hui Wei (2004) and to Norway by Ervik, Holmøy and Hægeland (2003).

230. Much of the required information can be found in the national accounts together with underlying work force accounts, etc. That is, most of the relevant data can be expected to be already available.

#### **4.3.3 A framework for social capital**

231. For sustainable development, defining social capital as the networks and their associated norms seems the most promising avenue for including it in the capital-based approach. Although there has been criticism of the network approach, particularly with the difficulty in defining 'trust' and 'networks' (Labonte, 1999), there has been significant progress in recent years and there are now several countries who have undertaken measurement of social capital using a network-based approach, including the UK, US, Canada and Australia.

232. Social networks can be described and analysed by their structure and quality. Network structure refers to their more 'physical' and easily quantifiable characteristics such as size, density, diversity, frequency and mode. Network quality refers to their more 'cognitive' aspects that reflect the norms and values of the culture they are embedded in and ultimately serve to reinforce, such as trust, efficacy, inclusiveness, intensity, sense of purpose and reciprocity.

233. Trust is integral to assessing the quality of the network because an increase in the level of trust can infer an increase in the volume of social capital, whereas a change in the size of a network may not necessarily increase the volume of capital, particularly if the intensity of the network declines. It is important to acknowledge that measuring levels of trust is not without its own difficulties and care needs to be taken in interpreting the results, particularly with inter-country analysis, as different legal, political and cultural contexts will impact these analyses.

234. Social networks can be seen to function across two social planes; horizontal - between people at the same hierarchical level, and vertical - between people at different hierarchical levels. There are three categories, which operate along a continuum of strong to weak. Bonding networks connect similar and equal individuals, groups or institutions (horizontal). Bridging networks connect dissimilar people at the same level (horizontal). Linking networks connect individuals, groups and institutions to authority (vertical).

235. The conventional approach described previously makes an assumption that individual social capital can be aggregated to represent a broader collective unit. It is important to note that there has been criticism of this approach, mainly pointing out that the collective consists of more than the sum of the parts. Portes and Landolt (1996).

236. Within a sustainable development context, there appear to be two important areas to consider. The first is the ability of a society to work together and the second is a stable political, legal and cultural framework in order to sustain effort, tap the change potential and ultimately achieve long-term goals. Therefore, indicators that focus more on linking and bridging are required within this model along with the flows that might decrease social capital and undermine society's ability to achieve long-term goals.

237. The size of the population is an important indicator as larger societies are likely to have more complex interactions and potentially more diversity. By examining the size of different sub-populations including religious affiliation, the extent of this diversity can be examined. The first diversity indicator attempts to provide an indication of the extent to which people interact with dissimilar people. Societies with high levels of diversity face more challenges in achieving high levels of interpersonal trust (Ben Cave and Associates, 2007) and so the trust indicator provides insight into this dynamic and therefore the quality of the networks.

238. The indicator for knowledge networks recognises that these networks make an important contribution to innovation and therefore change potential. (Smit, 2007)

239. The two linking indicators focus on the ability of the government and citizens to work together to achieve long-term goals. Both these indicators focus on the quality of the network rather than the physical characteristics. The first indicator looks at the capacity of the government to produce a desired outcome while the second is the trust between citizens and the government. High levels of effectiveness and trust would indicate high levels of social capital. Voting at elections or even turnover of governments are problematic and are usually only appropriate indicators for democratic, well-developed countries. However the measurement of government effectiveness if accepted as an indicator may also be problematic, even if conceptually it is more consistent.

240. At different levels of society, there are different threats, such as victimisation, unemployment, corruption, and human rights violations. These threats undermine society's ability to work together to achieve long term goals and thereby reducing social capital and in turn sustainable development.

**Table 4.3 Suggested physical indicators for social capital**

Bridging	Suggested Physical Indicators
Physical - Size of society	Resident population and sub-populations
Physical – Diversity of society	Number of people actively involved in clubs, organisations or associations
Physical - Diversity of knowledge networks	Number of partnerships among government, academia and business involved in research and development
Quality - Trust	Level of generalised trust
Linking	
Government and society	
Quality - Efficacy	Level of government effectiveness <sup>18</sup>
Quality - Trust	Level of institution trust
Negative flows/ Threats	
Bonding	Level of victimisation Level of social exclusion
Bridging	Level of unemployment Level of organised crime
Linking	Level of corruption Number of human rights violations

References to come.

## 5. Comparison of the capital approach and other approaches

241. Having described and characterised existing approaches to sustainable development indicator sets in Chapter 2 and discussed the capital approach in conceptual and practical terms in Chapters 3 and 4, the time has come to compare the two approaches.

### 5.1 Comparing indicators from different approaches

242. First of all, as shown in Table 5.1, both approaches have their strong and weak points. Most of the existing approaches have been developed in connection with policy-formulated strategies for sustainable development. This secures a close interaction with important stakeholders, but also makes the indicator sets vulnerable to political influence and frequent changes. Only a few existing indicator sets are directly and explicitly based on the capital approach. The strong point of this approach is, of course, its theoretical underpinning. However, in practice there are several problems in going from the conceptual idea of a sustainable

<sup>18</sup>Possible data source, <http://info.worldbank.org/governance/wgi2007/>

development indicator set to a practical realisation. In addition, it may be a weak point that indicator sets based on the capital approach may not be taken up by policy-makers.

**Table 5.1 Pro et con of the capital approach and existing approaches**

The Capital Approach		"Existing Approaches"	
Pro	Con	Pro	Con
The capital approach provides a theoretical framework for measuring sustainable development. This provides a useful context to analyse the indicators, and the relationship between them.	In practice it is difficult to value the different capital types.	Existing approaches often relates directly to policy-formulated strategies for sustainable development.	The approach lacks a theoretical foundation. Thus, the choice of indicators may seem ad hoc, with a fragile relationship to sustainable development. The analysis of indicators and how they are linked in a sustainable development context can be difficult.
The approach offers a comprehensive coverage of all relevant issues to sustainable development. I.e., all capital types are covered.	Some important policy dimensions of sustainable development are not sufficiently covered. There is therefore a risk that the proposed indicator set is not taken up by policy-makers	The existing indicator sets are often formulated in direct interactions with stakeholders, securing high policy relevance. The indicators are often easy to understand intuitively.	The number of issues covered sometimes is too large to convey an overall message of whether the development is sustainable or not.
The approach is framed in a language understandable to ministries of finance.	It does not address the issue of actually valuing well-being.	The approach is open to include new issues as they emerge.	The approach tends to be unstable over time as new issues are taken on board.

243. An interesting question is then to what extent the existing indicator sets and a set based on the capital approach will differ much in practice. A comparison is interesting both in order to investigate whether reconciliation between the approaches is possible, but also in order to find ways to strengthen them both, i.e. by identifying any obvious "holes" or missing parts of the indicator sets.

244. At the outset, it may seem difficult to identify commonalities among the two approaches. On the one hand, we have the heterogeneous collection of indicator sets stemming from existing approaches. On the other hand, we have a conceptual approach where Total national wealth (TNW) was singled out as the ideal indicator.

245. However, as was shown in Chapter 2, behind the heterogeneity of the existing indicator sets one can find common themes and domains of the individual indicators that overlap

somewhat among the existing sets. The heterogeneity is therefore not as large as it appears at first instance.

246. Furthermore, practical difficulties with estimation of relevant accounting prices was in Chapter 4 shown to lead to a larger indicator set also in the case of the capital approach. A relevant question is then whether the two approaches really are as different from each other as they may appear to be at first sight.

247. In Table 5.2 we try to answer this by comparing the suggested indicator set based on the capital approach (Table 4.1) with indicators often used in existing approaches (Table 2.3). The left hand column of the table lists types of indicators most often found in existing indicator sets, while the right hand column lists corresponding broad indicators based on the capital approach. As can be seen, we find some commonalities and quite a few differences between the two sets of indicators.

248. From the table it is apparent that none of the monetarised indicators in the set based on the capital approach (i.e. the per capita produced, natural, human and social capital) are among the commonly found indicators in existing sets. Also physical indicators for soil productivity are absent in the list of commonly used indicators in existing sets – although a determinant factor for this is data availability. On the other hand, what are ‘missing’ in the indicator set based on the capital approach compared to indicators commonly found in existing sets are indicators related to: GDP, waste, official development aid (ODA), unemployment, public finances, energy use, organic farming, spending on research and investments and transport.

**Comment [LL16]:** As mentioned in the Bucharest meeting, a lot of the differences are due to the capital-based indicator set being incomplete (no flows, no distributional aspects...)

**Table 5.2 A comparison between indicators commonly found in existing indicator sets and indicators based on the capital approach**

	Broad indicators commonly found in existing approaches (Table 2.3)	Covered by indicators based on the capital approach (Table 4.1)
1)	GDP per capita	
2)	Emissions of greenhouse gases	A physical indicator of climate
3)	Education attainment	A physical indicator of educational attainment
4)	Municipal waste collected and its disposal	
5)	Official Development Assistance	
6)	Unemployment rate	
7)	Life expectancy	A physical indicator of health status.
8)	Biodiversity and number of protected species (birds, trees)	A physical indicator of biological diversity
9)	Share of energy from renewable sources	
10)	General government gross net debt	
11)	Research & Development expenditure	
12)	Risk of poverty	
13)	Air pollution	A physical indicator of air quality
14)	Emission of ozone precursors	A physical indicator of air quality
15)	Employment rate	
16)	Organic farming	
17)	Mortality due to selected key illnesses	A physical indicator of health status.
18)	Energy consumption by sectors	
19)	Energy use and intensity	
20)	Water quality	A physical indicator of water quantity/quality
21)	Investment share of GDP	
22)	Freight transport by mode	
23)	Area of protected land	A physical indicator of ecological integrity
24)	Fishing stock within safe biological limits	A physical indicator of biological diversity
25)	Intensity of water use	A physical indicator of water quantity/quality

249. Some of these indicators, that is, indicators often found in existing indicator sets but absent from sets based on the capital approach, are clearly very difficult to relate to sustainable development. It is, for instance, difficult to see how GDP-related indicators can say very much about the long-term potential for further development. Thus, an unsustainable extraction or harvest of natural resources will likely increase the instantaneous GDP level, but nevertheless undermine long-term development. Others are partially captured by the capital indicators when flows are included. Thus, research and development can be seen as investments in human capital, investment enhances produced and/or financial capital, unemployment affects both human and social capital, and waste and energy can be considered as flow indicators within natural capital. What is clearly of relevance for global sustainable development and not covered in the indicator

set based on the capital approach is what nations are doing for the development in other nations, i.e. official development aid (ODA) – because, although discussed at the conceptual level, the issue of contributing to global sustainability was dropped at the indicator level.

## **5.2 A proposed small set of indicators (that might become the core for international comparisons)**

250. Based on the capital approach to sustainable development indicators and taking the comparison with existing approaches into account, it is possible to go some way towards recommending a small indicator set that might become the core for internationally comparable sustainable development indicators. From the capital approach point of view, sustainable development requires that none of the main capital components, notably natural capital or natural resources, is reduced beyond critical or irreversible levels. Thus one needs estimates not only for total economic wealth (EW) per capita in real value terms, but also for the individual components of the capital stock – including physical sustainability indicators for the part of total national wealth (TNW) not captured by EW.

251. This then defines the *domains* of the indicators and for sustainable development policies in general: on the one hand the four types of capital (produced, natural, human and social), and on the other what impacts on measured economic activity (captured by EW) and what has value in terms of well-being, but are not possible to ascribe a monetary value (captured by the physical indicators).

252. By focusing on national wealth, the capital approach indicators as laid out in Table 4.1 tend to neglect a nation's impact on the global wealth. This point was brought forward by comparing the indicator set based on the capital approach with common indicators found in existing indicator sets, see Table 5.2. An indicator reflecting national impacts on global wealth in the form of long-term development in developing/poor countries could therefore usefully supplement the capital approach indicator set. Even though e.g. ODA viewed in isolation reduces that country's national wealth in the short-term, ODA – more specifically the part that can be related to investments in the different types of capital in developing countries – could easily be seen as contributing to national wealth in developing countries and thus wealth globally. Thus, it is consistent with the analytical model behind the capital approach which looks at resources bases, both nationally and globally, and how the assets have to be sustained over time.

253. The core set of sustainable development indicators for national policy making could therefore be as shown in Table 5.3 and exemplified below. The examples represent a small set of national sustainable development indicators in monetary and non-monetary terms for national awareness and policy making. For more detailed analysis of key sustainable development policies, more detailed statistics and indicators could easily be foreseen. In particular, as discussed in previous sections, access to different types of capital and general distributional issues affect society's well-being, and need to be considered. As changes in stocks can be difficult to measure, and may not vary significantly over time, flow indicators are also important.

[Note: indicators 2-11 are not on a per capita basis. Somehow the population size should be factored in]



**Table 5.3 A proposed small set of sustainable development indicators**

Real per capita economic wealth decomposed on:
Real per capita produced capital
Real per capita human capital
Real per capita natural capital
Real per capita social capital (place holder)
A physical indicator of climate
A physical indicator of air quality
A physical indicator of water quantity/quality
A physical indicator of ecological integrity
A physical indicator of biological diversity
A physical indicator of soil productivity
A physical indicator of educational attainment
A physical indicator of health status
A physical indicator of social capital (place holder)
An indicator reflecting a nations impact on the global wealth

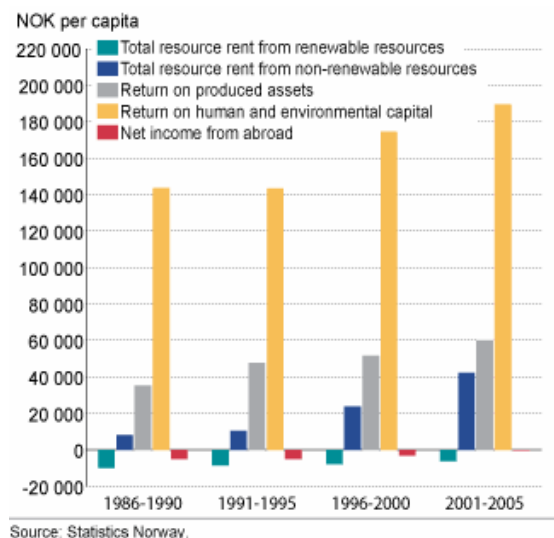
**Comment [kal17]:** Eurostat: Include a new physical indicator on poverty/social inclusion. Poverty does not affect only the wellbeing of the present generations but it is also recognised that it affects directly the ability of the next generations to access to a decent life and to wellbeing. A physical indicator of poverty – such as the At-risk-of-poverty rate – is therefore an indicator affecting both the human and the social capital.

**Comment [kal18]:** From Andrea: Number of physical indicators per form of capital is to be discussed – I would put at least three place holders (or indicators where available) per form of capital (except produced c. which is well represented in monetary terms), also global wealth is important enough to be represented with 3 indicators

**5.2.1 Economic wealth (EW) decomposed on types of capital**

254. As outlined in Chapter 4, economic wealth decomposed on the four types of capital assets is a main indicator in the indicator set. Followed over time, it will give an indication of how an important part of the total national wealth is developing. Just as important, however, is the decomposition showing where the economic wealth resides. This decomposition gives a clear signal of which capital assets are of particular value, and will also – when viewed over time - provide warnings of undue draw downs of particular capital types, should they occur.

255. Figure 5.1 shows an illustration of such indicators, taken from the Norwegian sustainable development indicator set. To reduce noise in the data coming from annual variations, five year averages are used in reporting the data. Also note that social capital is included in the residually determined component, here denoted human and environmental capital. Further work on estimating the contribution from the human capital component should be undertaken, for instance as outlined in section 4.3.2 on measurement frameworks.



**Figure 5.1 Net national income per capita, by source of income**

### 5.2.2 A physical indicator of climate

256. The natural choice for this indicator is a per capita measurement of greenhouse gas emissions, where the so-called Kyoto gases are included and the emission levels are for instance compared to long-term sustainability targets. These targets could reflect ambitions related to stabilising the mean global temperature or concentration of greenhouse gases in the atmosphere. This is a good example of a flow indicator that in some ways can be considered as a proxy for the stock, which is the absorption capacity of the atmosphere without causing global warming and related damages.

### 5.2.3 A physical indicator of air quality

257. Air quality has many dimensions reflecting the numerous chemical substances today's societies are emitting and that pollute the atmosphere. One of the more serious concerns is with particular matter, that is, particles of various sizes and chemical composition. The most dangerous particles for human health are the smaller ones, with a diameter below 2.5 micrometer: PM2.5. A possible indicator is therefore concentration of PM2.5 in central cities, for instance related to concentration standards.

258. An alternative indicator could be percentage of land area where the critical loads for acidification are exceeded. This is the preferred indicator for air quality in the Norwegian set.

### 5.2.4 A physical indicator of water quantity and quality

259. The choice of indicators for aquatic ecosystems could be based on the EU water framework directive. According to the directive, inland water bodies and coastal waters are to be classified by ecological status in five categories: high, good, moderate, poor and bad. Each member country must develop classification methods and monitoring systems.

### 5.2.5 A physical indicator of ecological integrity

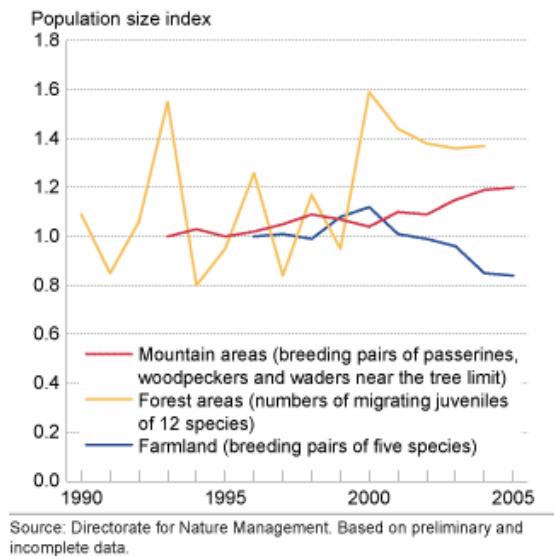
260. ??

**Comment [kal19]:** Eurostat: Fragmentation of natural habitats? But this is often seen also as a biodiversity indicator.

### 5.2.6 A physical indicator of biological diversity

261. Biological diversity is essential for well-functioning ecosystems, and as such could be considered part of ecological integrity. Biological diversity is also a phenomenon spanning a vast number of phenomena and dimensions. To pick a single or a few indicators therefore is a formidable challenge. Still, some countries like United Kingdom and Norway have suggested using a measure of the sizes of various bird populations as an indicator in this case. The reason is that trends in bird populations are considered to give a good indication of the state of their habitats. Birds represent different levels in the food chain, they are known to respond to relevant threat factors, and they are widely found in all habitats.

262. Figure 5.2 below shows the indicator as presented in the Norwegian indicator set.



**Figure 5.2 Population size of nesting wild birds in different habitats in Norway. Index**

### 5.2.7 A physical indicator of soil productivity

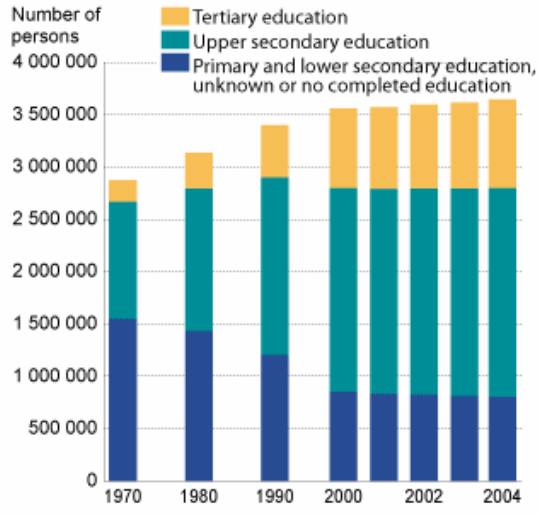
263. Yield?

### 5.2.8 A physical indicator of educational attainment

264. The level of education in the population may be regarded as an indicator of the supply of qualified labour for the public and private sectors, and hence an important determinant of human capital. The OECD report *The Well-being of Nations* states that "Education, training and learning

can play important roles in providing the basis for economic growth, social cohesion and personal development."

265. Figure 5.3 illustrates how such an indicator looks in Norway, where it is part of their set of indicators for sustainable development.



Source: Statistics Norway.

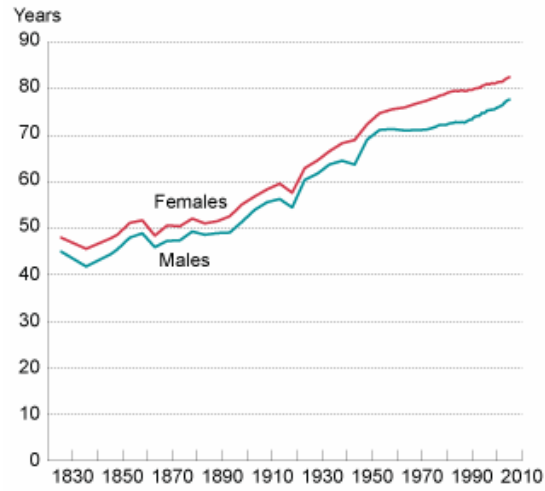
**Figure 5.3 Population age 16 and more in Norway by highest level of educational completed. 1970-2004**

### 5.2.9 A physical indicator of health status

266. Life expectancy is an indicator that captures a number of factors related to health and social welfare. Changes in the indicator can indirectly illustrate for example the quality of health services, changes in lifestyle, the quality of people's lives, diet, alcohol and drug abuse, accidents, etc.

267. Figure 5.4 illustrates numbers from Norway as used in their sustainable development indicator set.

**Comment [PW20]:** Healthy Life Years is a much better indicator of health and wellbeing status than Life expectancy which does not say anything on the shape of people living older and older. Healthy life years is more directly related to health (health expectancy indicator which combines information on mortality and morbidity) – in fact it was judged in the EU SDI set that for cross-country comparisons the comparison between healthy life years and life expectancy provided the most relevant information for sustainable development.



Source: Statistics Norway (2006a) and Brunborg (2004).

**Figure 5.4 Life expectancy at birth in Norway. 1825-2005.**

268. Life expectancy in Norway has been increasing for nearly two hundred years and there is every indication that this trend will continue. In recent years, male life expectancy has been increasing particularly quickly, after levelling off in the 1950s and 1960s. Life expectancy increased by 0.2 years for both sexes from 2004 to 2005, and was the highest ever estimated. Male life expectancy at birth is now 77.7 years, and female life expectancy is 82.5 years. An important cause of this is declining infant and child mortality, but lower mortality in older age groups has also contributed to the increasing life expectancy.

269. According to new population forecasts, life expectancy at birth will increase by about 8 years from 2004 to 2060, to 86.0 years for men and 90.1 years for women (Keilman and Pham 2005). Thus, population projections from Statistics Norway indicate that the Norwegian population will continue to age, almost regardless of what assumptions are made. Norway will therefore have a permanently higher share of older people in the population and higher pension and social security expenditure than today. This cannot be avoided by, for example, an increase in fertility or net immigration within realistic limits.

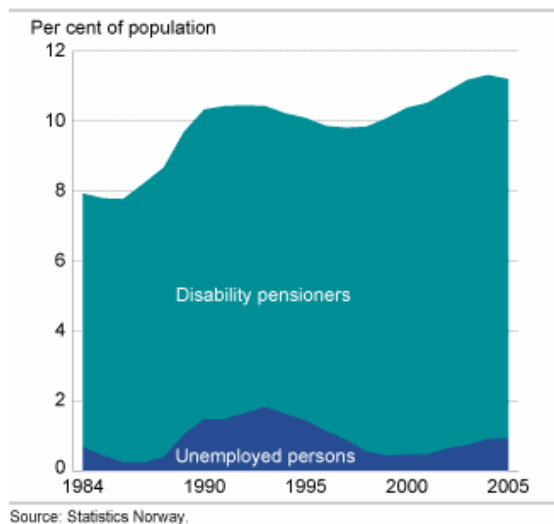
### 5.2.10 A physical indicator of social capital

270. As discussed throughout this report, social capital is probably the type of capital most difficult to define precisely, and hence to measure. Nevertheless, its importance to social well-being is not in question. For most people, employment is an important basis for their income and a key to social inclusion. If a large proportion of the working age population is outside the labour market, this may be a serious threat to the maintenance of both human and social capital. In the long term, this may affect the productive capacity of the economy and social stability, and thus the sustainability of society.

271. Figure 5.5 shows long-term unemployed persons and disability pensioners as percentage of population between 18 and 66 years of age, i.e. the working population. Although

**Comment [kal21]:** Eurostat: Would number of jobless households be a better indicator as this affects directly children and have a more obvious long-term impact. But this could be better seen as a human capital indicator, and it seems to me one of the indicators given as an example in the previous sections would be better indicated (an indicator on trust, or participation in networks?).

unemployment is low in Norway by international standards, the proportion of the population who receive a disability pension is high and rising.



**Figure 5.5 Long-term unemployed persons and disability pensioners in Norway as percentage of population between 18 and 66 years. 1984-2005**

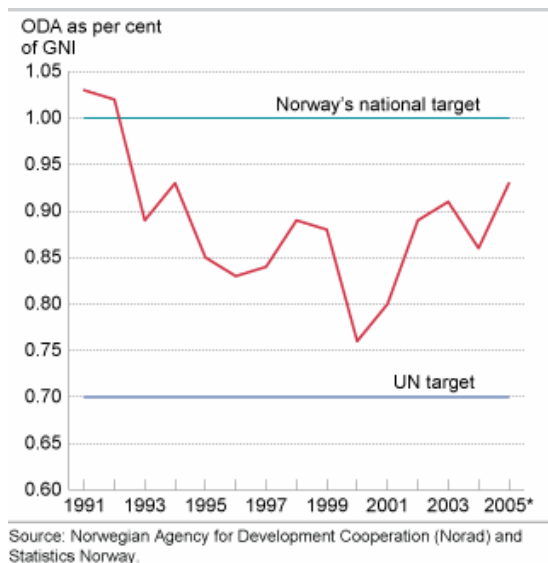
### 5.2.11 An indicator reflecting a nation's impact on the global wealth

272. In today's globalized world, there are strong arguments that the quality of a society should not be judged independently of the contribution it makes to solving global environmental and poverty problems. For this reason it is suggested to include an indicator for Official Development Aid (ODA) in the indicator set. ODA is used because often there is no detail available about how it is used, but it needs to be said that it is only a proxy, and in conceptual terms what is needed is the actual investment in different types of capitals in developing countries (e.g. ODA for education).

273. The effect of development assistance on poverty reduction and economic development is much disputed. The dominant view seems to be that development assistance is effective, but only under certain conditions. It appears to have a poverty-reducing effect in countries with a high level of poverty, but only if a stable economic policy and well-functioning institutions are also in place.

274. The UN target is for donor countries to provide 0.7 per cent of gross national income (GNI) as official development assistance (ODA). Norway's national target is to reach 1 per cent of GNI. Figure 5.6 illustrates how well Norway does in relation to UN and national targets.

275. As can be seen, Norway contributed in 2005 over 0.9 per cent of GNI as official development assistance. Thus, Norway has not quite achieved its target, but ODA as a proportion of GNI is higher than in most other OECD countries.



**Figure 5.6 Norwegian official development aid as a percentage of gross national income (GNI). 1991-2005**

### 5.3 Requirements to sustainable development indicators (SDI)

276. The indicator set is not spelled out in complete detail, e.g. it remains to actually select some of the concrete indicators and ways to present them. This final selection should fulfil some basic requirements in order for the complete indicator set to be a useful communication tool.

- The indicator set should be transparent. This is best secured if the individual indicator is based directly on observable data. In particular one should avoid using indexes when the weighting scheme is more or less arbitrary as this will lead to too much focus on methodological issues and take the focus away from the real issue.
- The indicators should preferably reflect changes in wealth components.
- Finally, the indicator set should be internationally comparable in order to allow benchmarking of nations with respect to sustainable development.

277. Fulfilling all of these requirements is obviously difficult; a compromise between ideal targets and achievable goals will have to be reached. Thus, the development of sets of sustainable development indicators should be an evolutionary exercise, progressing in a systematic manner with frequent evaluations taking place.

278. Both the starting point and the process will over time make clear where data are lacking and perhaps also what kind of data are needed. Thus, the development of sustainable development indicators will not only guide policy making, but will also indicate where further development of data, statistics, accounts and analyses are required.

## 6. Conclusions

### 6.1 The capital approach

279. Sustainable development is a popular concept, but difficult to define with precision and hence to measure. Over some quite considerable time, people spanning from researchers in academic settings, through mostly environmentally concerned NGOs to official statisticians in national as well as international organizations, have come up with suggestions for how to measure sustainable development. The proliferation of suggestions and general lack of coherence and convergence over time, cf. Chapter 2, testify to the challenge of the tasks.

280. This report has strived to establish a conceptual framework for the construction of sustainable development indicators that, over time, can allow a more congruent, harmonious and convergent development to take place nationally as well as internationally. The framework is called “The capital approach”.

281. A hallmark of the capital approach is its focus on the inputs in generating social well-being; what is termed total national wealth. This is in part a choice of convenience, since the social well-being itself is more difficult to observe and measure than its constituents. It is also, however, a reflection of the choice of targeting and focusing upon the long-term structural issues confronting our societies, a choice that is partly motivated by the “short-term-ism” that tends to dominate day-to-day policy and hence the media. Besides, it is undoubtedly so that without proper management of the total resource base of our societies, including economic, environmental as well as societal resources, we will have scant possibilities of sustaining the mainly positive development we have had over the last century or so.

282. Finally, by focusing on the resource base of our societies and its management, a framework is created that is a natural extension of the well-established framework for measuring economic activity; namely the national accounts (in particular the capital accounts). Traditional economic development theories have always focused on capital, investments and savings. Thus, extending the focus of the national accountants to non-marketed resources and new categories of capital, a well-founded basis for understanding and measuring sustainable development is given. The extension is natural also from a theoretical point of view.

283. If nations and regions (like the EU) and even local communities put in an effort in establishing sustainable development indicator sets along the lines outlined in this report, there would be the following advantages:

- countries could compare and perhaps compete in developing sound management systems for their total national wealth (including, in addition to financial and produced capital, also human and social capital and natural resources). Thereby best practices could be learned and a stronger focus on long-term structural development be secured;
- a higher recognition of nations’ comparative advantages could be developed, thus securing a more efficient management and use of the total resource base globally;
- the long-term structural development of societies can be highlighted, whereby negative and threatening but slow developments can be observed and hopefully corrected.



## **6.2 A brief set of recommendations to countries**

284. The report has, through discussions of the practical difficulties encountered in implementing the conceptual framework of the capital approach, and through a comparison with common elements in existing approaches to sustainable development indicators, come up with a suggested set of sustainable development indicators, cf. Table 5.3. This set could form a more or less common core in national indicator sets, allowing for a higher degree of comparability among the national sets than is the case today. While the suggested indicators are relatively concrete, the important point is that the indicators should be selected so as to reflect both the quantity and the quality of the different capital assets constituting the total national wealth:

- produced and financial capital;
- natural capital (including environmental services);
- human capital;
- social capital.

285. The report further argues that an indicator of changes in economic wealth (EW) and its decomposition on contributing capital assets will provide key information for sustainable development in terms of economic productivity effects of the various components of the resource base. While data on produced capital can be taken from the national accounts, supplementary data are needed when it comes to estimates of natural, human and social capital. SEEA (2003) provides guidance on data needed in estimating the natural capital component, and Greaker (2007) has elaborated on a possible scheme for estimating part of the human capital. These estimates, and the issue of understanding the residual between bottom-up calculation of the value of the different assets and the total economic wealth (EW), remain challenging and require further work.

286. So far, sustainable development indicators have been developed in many countries and international organizations by environmental ministries and institutions or other bodies outside the statistical community. The indicators have largely used official statistics as their sources, but often also different kinds of unofficial information. National statistical institutes have, however, usually been involved in the development work of indicators. This report suggests that work on sustainable development indicators should be seen as a proper part of the official statistics. This implies that measuring sustainable development by statistical means, in particular by use of indicators, should bear the same “hallmarks” as other official statistical information.

287. Finally, there are several challenges related to implementing sustainable development indicators based on the capital approach. These are discussed below, and clearly require a dedicated effort on the part of the implementing institutions.

## **6.3 Challenges in setting up a set of sustainable development indicators based on the capital approach**

### **6.3.1 Data collection challenges**

288. As mentioned, estimates of the various capital components require detailed data on quantities, for instance in the form of physical natural resource accounts, education, health and labour statistics, etc. What is available and what is lacking will vary by country, but will be made clearer by actual calculation of the proposed indicators.

### **6.3.2 Methodological challenges (e.g., valuation)**

289. In addition to information in physical terms, valuations of the assets are needed. Sometimes market prices are acceptable estimates of the relevant accounting prices, in other instances specific analyses will have to be carried out. Priorities in this work will again vary from country to country.

### **6.3.3 Conceptual challenges**

290. It has been noted earlier in this report that the understanding and definition of social capital is less precise and mature than our understanding and conceptualisation of the other broad types of assets. There are clearly challenges related to work out more specific indicators and valuation schemes for social capital.

### **6.3.4 Communication challenges**

291. Developing a suitable set of indicators of sustainable development is really only half the job. Just as important is to secure effective modes of communications to policy makers and the general public. Also, often the indicators and their meaning or preferred interpretation will have to be explained in some detail when they are presented.

## **6.4 Last words**

292. Inevitably, within a large group like the Working Group on Statistics for Sustainable Development, opinions will differ when it comes to interpreting and implementing a capital approach to sustainable development indicators. The fiercest discussions within the group have perhaps been on topics like:

- whether, or to what extent, the capital approach is able to include intra-generational, i.e. distributive or equity issues of sustainable development;
- whether development aid and similar foreign investments should be part of an indicator set for sustainable development;
- whether economic indicators like Economic Wealth (EW) belong to an indicator set for sustainable development and whether or not EW can be considered part of official statistics given its dependency on future prices.
- 

293. The answers to these and other questions outlined in this report will then necessarily be controversial, and some parties may be uncomfortable with the proposed solutions. The important thing is, however, that the capital approach provides a theoretical underpinning for the measurement of sustainable development. That is strictly necessary if such measurements are to be made more internationally comparable than they have been so far.

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**Appendix 1**

**Names of the authors who contributed papers in the course of the work of the Working Group**



**Appendix 2**

**List of members of the Working Group that attended the meetings**

### **Appendix 3**

## **Terms of reference for the Working Group on Statistics for Sustainable Development (WGSSD)**

### **Introduction**

1. Sustainable development indicators are used by national governments and international agencies for monitoring progress towards goals set by national governments and comparing performance among countries. The working group should identify good concepts and practices in order to assist national governments and international organizations in the design of sustainable development indicator sets and in the development of official statistics in the area. However, it should be clear that the objective is not to develop international recommendations on a particular set of sustainable development indicators to be used at the national level. Effort should be devoted to establishing a common understanding of the “object” of sustainability (that which is to be sustained) and to establishing core principles of the measurement of sustainability.

### **Proposal**

2. The working group should:

- i) articulate a broad conceptual framework for sustainable development measurement. While the starting point of this work should be the concept of capital, the group should also consider other approaches to the extent the capital approach is found insufficient from a conceptual standpoint;
- ii) identify the broad domains that good indicator sets should span;
- iii) develop a menu of good sustainable development indicators in order to help governments and international organizations when they are designing indicator sets;
- iv) identify a small set of indicators from the menu that might become the core for international comparisons;
- v) identify basic data systems necessary for a small set of indicators and identify their possible sources (existing or new statistical surveys, administrative records, information derived from environmental monitoring systems);
- vi) discuss the relationship between integrated environmental and economic accounts and sustainable development indicators.

3. The working group will be a joint working group of the OECD and the UNECE Conference of European Statisticians (CES) chaired by Robert Smith from Statistics Canada. The OECD Statistics Directorate will provide the working group with a secretariat; some secretarial support will also be provided by UNECE and Eurostat. The working group will submit a more detailed project (with milestones) to the Bureau of the Conference of European Statisticians in February 2006. The working group should, at the conclusion of its work, report back to the Conference of European Statisticians and the OECD Annual Meeting of Sustainable Development Experts.

**Timetable**

4. The working group should endeavour to have an interim set of recommendations by spring 2008, in time for discussion as appropriate at the June 2008 meeting of the CES. A final set of recommendations should be prepared by the end of 2008.

**Appendix 4**  
**Terms of reference for the Steering Committee**

ECE/CES/BUR/2006/17

**STATISTICAL COMMISSION and  
ECONOMIC COMMISSION FOR EUROPE**

**CONFERENCE OF EUROPEAN STATISTICIANS**

Third meeting of the 2005/2006 Bureau  
Geneva, 20-21 February 2006

**STEERING COMMITTEE FOR THE WORKING GROUP ON STATISTICS FOR  
SUSTAINABLE DEVELOPMENT (WGSSD)**

**BACKGROUND**

1. At the second meeting of the 2005/2006 CES Bureau, 24-25 October 2005, Washington D.C., the creation of a joint OECD/UNECE Working group on Statistics for Sustainable Development (WGSSD) was approved (ECE/CES/BUR/2005/12/Rev). To facilitate the operations of the WGSSD, an informal meeting of experts that took place in December 2005 in New York recommended that a Steering Committee be created. The members of the Steering Committee will be identified from among those countries and institutions participating in the full working group.

**OBJECTIVES OF THE STEERING COMMITTEE**

2. The main objectives of the Steering Committee are: to assist the Chair in operational planning for the WGSSD (e.g. identifying meeting dates and locations; preparing meeting agendas); to propose a programme of work for the WGSSD for approval by the full group; to periodically review the programme of work and recommend changes as necessary for approval by the full group; to oversee and, as necessary, contribute to the programme of work to ensure that the group is progressing effectively toward its objectives; to ensure, to the best of its ability, that the WGSSD is able to garner sufficient support from countries and institutions to complete its mandate.

**COMPOSITION OF THE STEERING COMMITTEE**

3. The Steering Committee will include representatives from Canada, Germany, Norway, Sweden, Switzerland, UNECE, Eurostat, OECD, UN Statistics Division, UN Division for Sustainable Development and (possibly) World Bank.

**MEETINGS OF THE STEERING COMMITTEE**

4. The Steering Committee is expected to meet face-to-face two or three times per year during the WGSSD's mandate. Meetings will normally be held in Paris and occasionally in New

York, Geneva or Ottawa. The first meeting will take place in Paris on 13 March 2006. Work between meetings will be carried out electronically.

## **OUTPUTS**

5. The main outputs of the Steering Committee will be: a proposed programme of work and timetable for the WGSSD; coordination of the work of the WGSSD with the aim of ensuring that the group meets its objectives within the timeframe of its mandate.

## **TIME FRAME**

6. The Steering Committee will be operational during the full two-year mandate of the WGSSD.

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OECD: The report discusses extensively and in several places the notional of "*social capital*". But a definition is only provided on paragraph 138; and until then it is not clear how the term is used. Paragraph 35 talks of "*institutional or social capital*", without clarifying if the two are identical or complementary constructs. Paragraph 105 suggests that the term "*social capital*" as used in the report is broader than the OECD/CERI definition; this should be stated clearly (and early) to avoid confusion. Paragraph 103 relates distributional issue to social capital but the message is confused. Yes, societies do care about "equity" but this holds whether or not inequality "*deteriorate trust*". Incidentally, wider inequalities can also have negative effect on other types of capital (e.g. by leading to policies inimical to capital accumulation and environmental protection, or by reducing human capital investment of poor families). But it is wrong to suggest that these equity considerations are adequately addressed by looking whether the aggregate stock of social capital goes up or down. The report should accept that the choice of the capital framework comes at the costs of partially neglecting intra-generational equity. Better to say it openly than to invoke partial and unconvincing arguments to justify the choice.

OECD: Paragraph 36 argues that "*Within the capital approach, (technological change) can best be seen as a manifestation of human and social capital*". This statement reflects the accounting practice of measuring human and social capital as the difference between GNI and the returns of other types of (measured) capital stocks but it is not what most people understand as technology (much of it is embedded in new capital goods). Technology is mentioned several times but never comprehensively discussed; this is a weak point of the report. Rather than subsuming it within and social capital, technological change should be recognized as one element affecting the accounting prices (in efficiency units) of all types of capital good.