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Report of the Working Group on Statistics for Sustainable Development

Paper prepared by UNECE

(for information)

STATISTICS FOR SUSTAINABLE DEVELOPMENT

COMMONALITIES BETWEEN CURRENT PRACTICE AND THEORY

Note by the UNECE secretariat at the invitation of the UNCEEA

I. BACKGROUND

1. The Draft Report of the Joint UNECE/Eurostat/OECD Working Group on Statistics for Sustainable Development (chaired by Rob Smith, Statistics Canada) was discussed by the Bureau of the Conference of European Statisticians (CES) at its meeting in February 2008. The Bureau found the document to be useful as a research report and decided to be presented to the plenary session of the CES for discussion. The Report is the result of two years work and explores the capital approach to measuring sustainable development. The Report also reveals commonalities with the existing sustainable development indicators developed by some countries and provides recommendations for future work.

2. For further details, please, find below the Executive Summary which is part of the main report. The full text of the Report is available on the website of the Conference of European Statisticians at: http://www.unece.org/stats/documents/2008.06.ces.htm

3. The CES Bureau has recognized that with this report the conceptual work on developing statistics for sustainable development is not closed: many issues remain unresolved and can be further developed. The CES Bureau has also recognized that a lack of concrete follow-up steps would lead to loss of the momentum that has been built up during the last few years since the Joint UNECE/Eurostat/OECD Working Group was created.

4. The Report is on the agenda at the forthcoming plenary session of the Conference to be held in Paris on 10-12 June 2008. It was also circulated for comments to all countries, members of UNECE and OECD. The country comments will be presented in a summary document that will be available at the CES plenary session as a room document. During the plenary session there will also be a discussion on the way forward based on a proposal by the CES Bureau (document ECE/CES/2008/29/Add 1 on the CES website). An oral report on the outcome of the discussions at the Conference, including the decisions for further work, will be presented at the UNCEEA meeting.

II. EXECUTIVE SUMMARY (EXCERPT FROM THE REPORT)

5. The present report is prepared by the Joint UNECE/OECD/Eurostat Working Group on Statistics for Sustainable Development, which was mandated to propose a small set of sustainable development indicators that could be used for the purposes of international comparison. The results of the group's efforts are presented in detail in the main body of this report and in summary form below.

6. Although formally prepared for statistical offices in the UNECE, OECD and European Union member states, this report targets other audiences as well. It will benefit statisticians of any country in need of conceptual guidance on the measurement of sustainable development. At the same time, the general reader will find it helpful in understanding how sustainable development might be measured in concrete terms, as well as the strengths and weaknesses of different approaches. Policy makers whose task it is to ensure sustainable development will find in it an approach with which they may not be fully familiar – the approach based on capital. They will see this approach compared with existing national indicator sets derived from policy frameworks with which they will likely be more familiar. It is hoped that this comparison will help ignite a discussion about new ways of measuring sustainable development.

A. Mandate and functioning of the Working Group

7. The Working Group was established by the Bureau of the Conference of European Statisticians (CES) in 2005 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). More particularly the Working Group was to:

(a) 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;

(b) Identify the broad domains that good indicator sets should span;

(c) Develop a menu of good sustainable development indicators in order to help governments and international organizations when they are designing indicator sets;

(d) Identify a small set of indicators from the menu that might become the core set for international comparisons;

(e) 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); and

(f) Discuss the relationship between integrated environmental and economic accounts and sustainable development indicators.

8. The mandate was further clarified by the CES Bureau in October 2006. The Bureau agreed that:

(a) The WGSSD is 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;

(b) 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.

9. The Working Group was open to participants from national statistical offices and other government bodies of all member states of the UNECE and OECD. A Steering Committee was established in order to guide its work. The full Working Group met five times over the course of its mandate.

B. Basic concepts

10. **Development** is thought of here as an increase in well-being across the members of a society between two points in time. Well-being is often used as a synonym for welfare, though the terms can have different formal meanings – particularly to economists. **Welfare** is formally defined as the benefit an individual derives from consuming goods and services over time. It is equal to the discounted present value of future utility. If consumption is measured for all members of a society, then this discounted present value is termed social welfare.

11. From the insights of economists, it can be shown that the way in which access to resources – another way of saying consumption opportunities – is distributed across individuals and their expectations of how they will benefit from that access are at the heart of welfare (Dasgupta, 2001; Samuelson 1961). This means that welfare is very closely related to what we think of as wealth, as wealth represents the totality of resources upon which we are able to draw to support ourselves over time. From this it is clear that welfare is a forward looking concept in which what counts is not how well off we are at a point in time, but our prospects for being well off in the future. In other words, welfare is an intertemporal concept.

12. As for **well-being**, there is no single definition and there remains considerable debate regarding its determinants. Some, as noted, use it synonymously with welfare. Others, including Dasgupta (2001), claim that well-being encompasses welfare but goes beyond it to include benefits derived from things other than consumption; for example, from the presence of fundamental human rights. While a formal distinction between welfare and well-being may be of importance in academic debate, it is not of great importance to the conclusions of this report. For this reason, and because it may be the more encompassing term, well-being is the term adopted here.

13. A central theme of this report is that the concept of well-being has much potential for measuring sustainable development *if* it is broadened beyond its traditional scope in economics. Economists are interested mainly in the well-being derived from consumption as traditionally defined: the enjoyment of goods and services purchased in the market.

But if it is to be useful for measuring sustainable development, well-being must be seen to be a function of consumption in the broadest sense possible. Consumption in this sense must include the enjoyment of any good or service that contributes to well-being, including things freely provided by nature like forest products and beautiful sunsets. It is possible even to think abstractly of the enjoyment of the benefits of human rights or psychic fitness as being forms of consumption.

14. It seems reasonable to interpret sustainable development as development that can continue "forever" or at least for a very long time; say, for several generations. Given the discussion above, this statement can be put more fundamentally: sustainable development is increasing well-being over a very long time. Yet more fundamentally: sustainable development is increasing consumption, following its broadest economic interpretation, over a very long time.

15. Upon these basic points, all members of the Working Group agreed. It must be acknowledged, though, that the group's views diverged importantly on other points. Differences arose, in particular, regarding the relationship between short- and long-term well-being and sustainable development. One view within the group, referred to as the integrated view, held that the goal of sustainable development is to ensure both the well-being of those currently living and the potential for the well-being of future generations. The second, labelled the future-oriented view, held that the concern of sustainable development is properly limited to just the latter; that is, sustainable development is about ensuring the potential for the well-being of future generations.

16. There was no attempt by the group to resolve this debate. Rather, the debate was acknowledged and the group moved on to explore the commonalities between existing national and international indicators of sustainable development, most of which are founded on the integrated view, and the indicators that fall out of the capital approach, which is aligned with the future-oriented view. The results of this exploration, outlined further below, show that there is much more in common between the approaches than imagined at the outset.

C. Commonalities in existing policy-based indicator sets

17. The focus of countries in establishing sustainable development indicator sets to date has been generally to meet the information needs of a national sustainable development strategy. It is relatively rare that such policies have been based on an explicitly defined conceptual framework. They have often been, however, the result of rigorous consultation inside and outside of government to ensure that different perspectives on how sustainable development should be defined are taken into account.

18. The establishment of sustainable development indicators has been for many countries and institutions a key opportunity to move environmental issues higher up the policy agenda alongside economic and social issues. The sustainable development

indicators have also been instrumental in promoting the concept in a much clearer way than can be achieved through national sustainable development strategies alone.

19. In many cases the relationship between indicators and policy is very strong – with the policy framework in effect determining the indicators. While there may be concerns about having indicators closely aligned with policy and hence potentially biased towards particular policy priorities at the expense of other aspects of sustainable development, this is also one of their strengths. Policy makers see them as being directly relevant to the policies they have established and effective for communication.

20. An obvious drawback to indicators that are strongly aligned with a policy framework is that changes in the policy framework can mean the indicators have to follow suit. This is particularly illustrated by the example of the United Kingdom, where there have been three sustainable development strategies and three associated indicator sets since 1996.

21. Of course, it would be wrong to set the indicators in stone when refinements would be beneficial in terms of coverage or understanding. Moreover, in practice, changes to indicator sets may be on the periphery while at the core there is reasonable consistency between different generations of indicators.

22. Only minor consideration has been given to international comparability in the development of national indicator sets. This is perhaps inevitable in terms of both differing priorities and data availability among countries. However, for issues that are of global or regional importance, there is broad consistency among countries; for example, most sustainable development indicators sets include an indicator on greenhouse gas emissions.

23. Within the European Union, at least, there has been some inevitable convergence among national indicators used. This is for two reasons. Firstly, and most obviously, as newer member states develop their indicator systems, they are likely to be influenced by the indicators adopted at the European Union level. Secondly, and less obviously, the indicators used by the European Union itself have been developed through engagement with older member states and those with well-established national indicator sets have been influential in the direction taken by the European Union.

24. In order to determine the degree to which commonalities exist among policy-based indicators of sustainable development, the Working Group analysed indicator sets from 20 European countries[1] (Eurostat, 2007b; Kulig, Kolfort and Hoekstra, 2007), two countries outside Europe (Australia and Canada), and two international institutions (the European Union and the United Nations).

[1] Austria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Iceland, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom.

25. Based on this analysis, some 27 indicators emerged as being common to 10 or more sets (Table 1). This list was the basis upon which the Working Group compared existing indicators with those that fall out of the approach based on an extended concept of capital.

Table 1 Most common policy-based sustainable development indicators in policy-based sets

Rank	Broad indicators	Number of indicator sets where found*
1)	Greenhouse gas emissions	22
2)	Education attainment	19
3)	GDP *per capita*	18
4)	Collection and disposal of waste	18
5)	Biodiversity	18
6)	Official Development Assistance	17
7)	Unemployment rate	16
8)	Life expectancy (or Healthy Life Years)	15
9)	Share of energy from renewable sources	15
10)	Risk of poverty	14
11)	Air pollution	14
12)	Energy use and intensity	14
13)	Water quality	14
14)	General government net debt	13
15)	Research & Development expenditure	13
16)	Organic farming	13
17)	Area of protected land	13
18)	Mortality due to selected key illnesses	12
19)	Energy consumption	12
20)	Employment rate	12
21)	Emission of ozone precursors	11
22)	Fishing stock within safe biological limits	11
23)	Use of fertilisers and pesticides	10
24)	Freight transport by mode	10
25)	Passenger transport by mode	10
26)	Intensity of water use	10
27)	Forest area and its utilisation	10

*Based on indicators where 10 or more countries/institutions have adopted them.

D. The capital approach in theory

26. Classical development theory is strongly focused on investment and capital as central determining factors for development. While traditionally restricted to understanding economic development through expansion of markets and increases in human-made capital, the theory is increasingly extended and broadened so that it speaks to the broader question of how to secure sustainable development as well.

27. From a capital perspective, sustainable development can be defined as non-declining *per capita* wealth over time (United Nations *et al.*, 2003). This definition concords well with that above, but is more nuanced. In particular, it states directly the need to maintain wealth as the basis of sustainable development. It also recognizes that wealth *per capita* is what that matters and not just the total wealth of a society. This reflects the fact that populations increase over time and that the rate of increase of wealth must be at least equal to population growth if sustainable development is to be achieved.

28. All goods and services can be viewed as being produced through the use of capital, normally in conjunction with human labour. Since the concept of sustainable development demands that a very broad view of consumption be taken, it is necessary here to take an equally broad view of capital.

29. From this broad view, a society's total capital base is seen to comprise five individual stocks: **financial capital** like stocks, bonds and currency deposits; **produced capital** like machinery, buildings, telecommunications and other types of infrastructure; **natural capital** in the form of natural resources, land and ecosystems providing services like waste absorption; **human capital** in the form of an educated and healthy workforce; and, finally, **social capital** in the form of functioning social networks and institutions.

30. Not all these forms of capital are equally well understood, either conceptually or empirically. Indeed, the order in which they have just been presented reflects well the degree to which they are understood. Social capital, the least well studied of the five, remains a controversial concept for which no single definition is universally accepted.

31. It should be noted that managing total national wealth in a manner that sustains it over time, measured *per capita*, only provides the potential for sustainable development. This is because there is no guarantee that future generations will manage well the capital base they inherit. They may fail in utilising it effectively to create well-being and instead waste the resources on wars or on excessively "high living" without concern for the well-being of their descendants.

32. While stable or growing total wealth *per capita* is no guarantee of sustainable development, the opposite is a guarantee of its impossibility. That is, in the face of declining *per capita* capital stocks, well-being will in the long run deteriorate and sustainable development will not be possible (Hamilton and Ruta, 2006).

33. By taking the perspective of capital, the challenge of sustainable development is simplified into a question of whether a country's total capital base – or total national wealth – is managed in a way that secures its maintenance over time. In simplifying it thus, the focus of the sustainable development challenge is sharpened and put into concrete terms. The question whether financial, produced, natural, human and social capital stocks *per capita* are increasing or declining over time is one that lends itself to a precise answer. Furthermore, this focus helps make sense of the inevitable tradeoffs that must be weighed as development proceeds. For example, if one capital stock – let us say, petroleum wealth – declines, the framework allows us to ask whether it is being offset by growth of another stock, human capital perhaps.

E. Limitations on the theoretical capital approach

34. To reach its full potential, the capital approach requires measurement of all capital stocks using a common unit. The only obvious choice of unit – money – is problematic for two reasons. First, it is difficult to uniquely determine all of the ways in which capital contributes to well-being. Those that cannot be identified obviously cannot be valued. Second, even for those contributions we can identify, it is sometimes difficult to translate their value into dollars. This is partly because functioning markets rarely achieve the ideal conditions economists impose upon them in their valuation methods and partly because the methods themselves remain underdeveloped in some cases.

35. There is in addition to the debate over the economics of valuation a debate over its ethical underpinnings. Certain observers place a question mark after the right of humans to exploit nature in a destructive manner, even if this, at least in the short run, may increase total national wealth. Clearly, aggregating nature along with other forms of wealth as though humans are indifferent to its existence so long as their well-being is otherwise assured is at ethical odds with this view.

36. A third limitation on valuation is the degree of substitutability among capital types. It is generally accepted that the various components of national wealth cannot always and without difficulty be replaced with each other. It is not so, for instance, that ecosystem services, which may be considered as one of the dividends of natural capital, can easily and always be replaced by increased income, the dividend of financial, produced or human capital. Capital services for which no substitute can be found are said to flow from **critical capital** stocks. To the extent that some capital stocks are indeed critical, the possibility of using a single monetary aggregate to measure sustainable development disappears. It would be wrong to aggregate values for non-critical capital with those for critical capital into a single measure. In doing so, essential information for sustainable development would be lost.

37. All of this suggests that a practical implementation of the capital framework cannot rest on monetary indicators alone. Certainly, monetary indicators are desirable and should form part of any set of sustainable development indicators based on capital. Additionally,

though, the approach requires separate indicators of critical capital stocks measured in physical units.

F. A practical set of capital-based indicators

38. It is clear that not all capital stocks can or should be measured in monetary terms. Yet many stocks and/or the goods and services they provide are bought and sold in markets and there is good reason to argue that the market value assigned to these assets (or goods and services) is a close approximation of their contribution to well-being. This is true of all financial and produced capital. It also applies to those elements of natural capital and related products that are commonly traded in the market; including, timber, fish, minerals and energy. It applies as well to the output of human capital (labour) insofar as it is used in the market.

39. Using market prices as a guide, then, it is possible to estimate the contribution of a fair range of capital assets to what might be called the economic component of well-being. Given this, extending the valuation of these assets as far as possible into an indicator of market-based **economic wealth** is an important task in a practical set of capital-based sustainable development indicators. To be precise, the correct form of the indicator is **real (inflation-adjusted) *per capita* economic wealth**.

40. Economic wealth is equal to the sum of the value of all assets that contribute to market production, including financial, produced, natural, human and social capital. In practice, it is not possible to observe market values for all capital types directly, so calculating economic wealth by summing just observed values is not possible. Only in the cases of financial and produced capital are market values normally directly observable. Market values for natural capital are observable in some instances[2], but natural assets are generally not traded on markets. Well-established indirect methods based on universal principles of valuation can be used, however, to estimate natural capital values in the absence of market prices (Freeman, 1993). Human capital values are also not directly observable, but again indirect methods exist for valuing it (Greaker, 2007). Most problematic is social capital, where neither directly observed values nor well-established indirect methods exist.

41. Although economic wealth cannot be measured today by summing observed or estimated values for the five categories of capital, economic theory (Hamilton and Hartwick, 2005; World Bank, 2006) gives us another approach. According to this theory, economic wealth is also equal to the present value of future market income, where market income equals what is spent on market goods and services plus net investment in various types of capital. The World Bank (2006) has discussed this approach in detail and used it as the basis for estimating economic wealth in more than 100 countries.

[2] For example, in some countries entire forest tracks are held privately and traded in open markets.

42. It should be noted that economic wealth calculated in the above fashion is sensitive to assumptions about future income and to the choice of discount rate. These assumptions must, of course, be made explicit in any use of this method in official statistics.

43. While economic wealth is an important measure of sustainable development from the capital perspective, it cannot stand alone. It must be supplemented to form a practical and complete indicator set from a capital perspective. Additional indicators must be selected to reflect the well-being effects of capital that cannot or should not be captured in a market-based monetary measure. They must take into consideration the limited substitutability among different forms of capital, the existence of critical forms of capital and the fact that well-being is derived from more than market consumption. Finally, they must take into account the fact that it is not just stocks, but flows too that are important from a capital perspective. Flows are important because they are what determine changes in stocks from one period to the next.

44. The first necessary extension to the set of capital stock indicators is to complement the aggregate indicator of economic wealth with separate monetary indicators of financial capital, produced capital, human capital, natural capital and social capital. Extending the indicator set in this way takes care of the concern about the non-substitutability of capital stocks at the margin. As with economic wealth, these separate monetary indicators should all be measured in real *per capita* terms.

45. The next extension of the practical indicator set is necessary to take care of the fact that some capital assets are "critical" to development. One 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, there is reasonable consensus that the following are all very important if not essential:

(a) A reasonably stable and predictable climate;

(b) Air that is safe to breath;

(c) High-quality water in sufficient quantities; and

(d) Intact natural landscapes suitable for supporting a diversity of plant and animal life.

46. There may well be other forms of capital that also have critical elements, including social capital. It is not known yet what these might be, so only a place holder can be set aside within the indicator set at this time.

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

48. Natural capital contributes to well-being outside the market mainly when humans experience nature directly (for example, when camping) or when they derive pleasure from the knowledge that nature continues to exist. 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.

49. 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. Indicators are therefore added for the two core dimensions of human capital: educational achievement and health status.

50. As for social capital, it has been suggested (Grootaert and van Bastelaer, 2002; pp. 31-32) that the focus should be on three types of proxy indicators: membership in local associations and networks, trust and adherence to norms, and collective action.

51. Though the central focus of the capital approach is asset stocks, the measurement of flows is also integral to the approach. To the extent that an asset changes in value or size over time, there must be identifiable flow that is the cause of the change. Indicators of these flows must be included in the practical set of sustainable development indicators.

52. When it comes to economic wealth overall, the fundamental flow variable is net investment in all forms of market assets. This is the value of new investment in these assets during a period net of the depreciation in their value as a result of their use in production. The term "genuine economic savings" is used here to denote this flow.

53. For financial capital, the fundamental flow variable is net investment in foreign financial assets.

54. For produced capital, the fundamental flow indicator is net investment. This is the value of new investment in produced capital during a period net of the depreciation of the existing produced capital stock.

55. For human capital, the fundamental flow indicator is also net investment. This would be the value of the increase in human capital during a period less its depreciation. Depreciation of human capital results from the obsolescence of skills and the loss of workers from the labour force as a result of retirement, unemployment or other factors. Investment in human capital occurs through education and training and through improvements to health status.

56. For natural capital, there are several flow indicators that are important. First, for non-critical forms of natural capital – that is, those that can be meaningfully aggregated together and measured in monetary terms – the fundamental indicator is the aggregate value of net depletion. A separate flow indicator is included for each critical form of natural capital noted earlier.

57. When it comes to social capital, identifying flow indicators to parallel the proxy stock indicators discussed above is not straightforward. Only the indicator of membership in local associations and networks has an obvious flow parallel: change in membership in these same groups. No obvious flow variable parallels the indicator of trust and adherence to norms or the indicator of collective action. For now, place holders are included for these two flow indicators.

58. The final set of practical sustainable development indicators based on the capital approach is presented inTable 2. In the end, the practical set includes 15 stock indicators. The flow indicators also total to 15, though both of the social capital flow indicators and the indicator of changes in age-specific mortality and morbidity are simply place holders for the time being until research in these areas matures.

59. Regarding the feasibility of the set, all of the indicators that are not place holders can be estimated today using existing methods and data that are available in most developed nations. Not all of the methods are equally well established however. Some, like those for estimating produced capital, are formally part of official statistical methods. Other methods, like those for measuring human capital or fragmentation of habitats, exist and are used in the research community but are not yet formally recognized as statistical standards.

Table 2 A practical set of capital-based sustainable development indicators

Stock indicators	**Flow indicators**
Real *per capita* economic wealth	Real *per capita* genuine economic savings
Real *per capita* net foreign financial asset holdings	Real *per capita* investment in foreign financial assets
Real *per capita* produced capital	Real *per capita* net investment in produced capital
Real *per capita* human capital	Real *per capita* net investment in human capital
Real *per capita* natural capital	Real *per capita* net depletion of natural capital
Real *per capita* social capital (place holder)	Real *per capita* net investment in social capital (place holder)
Temperature deviations from normal temperatures	Greenhouse gas emissions
Ground-level ozone and fine particulate concentrations	Smog-forming pollutant emissions
Quality-adjusted water availability	Nutrient loadings to water bodies
Fragmentation of natural habitats	Conversion of natural habitats to other uses
Percentage of the population with post-	Enrolment in post-secondary educational

secondary education	institutions
Health-adjusted life expectancy	Changes in age-specific mortality and morbidity (place holder)
Membership in local associations and networks	Change in membership in local associations and networks
Trust and adherence to norms	Flow indicators of trust/adherence to norms and collective action (place holder)
Collective action	

Legend: MONETARY INDICATORS PHYSICAL INDICATORS

G. Comparing the approaches

60. Based on the set of common policy-based indicators presented in Table 1 and the practical set of capital-based indicators presented in Table 2, the following points can be drawn by way of comparison between the two:

(a) First, few monetary indicators are commonly found in policy-based sets, while they figure centrally in the capital-based set. In particular, there is no effort in policy-based sets to measure sustainable development with highly aggregated monetary indicators like economic wealth. Many common policy-based indicators are, however, closely related to the monetary indicators of individual capital stocks even if they are measured in physical terms;

(b) There are very close and even direct relations between a number of common policy-based indicators and the physical indicators of human and natural capital stocks;

(c) Only a few common policy-based indicators cannot be reconciled with the capital approach. Among these, GDP *per capita* is the most important. It is simply not possible to justify selection of any indicator based on GDP as a sustainable development indicator from the capital perspective.

61. With this summary in mind, attention can be turned to defining – in an exploratory fashion – a small set of sustainable development indicators that might be consistent with the capital approach, relevant from the policy perspective and suitable for comparing performance among countries. Such a set is presented in Table 3.

62. As can be seen, the proposed small set in Table 3 has been divided into two **indicator domains**. The first is labelled foundational well-being to reflect the fact that the indicators measure stocks and flows that are essential to the well-being of society. The second domain is labelled economic well-being. The indicators within it are more narrowly related to the well-being derived from market activity.

Table 3 A proposed small set of sustainable development indicators

Indicator domain	Stock Indicators	Flow Indicators
Foundational well-being	Health-adjusted life expectancy	Index of changes in age-specific mortality and morbidity (place holder)
	Percentage of population with post-secondary education	Enrolment in post-secondary education
	Temperature deviations from normals	Greenhouse gas emissions
	Ground-level ozone and fine particulate concentrations	Smog-forming pollutant emissions
	Quality-adjusted water availability	Nutrient loadings to water bodies
	Fragmentation of natural habitats	Conversion of natural habitats to other uses
Economic well-being	Real *per capita* net foreign financial asset holdings	Real *per capita* investment in foreign financial assets
	Real *per capita* produced capital	Real *per capita* net investment in produced capital
	Real *per capita* human capital	Real *per capita* net investment in human capital
	Real *per capita* natural capital	Real *per capita* net depletion of natural capital
	Reserves of energy resources	Depletion of energy resources
	Reserves of mineral resources	Depletion of mineral resources
	Timber resource stocks	Depletion of timber resources
	Marine resource stocks	Depletion of marine resources

63. In selecting the indicators for inclusion in the small set, the following decisions were made.

(a) As a general rule, to be included in the small set, an indicator had to be both consistent with the capital approach and identifiable with an indicator found among the most common indicators from policy-based sets;

(b) No particular effort was made to include only indicators that are methodologically well-established or feasible today in all countries. Rather, priority was given to selecting a small set that is as robust and complete as possible. As it happens, though, most of the indicators in the set may in fact be developed today using methodologies outlined either in the academic literature or in statistical guidelines. Some

of these methodologies – for example, those related to human capital valuation – remain experimental and may not yet meet the standards of official statistics. Not all of them will be feasible in all countries. The small set should therefore be considered a goal to which some countries will have to aspire, though it is largely practical for countries with well-established statistical systems;

(c) No distribution- or efficiency-based indicators were included in the set. This is not because distribution of wealth and efficient use of assets are unimportant to sustainable development, but because distributional or efficiency versions of most of the indicators in the small set can be easily compiled using basic statistical techniques;

(d) No indicators related to social capital were included. Even though proxy indicators of social capital were included in the proposed list of capital indicators in Table 2, it is not felt that these are sufficiently robust either theoretically or methodologically to be proposed for the small set. The fact that only one indicator related to social capital is found among the most common indicators in existing policy-based sets was another reason for excluding social indicators from the small set. Clearly, further research will be necessary before social indicators consistent with the capital approach and relevant to sustainable development policy across a large number of countries can be proposed;

(e) The aggregate monetary indicator of economic wealth was not included. Although this indicator is highly relevant to the capital approach, it is far from what is currently measured in policy-based sets. For that reason, its inclusion in the small set was felt to be unjustified;

(f) The aggregate monetary indicators of financial, produced, natural and human capital were included. The inclusion of the financial and produced capital indicators is consistent with, if broader than, the policy-based indicators of government net debt and research and development expenditure. The inclusion of the monetary natural and human capital indicators is justified in two ways. First, their exclusion would be inconsistent with the inclusion of the financial and produced capital indicators. If the wealth associated with financial and produced capital is considered relevant to sustainable development, then surely so must the wealth associated with natural and human capital. Second, many of the indicators in existing policy-based sets are closely related to human and natural capital, even if they are measured in physical terms. So that the proposed small set is consistent with both the capital approach and existing policy approaches, the small set also includes a number of physical indicators of non-critical natural capital among the economic well-being indicators. Physical indicators of human capital are included among the foundational well-being indicators.

64. There are 29 indicators in the proposed small set. While this is a large number, it is fewer than in most policy-based sets – in some cases much fewer. The indicators in the small set represent a theoretically robust, substantially complete and policy-relevant approach to measuring sustainable development. Any country that compiled them all would be in a very good position to report upon its potential for sustaining well-being in

the long term. If many countries were to compile them as part (or all) of their national sustainable development indicator sets, the basis for comparing progress across nations in terms of achieving sustainable development would be greatly improved. Likewise, the basis for long-term policy making at the national level could be improved by:

(a) Providing a focus on the long-term determinants of development;

(b) Clarifying the distinction between current income and capital consumption;

(c) Defining the concept of investment more broadly; and

(d) Helping balance current well-being with the maintenance of capital.

65. The set is not of as much use for reporting on the elements of current well-being, though it is far from useless for this purpose. The set will also not correspond perfectly to the policy priorities in all countries. For both these reasons, any given country might feel that the proposed small set is insufficient to meet its needs for measuring sustainable development. To the extent that this is true, the small set can, of course, be supplemented with additional indicators reflecting the national situation.

66. It is also worth emphasizing that the small set of indicators on its own should not be thought of as all that is relevant to measuring sustainable development. Indicators by their nature tell a very high-level story. They are valuable for pointing out where a policy may not be having its desired effect, but they are not likely to reveal why this is the case. Thus, to be fully useful for crafting and assessing policies, indicators must be built upon well-organized underlying data structures. Creating such structures requires a measurement framework; that is, a set of methodologies and organizational rules for turning basic data into useful information coherent with an underlying conceptual framework.

67. The *System of National Accounts* (United Nations et al., 1993) is a good example of a measurement framework and is, in fact, the most obvious starting point for designing a measurement framework for the small set of sustainable development indicators. This is true for several reasons. First, the *System of National Accounts* – or SNA – is already the source for measures of financial and produced capital stocks. Second, there already exists a measurement framework for natural capital that is consistent with the SNA. This is the United Nations *System of Environmental and Economic Accounts* (United Nations et al., 2003). Third, while no fully developed SNA-based measurement framework for human capital exists, it is the case that many of the data required to compile estimates of human capital are available from the SNA. Thus, it is reasonable to suggest that an SNA-based measurement framework for human capital could be easily conceived.

H. Conclusion

68. Sustainable development is a popular and important concept, but one that is difficult to define with precision and, therefore, difficult to measure. The Working Group on Statistics for Sustainable Development has attempted to contribute to this undertaking by drawing the best from the conceptual work of researchers and the practical work of policy makers and statisticians. Its efforts can be viewed as a success from a number of perspectives.

69. Importantly, over the course of two years of discussions, there emerged a significant convergence of opinion among the members of the group. While at the outset there was doubt on the part of some about the value of an approach based on capital and doubt on the part of others of the effectiveness of existing indicator sets, at the end there was greater understanding of the role each has to play. For this alone, the work of the group can be considered to have been worthwhile.

70. Second, the very thorough discussions of the capital approach have helped clarify many of the concepts that are central to it and, more importantly, identified where further work is needed to clarify these concepts if they are to become more widely accepted. In particular, further work is proposed to more fully assess the methods for estimating economic wealth, to refine the proposed indicators of critical capital and to better define social capital.

71. Finally, and most importantly, the work of the group has lead to the proposal of practical set of sustainable development indicators that might serve as the basis for international comparisons. This set is consistent with the capital approach and with the most common elements of existing policy-based indicator sets. It is relatively small and has a high degree of internal coherence

72. The small set of indicators in is offered in an exploratory fashion only. It is not intended as an international recommendation, but as a research proposal worthy of consideration by countries interested in finding a conceptually clear and defensible basis for sustainable development indicators focused on long-term well-being.

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