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Indicators of Sustainable Development: Guidelines and Methodologies

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Indicators of Sustainable Development:

Guidelines and Methodologies

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DESA

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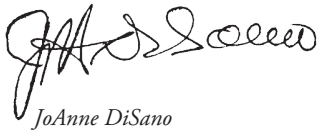
Foreword

This publication presents the third set of Indicators of Sustainable Development and provides suggestions on how to adapt them to national conditions and priorities. It benefits from the active participation of and excellent collaboration with, a wide range of governments, international organizations, academic institutions, non-governmental organizations and individual experts. The indicators are a follow-up to the two earlier sets prepared under the work programme on indicators of sustainable development approved by the Commission on Sustainable Development in 1995. These earlier sets were published in 1996 and 2001.

We hope that countries will find the publication useful whenever they are reviewing their existing indicators or developing new indicators to measure progress towards nationally defined goals for sustainable development. The indicators of sustainable development presented here reflect the valuable experiences of countries and international organizations over the past fifteen years since the adoption of Agenda 21 in Rio de Janeiro. With this publication, we also hope to further the momentum at the national and international level to develop and apply sustainable development indicators. This will help the understanding of the various dimensions of sustainable development and their complex interactions and the facilitation of policy decisions aimed at achieving sustainable development goals.

On behalf of the United Nations, I would like to thank all countries, organizations, agencies and individuals that have contributed their time and effort to make this publication possible.



JoAnne DiSano
Director
Division for Sustainable Development

I. Introduction

Indicators perform many functions. They can lead to better decisions and more effective actions by simplifying, clarifying and making aggregated information available to policy makers. They can help incorporate physical and social science knowledge into decision-making, and they can help measure and calibrate progress toward sustainable development goals. They can provide an early warning to prevent economic, social and environmental setbacks. They are also useful tools to communicate ideas, thoughts and values.

The United Nations Conference on Environment and Development in 1992 recognized the important role that indicators could play in helping countries make informed decisions concerning sustainable development. At the international level, the Commission on Sustainable Development (CSD) approved its Work Programme on Indicators of Sustainable Development in 1995. The first two sets of CSD Indicators of Sustainable Development (henceforth CSD indicators) were developed between 1994 and 2001. They have been extensively tested, applied and used in many countries as the basis for the development of national indicators of sustainable development.

The new revised edition of the CSD indicators has been developed in response to decisions by the CSD and the World Summit on Sustainable Development in 2002, which encouraged further work on indicators at the country level in line with national conditions and priorities and invited the international community to support efforts of developing countries in this regard. Since the publication of the previous set, knowledge of and experience with sustainable development indicators of countries and organizations has increased significantly, as has the emphasis on measuring progress on achieving sustainable development, including the Millennium Development Goals (MDGs), at the national and the international levels. By incorporating these developments, the revision of the CSD indicators gives vital support to countries in their efforts to develop and implement national indicators for sustainable development.

This publication presents the revised, third edition of the CSD indicators. It also provides a synopsis of their foundation. The presentation of the indicator

set explicitly addresses their relation to Agenda 21 and the Johannesburg Plan of Implementation, the outcomes of the major international conferences on sustainable development in 1992 and 2002, as well as their relation to the MDG Indicators. The publication also provides guidance on applying and adapting the CSD indicators for the development of national indicator sets. The role of indicator frameworks is briefly discussed, and a succinct description of all indicators is included. Detailed methodology sheets for each indicator are included in an accompanying CD-ROM. These methodology sheets are also available on the indicators section of the webpage of the United Nations Division for Sustainable Development (*http://www.un.org/esa/sustdev/*) and will be regularly updated.

II. CSD Indicators of Sustainable Development

A. History

Chapter 40 of Agenda 21[1], the action plan adopted in 1992 at the United Nations Conference on Environment and Development in Rio de Janeiro, calls on countries, as well as international, governmental and non-governmental organizations, to develop indicators of sustainable development that can provide a solid basis for decision-making at all levels. Agenda 21 also calls for the harmonization of efforts to develop such indicators.

This mandate was reflected in the decision of the CSD in 1995 to adopt an indicators work programme that involved several stages: consensus-building on a core list of indicators of sustainable development; development of the related methodology sheets; policy discussions within a CSD publication and widespread dissemination of this work; testing; and evaluation and revision of the indicators.

The first draft set of indicators of sustainable development was developed for discussion jointly by the Division for Sustainable Development (DSD) and the Statistics Division, both within the United Nations Department of Economic and Social Affairs. This draft then became the focus of a broad consensus-building process that included a number of organizations within the United Nations System and other international organizations, both intergovernmental and non-governmental, and coordinated by the DSD. The result was a set of 134 indicators. During 1995 and 1996, the same organizations that had participated in the consultations drafted methodology sheets for each of the indicators, and these, along with the indicators, were contained in a publication known as the 'blue book' [2] and widely disseminated.

From 1996 to 1999, 22 countries from across the world voluntarily pilot-tested the indicator set. In order to facilitate this process, the DSD developed guidelines for the implementation of the CSD indicators, initi-

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1 Agenda 21, Programme of Action for Sustainable Development, adopted at the United Nations Conference on Environment and Development, Rio de Janeiro, Brazil, 1992.

2 United Nations, Indicators of Sustainable Development Framework and Methodologies, United Nations Sales Publication No. E.96.II.A.16 (New York, August 1996).

ated a series of regional briefing and training workshops, and encouraged the organization of national workshops and twinning arrangements between testing countries.

From 1999 to 2000, the results of the national testing were evaluated, and the indicator set was revised. Overall, countries considered the testing process to be successful, although they indicated that they had faced significant institutional challenges especially in the areas of human resources and policy coordination. Integrating indicator initiatives with national development policies and transforming them into permanent work programmes ranked high among the recommendations to ensure success. Most countries also found that the initial CSD indicator set was too large to be easily managed. Consequently, the revised set of CSD indicators was reduced to 58 indicators, embedded in a policy-oriented framework of themes and sub-themes. These indicators were presented to the CSD in 2001, and subsequently published as part of the second edition of the 'blue book'.[3]

Overall, the focus of the CSD and its secretariat on indicators provided a very useful and timely forum for the discussion of national-level indicators with the involvement of governments, international organizations, and various stakeholders at a time when thoughts on the potential role of indicators in achieving sustainable development goals were at an early stage and thus still evolving. Therefore, the proactive role of the CSD proved to be instrumental in advancing work in this area.

B. Latest review of the CSD Indicators of Sustainable Development

In 2005, the DSD started a process to review the CSD Indicators of Sustainable Development. This process, which is in line with the decision made by the CSD in 2001 to keep the indicators under review, was largely carried out for two reasons. In the five years that had passed since the last revision, perspectives on indicators had evolved and experience in applying indicators of sustainable development at the country level had grown considerably. A large number of countries had developed their own national indicator sets, often based on the CSD indicators. In addition, since the adoption of the United Nations Millennium Declaration in 2000, much attention had been given, within the UN Sys-

[3] United Nations, Indicators of Sustainable Development: Guidelines and Methodologies, Second Edition, UN Sales Publication No. E.01.II.A.6 (New York, September 2001).

tem and by member States, to the development and use of indicators to measure progress on achieving the MDGs.[4]

The review began with research and analysis of national and global trends in applying indicators and with a renewal of the dialogue with international experts. The DSD also proceeded to assess the coherence between CSD and MDG indicators. This was followed by two expert group meetings and supplemented by ongoing communications. The original partners, including experts from those organizations that had prepared methodology sheets, as well as experts from a number of member States that were developing and using the indicators were invited. Thereby, the review benefited from the vast expertise of a wide-range of international agencies as well as from the rich experience gained by individual countries.

The first expert group meeting carried out a preliminary review of indicator frameworks and options for a way forward for the CSD indicators. It agreed on an interim revised list of indicators and proposed changes to the framework. At its second meeting in October 2006, the expert group completed the review and finalized the revised list of CSD indicators.

Countries are now invited to consider these revised CSD indicators when reviewing existing or developing new national indicators of sustainable development. Collaborating agencies have agreed to incorporate these indicators in relevant capacity-building activities and inter-agency cooperation is to ensure coherence of CSD indicators with other indicator sets such as the MDG Indicators, the 2010 Biodiversity Indicators Partnership, the Hyogo Framework for Action on Disaster Reduction, the Global Forest Resource Assessment, and Sustainable Tourism Indicators. The experiences gained by countries in applying and adapting the new indicator set will be taken into account in the continuous review of the CSD indicators. As relevant progress is made, methodologies of indicators will be regularly updated on the website of the DSD.

[4] The Millennium Development Goals were derived from the United Nations Millennium Declaration, adopted by 189 nations in 2000. Most of the goals and targets were set to be achieved by 2015 on the basis of the global situation during the 1990s. The baseline for the assessment of progress is therefore 1990 for most of the MDG targets.

III. Overview of the revised CSD Indicators of Sustainable Development

A. General description

The newly revised CSD indicators contain a core set of 50 indicators. These core indicators are part of a larger set of 96 indicators of sustainable development. The introduction of a core set helps to keep the indicator set manageable, whereas the larger set allows the inclusion of additional indicators that enable countries to do a more comprehensive and differentiated assessment of sustainable development. Core indicators fulfill three criteria. First, they cover issues that are relevant for sustainable development in most countries. Second, they provide critical information not available from other core indicators. Third, they can be calculated by most countries with data that is either readily available or could be made available within reasonable time and costs. Conversely, indicators that are not part of the core are either relevant only for a smaller set of countries, provide complementary information to core indicators or are not easily available for most countries.

The indicator set retains the thematic/sub-thematic framework that was adopted in 2001. In doing so, it remains consistent with the practice of most countries applying national sustainable development indicator sets and it is directly relevant to the monitoring of national sustainable development strategies. At the same time, it is noted that there is important work going on elsewhere on alternative frameworks, and these will continue to be considered in future revisions of the CSD indicators (see chapter V, page 39).

CSD indicator themes

- Poverty
- Governance
- Health
- Education
- Demographics
- Natural hazards
- Atmosphere
- Land
- Oceans, seas and coasts
- Freshwater
- Biodiversity
- Economic development
- Global economic partnership
- Consumption and production patterns

The division of indicators along the lines of four 'pillars' (social, economic, environmental and institutional) is no longer explicit in the newly revised set. This change emphasizes the multi-dimensional nature of sustainable development and reflects the importance of integrating its pillars. Consequently, new cross-cutting themes such as poverty and natural hazards were introduced and existing cross-cutting themes such as consumption and production patterns are better represented.

Since poverty covers a broad range of related issues, it was conceptually limiting to keep it as a sub-theme under equity. Consequently, it is now a separate theme that includes sub-themes related to income, sanitation, drinking water, energy access and living conditions.

Natural hazards were a sub-theme of the now dissolved theme 'institutional capacity', which did not reflect the cross-cutting nature of the topic. Other new themes include global economic partnership and governance. Global economic partnership includes a number of new indicators that capture key issues such as trade and development financing. The indicators for the theme 'governance' are largely undeveloped; only crime related indicators are currently included. Significant methodological work is needed to develop good, measurable and internationally accepted indicators on other aspects of governance.

Table 1:
CSD Indicators of Sustainable Development

Theme	*Sub-theme*	*Core indicator*	*Other indicator*
Poverty	Income poverty	Proportion of population living below national poverty line	Proportion of population below $1 a day
	Income inequality	Ratio of share in national income of highest to lowest quintile	
	Sanitation	Proportion of population using an improved sanitation facility	
	Drinking water	Proportion of population using an improved water source	

Theme	*Sub-theme*	*Core indicator*	*Other indicator*
Poverty (continued)	Access to energy	Share of households without electricity or other modern energy services	Percentage of population using solid fuels for cooking
	Living conditions	Proportion of urban population living in slums	
Governance	Corruption	Percentage of population having paid bribes	
	Crime	Number of intentional homicides per 100,000 population	
Health	Mortality	Under-five mortality rate	
		Life expectancy at birth	Healthy life expectancy at birth
	Health care delivery	Percent of population with access to primary health care facilities	Contraceptive prevalence rate
		Immunization against infectious childhood diseases	
	Nutritional status	Nutritional status of children	
	Health status and risks	Morbidity of major diseases such as HIV/AIDS, malaria, tuberculosis	Prevalence of tobacco use
			Suicide rate
Education	Education level	Gross intake ratio to last grade of primary education	Life long learning
		Net enrolment rate in primary education	
		Adult secondary (tertiary) schooling attainment level	
	Literacy	Adult literacy rate	
Demographics	Population	Population growth rate	Total fertility rate
		Dependency ratio	
	Tourism		Ratio of local residents to tourists in major tourist regions and destinations

Theme	*Sub-theme*	*Core indicator*	*Other indicator*
Natural hazards	Vulnerability to natural hazards	Percentage of population living in hazard prone areas	
	Disaster preparedness and response		Human and economic loss due to natural disasters
Atmosphere	Climate change	Carbon dioxide emissions	Emissions of greenhouse gases
	Ozone layer depletion	Consumption of ozone depleting substances	
	Air quality	Ambient concentration of air pollutants in urban areas	
Land	Land use and status		Land use change
			Land degradation
	Desertification		Land affected by desertification
	Agriculture	Arable and permanent cropland area	Fertilizer use efficiency
			Use of agricultural pesticides
			Area under organic farming
	Forests	Proportion of land area covered by forests	Percent of forest trees damaged by defoliation
			Area of forest under sustainable forest management
Oceans, seas and coasts	Coastal zone	Percentage of total population living in coastal areas	Bathing water quality
	Fisheries	Proportion of fish stocks within safe biological limits	
	Marine environment	Proportion of marine area protected	Marine trophic index
			Area of coral reef ecosystems and percentage live cover

Theme	*Sub-theme*	*Core indicator*	*Other indicator*
Freshwater	Water quantity	Proportion of total water resources used	
		Water use intensity by economic activity	
	Water quality	Presence of faecal coliforms in freshwater	Biochemical oxygen demand in water bodies
			Wastewater treatment
Biodiversity	Ecosystem	Proportion of terrestrial area protected, total and by ecological region	Management effectiveness of protected areas
			Area of selected key ecosystems
			Fragmentation of habitats
	Species	Change in threat status of species	Abundance of selected key species
			Abundance of invasive alien species
Economic development	Macroeconomic performance	Gross domestic product (GDP) per capita	Gross saving
		Investment share in GDP	Adjusted net savings as percentage of gross national income (GNI)
			Inflation rate
	Sustainable public finance	Debt to GNI ratio	
	Employment	Employment-population ratio	Vulnerable employment
		Labor productivity and unit labor costs	
		Share of women in wage employment in the non-agricultural sector	
	Information and communication technologies	Internet users per 100 population	Fixed telephone lines per 100 population
			Mobile cellular telephone subscribers per 100 population

Theme	*Sub-theme*	*Core indicator*	*Other indicator*
Economic development (continued)	Research and development		Gross domestic expenditure on R&D as a percent of GDP
	Tourism	Tourism contribution to GDP	
Global economic partnership	Trade	Current account deficit as percentage of GDP	Share of imports from developing countries and from LDCs
			Average tariff barriers imposed on exports from developing countries and LDCs
	External financing	Net Official Development Assistance (ODA) given or received as a percentage of GNI	Foreign direct investment (FDI) net inflows and net outflows as percentage of GDP
			Remittances as percentage of GNI
Consumption and production patterns	Material consumption	Material intensity of the economy	Domestic material consumption
	Energy use	Annual energy consumption, total and by main user category	Share of renewable energy sources in total energy use
		Intensity of energy use, total and by economic activity	
	Waste generation and management	Generation of hazardous waste	Generation of waste
		Waste treatment and disposal	Management of radioactive waste
	Transportation	Modal split of passenger transportation	Modal split of freight transport
			Energy intensity of transport

B. Addressing thematic linkages

Sustainable development indicators attempt to measure sustainable development in its entirety, taking into account the multi-dimensional and integrated nature of sustainable development. Whereas single-valued indices are integrative but mask differences in progress across and within dimensions, indicator

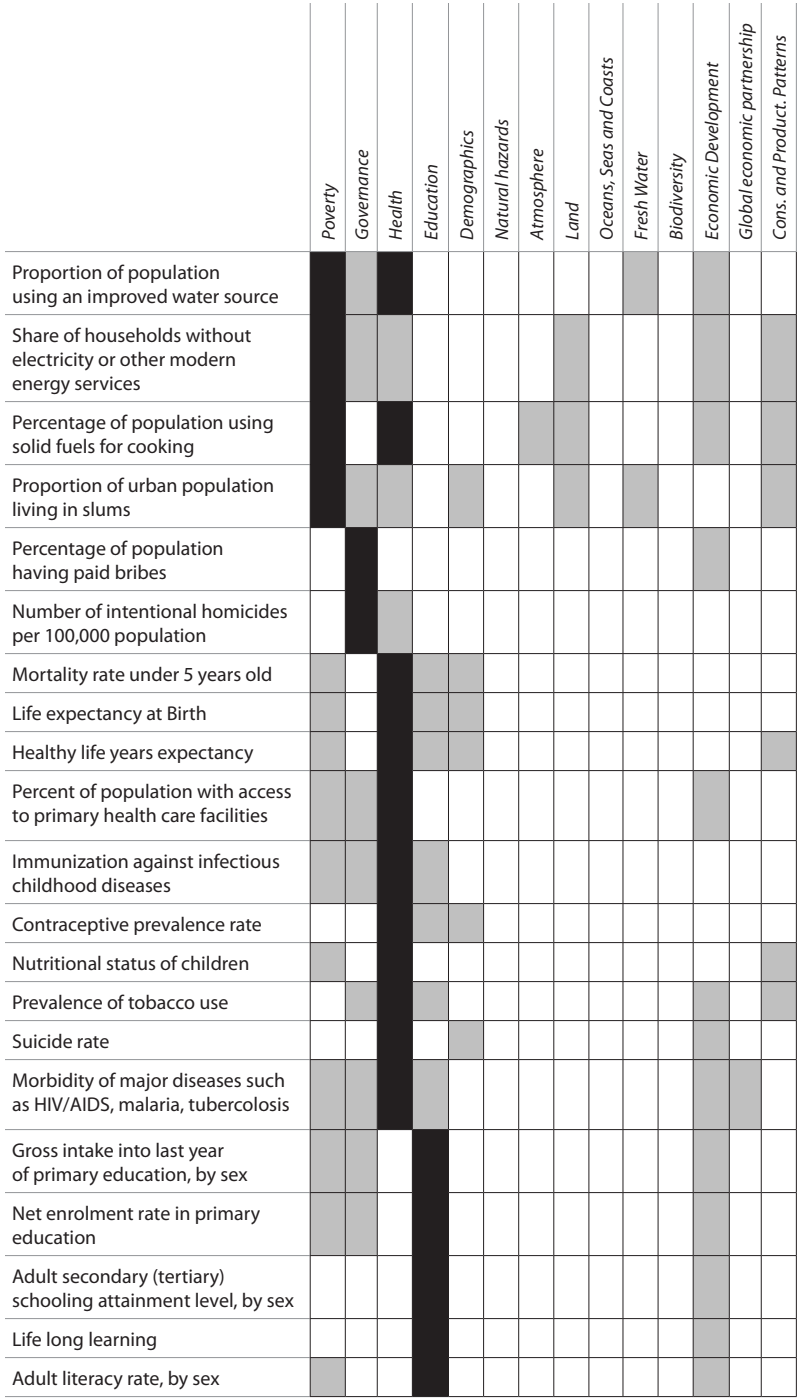
sets such as the CSD indicators track progress but may require some additional information to make their integrative nature more explicit.

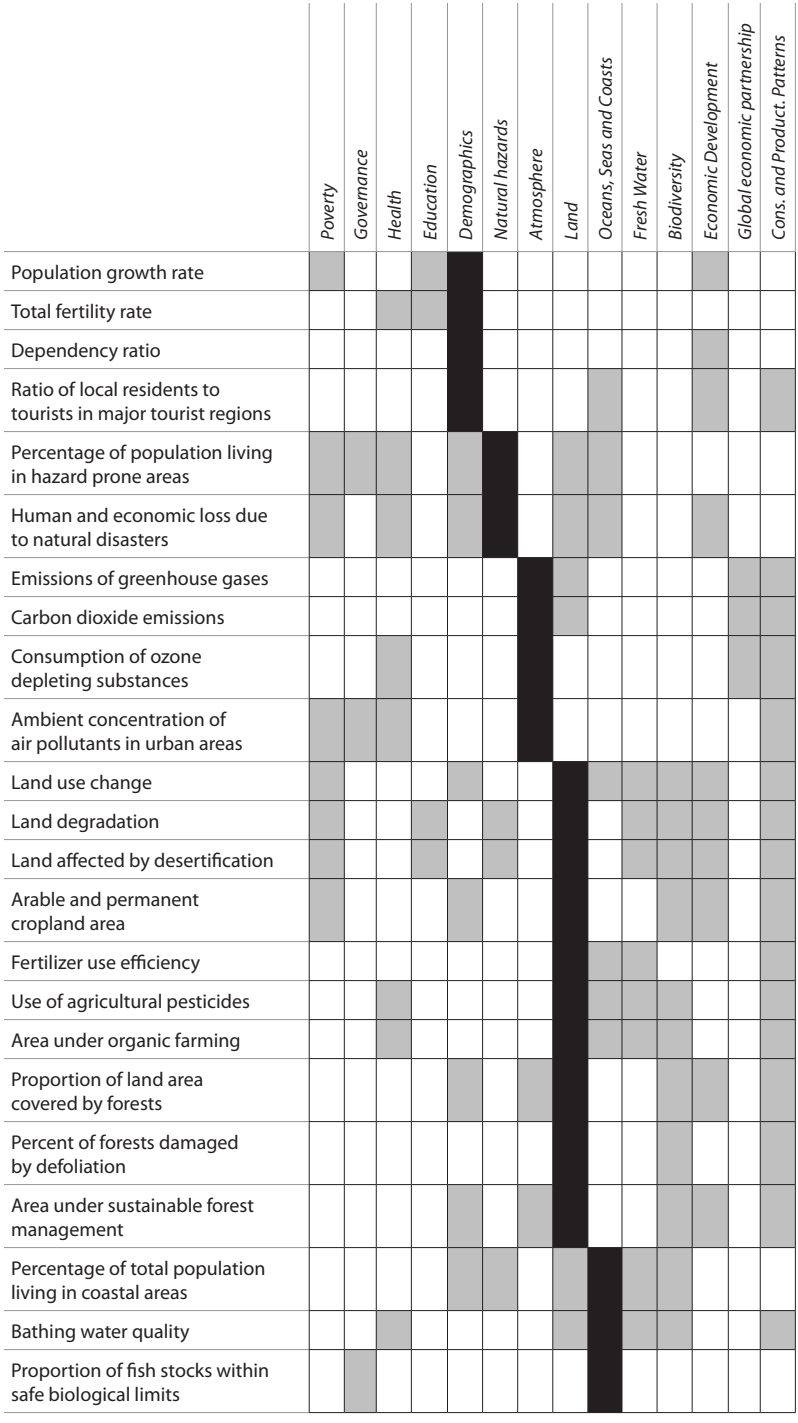
As noted, ceasing to categorize indicators into the pillars of sustainable development already strengthens the emphasis on the multi-dimensional character of sustainable development as does rethinking themes and sub-themes. To illustrate how the CSD indicators address inter-thematic linkages, Table 2 presents an overview of their potential to measure progress towards sustainable development across various themes.

The themes to which the indicators primarily apply are shaded in Table 2. Note that an indicator may apply to more than one theme, as for example with "proportion of population with access to safe drinking water," which has primary links to poverty and health. Light grey shading indicates a clear but possibly secondary link. In the drinking water example, the indicator is also useful for measuring the impact of regulating and governing water utilities and, therefore, the governance theme is shaded light grey. Moreover, as domestic fresh water is the major source of drinking water for most countries, the indicator provides information on availability and use of water resources and for the availability of infrastructure in utilities. Consequently, the theme of economic development is also shaded in light grey.

Table 2:
CSD indicators and thematic linkages

	Poverty	*Governance*	*Health*	*Education*	*Demographics*	*Natural hazards*	*Atmosphere*	*Land*	*Oceans, Seas and Coasts*	*Fresh Water*	*Biodiversity*	*Economic Development*	*Global economic partnership*	*Cons. and Product. Patterns*
Percent of population living below national poverty line	■		▒	▒	▒							▒		
Proportion of population below international poverty line	■		▒	▒	▒							▒		
Ratio of share in national income of highest to lowest quintile	■											▒		
Proportion of population using improved sanitation facilities	■	▒	■							▒		▒		


Poverty
Governance
Health
Education
Demographics
Natural hazards
Atmosphere
Land
Oceans, Seas and Coasts
Fresh Water
Biodiversity
Economic Development
Global economic partnership
Cons. and Product. Patterns
Proportion of population using an improved water source
Share of households without electricity or other modern energy services
Percentage of population using solid fuels for cooking
Proportion of urban population living in slums
Percentage of population having paid bribes
Number of intentional homicides per 100,000 population
Mortality rate under 5 years old
Life expectancy at Birth
Healthy life years expectancy
Percent of population with access to primary health care facilities
Immunization against infectious childhood diseases
Contraceptive prevalence rate
Nutritional status of children
Prevalence of tobacco use
Suicide rate
Morbidity of major diseases such as HIV/AIDS, malaria, tubercolosis
Gross intake into last year of primary education, by sex
Net enrolment rate in primary education
Adult secondary (tertiary) schooling attainment level, by sex
Life long learning
Adult literacy rate, by sex


Poverty
Governance
Health
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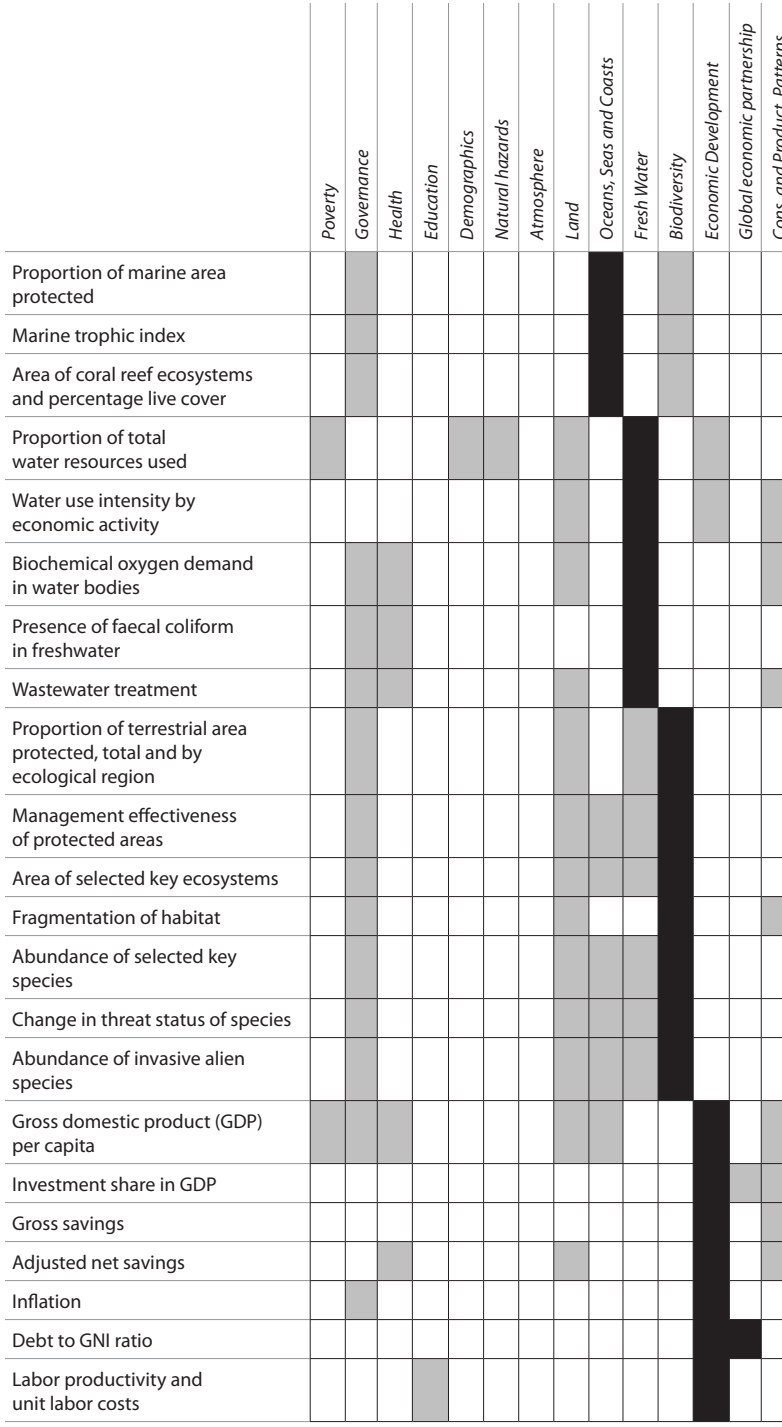
Demographics
Natural hazards
Atmosphere
Land
Oceans, Seas and Coasts
Fresh Water
Biodiversity
Economic Development
Global economic partnership
Cons. and Product. Patterns
Population growth rate
Total fertility rate
Dependency ratio
Ratio of local residents to tourists in major tourist regions
Percentage of population living in hazard prone areas
Human and economic loss due to natural disasters
Emissions of greenhouse gases
Carbon dioxide emissions
Consumption of ozone depleting substances
Ambient concentration of air pollutants in urban areas
Land use change
Land degradation
Land affected by desertification
Arable and permanent cropland area
Fertilizer use efficiency
Use of agricultural pesticides
Area under organic farming
Proportion of land area covered by forests
Percent of forests damaged by defoliation
Area under sustainable forest management
Percentage of total population living in coastal areas
Bathing water quality
Proportion of fish stocks within safe biological limits


Poverty
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Natural hazards
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Land
Oceans, Seas and Coasts
Fresh Water
Biodiversity
Economic Development
Global economic partnership
Cons. and Product. Patterns
Proportion of marine area protected
Marine trophic index
Area of coral reef ecosystems and percentage live cover
Proportion of total water resources used
Water use intensity by economic activity
Biochemical oxygen demand in water bodies
Presence of faecal coliform in freshwater
Wastewater treatment
Proportion of terrestrial area protected, total and by ecological region
Management effectiveness of protected areas
Area of selected key ecosystems
Fragmentation of habitat
Abundance of selected key species
Change in threat status of species
Abundance of invasive alien species
Gross domestic product (GDP) per capita
Investment share in GDP
Gross savings
Adjusted net savings
Inflation
Debt to GNI ratio
Labor productivity and unit labor costs

	Poverty	*Governance*	*Health*	*Education*	*Demographics*	*Natural hazards*	*Atmosphere*	*Land*	*Oceans, Seas and Coasts*	*Fresh Water*	*Biodiversity*	*Economic Development*	*Global economic partnership*	*Cons. and Product. Patterns*
Employment-population ratio, by sex	■											■		
Vulnerable employment	■											■		
Share of women in wage employment in the non-agricultural sector	■											■		
Number of internet users per 100 population		■										■		■
Fixed telephone lines per 100 population		■										■		
Mobile cellular telephone subscribers per 100 population		■										■		
Gross domestic expenditure on R&D as a percent of GDP		■		■								■		
Tourism contribution to GDP							■	■	■			■		■
Current account deficit as percentage of GDP												■	■	
Share of imports from developing countries and from LDCs	■							■				■	■	
Average tariff barriers imposed on exports from developing countries and LDCs												■	■	
Net Official Development Assistance (ODA) given or received as a percentage of GNI												■	■	
FDI inflows and outflows as percentage of GNI		■										■	■	
Remittances as percentage of GNI					■							■	■	
Material intensity of the economy								■				■		■
Domestic material consumption								■				■		■
Annual energy consumption per capita, total and by main user category	■						■					■		■
Share of renewable energy sources in total energy use							■	■	■			■		■

	Poverty	*Governance*	*Health*	*Education*	*Demographics*	*Natural hazards*	*Atmosphere*	*Land*	*Oceans, Seas and Coasts*	*Fresh Water*	*Biodiversity*	*Economic Development*	*Global economic partnership*	*Cons. and Product. Patterns*
Intensity of energy use, total and by sector							■					■		■
Generation of waste			■									■		■
Generation of hazardous waste			■				■	■	■	■			■	■
Management of radioactive waste		■	■											■
Waste treatment and disposal		■	■				■	■				■		■
Modal split of passenger transportation		■					■	■				■		■
Modal split of freight transport		■					■	■				■		■
Energy intensity of transport							■					■		■

Table 2 only reveals direct relationships between indicators and themes. To illustrate this point, consider the indicator on educational attainment. As educational attainment is a measure of human capital, which in turn is a major element of economic growth, the theme of economic development is shaded in light gray. At the same time, economic growth is a major determinant of consumption patterns in the areas of energy, waste, transport or material consumption. Therefore, educational attainment would be a valid indirect measure for elements of consumption and production. However, given that this link is indirect, the consumption theme is not shaded. Education certainly has important direct linkages to consumption patterns, as evidenced for example in the declaration of the United Nations Decade of Education for Sustainable Development.[5] However, the CSD indicator on education does not directly serve as a measure for the impact of education on sustainable consumption patterns.

[5] For details, see UNESCO website at *http://portal.unesco.org/education/en/ev.php-URL_ID=27234&URL_DO=DO_TOPIC&URL_SECTION=201.html*.

C. Relationship between MDG Indicators and CSD Indicators of Sustainable Development

The Millennium Development Goals Indicators currently consist of 48 indicators linked to the eight goals derived from the United Nations Millennium Declaration. However, the revised MDG monitoring framework presented by the Secretary-General of the United Nations in 2007 contains 58 indicators, as four new targets have been included to reflect commitments made at the 2005 World Summit.[6] Like the CSD Indicators of Sustainable Development, the MDG Indicators were developed through a collaborative process involving various Departments within the United Nations Secretariat, a number of specialized agencies from within the United Nations system as well as external international organizations, various government agencies and national statisticians. Also like the CSD indicators, the MDG Indicators are driven by policy relevance, rooted in major inter-governmental development summits and frequently applied at the national level. Because of these similarities, there may have been some confusion on the part of policy-makers and practitioners on the relationship between the two sets and on the need of having two indicator sets.

Millennium Development Goals

1. Eradicate extreme poverty
2. Achieve universal primary education
3. Promote gender equality and empower women
4. Reduce child mortality
5. Improve maternal health
6. Combat HIV/AIDS, malaria and other diseases
7. Ensure environmental sustainability
8. Develop a global partnership

In fact, while many of the indicators overlap, the overall purpose of the two sets is different: the CSD indicators are intended solely to provide a reference, or sample set, for use by countries to track progress toward nationally-defined goals, in particular, and sustainable development, in general. The MDG Indica-

[6] For the revised MDG monitoring framework, see United Nations, Report of the Secretary-General on the work of the Organization, (New York, 2006). For information on the MDG Indicators, see the official United Nations website at *http://mdgs.un.org/unsd/mdg/Default.aspx*.

tors, on the other hand, were developed for the global monitoring of progress toward meeting internationally established goals.

In addition, the CSD indicators cover a broad range of issues intrinsic to all pillars of sustainable development—economic development, social development and environmental protection. The MDG Indicators, on the other hand, are specific to the eight MDGs. As the MDGs constitute an important subset of the sustainable development agenda, the MDG indicator necessarily have a more limited coverage, with a strong focus on issues related to the poverty-health nexus. Sustainable development issues that are not covered by the MDG Indicators include demographics, natural hazards, governance and macroeconomics. The area of consumption and production patterns, one of the three overarching objectives and essential requirements of sustainable development, is covered by one single MDG indicator (energy intensity), which incidentally will be dropped from the MDG Indicators framework this year.

The focus of the MDG Indicators on global monitoring also imposes some selection criteria that are less relevant for nationally oriented sets. For example, since the MDG Indicators need to allow for meaningful regional and global aggregation, they require data that are available and internationally comparable. Moreover, the use of single-value indicators predominates since this allows for easier presentation across time and countries or country groups. National-oriented sets, such as the CSD indicators, may easily include multiple dimensions, such as population groups, gender and sectoral breakdowns. The CSD indicators can also include indicators which lack accepted adjustment methods for cross-country comparisons or indicators for which countries have no time-series data dating back to the 1990s.

The review of the CSD indicators has identified a number of inconsistencies between previous definitions of CSD and MDG indicators, which have been corrected in this new edition. The concurrent review of the MDG Indicators lead to the inclusion of selected CSD indicators into the revised MDG framework, especially in the areas of natural resources, biodiversity and employment.

Table 3 shows the similarities between CSD and MDG Indicators. The MDG indicator numbers are those assigned on the official list of MDG Indicators, which has been effective since September 2003. Indicators formally recommended for inclusion to the MDG indicators in 2007 are listed as

'New', as the numbering of indicators in the revised MDG monitoring framework has not been completed. Indicators that are contained in the original list of MDG Indicators, but are no longer part of the revised framework are marked as 'dropped' in parenthesis to their original number. Indicators that are not official MDG Indicators, but contained in the official MDG database are marked as 'Additional'. Indicators that are similar to CSD indicators but not identical are marked with an asterisk. In most cases, differences relate to the fact the CSD indicators have a different coverage in terms of countries or definition covered. For example, the CSD indicator on ODA refers to all countries that provide or receive development assistance, whereas the MDG framework contains specific indicators for donors on the OECD/DAC list, and recipients from least developed countries, landlocked developing countries and small island developing States.[7] The CSD indicator on childhood nutrition refers to underweight, stunting and overweight, whereas the corresponding MDG indicator covers underweight only.

Table 3:
CSD Indicators of Sustainable Development, MDG Indicators, Agenda 21 and JPOI

CSD Indicator of Sustainable Development	*MDG Indicator*	*Agenda 21 chapter*	*JPOI chapter*
Proportion of population living below national poverty line	Additional	3 (3.4 a)	II (7a)
Proportion of population below $ 1 a day	# 1	3 (3.4 a)	II (7a)
Ratio of share in national income of highest to lowest quintile		3	V (47)
Proportion of population using an improved sanitation facility	# 30	6 (6.12 e)	II (8); IV (25)
Proportion of population using improved water source	# 31	6 (6.12 e)	II (8); IV (25)
Share of households without electricity or other modern energy services		7 (7.40)	II (9 a)
Percentage of population using solid fuels for cooking	# 29 (dropped)	6 (6.41 b); 11 (11.21 b)	VI (56 d)

[7] It should be noted, though, that data for receipts of ODA in all developing countries are provided on the MDG database.

CSD Indicator of Sustainable Development	*MDG Indicator*	*Agenda 21 chapter*	*JPOI chapter*
Proportion of urban population living in slums	# 32 *	7 (7.8)	II (11 a)
Percentage of population having paid bribes		2 (2.32)	I (4)
Number of intentional homicides per 100,000 population			I (4)
Under-five mortality rate	# 13	6 (6.24)	VI (54 f)
Life expectancy at birth		6	
Healthy life expectancy at birth		6	
Percent of population with access to primary health care facilities		6 (6.4)	VI (54 b)
Immunization against infectious childhood diseases	# 15 *	6 (6.12; 6.27)	VI (54 f)
Contraceptive prevalence rate	# 19 c	5 (5.50); 6 (6.12)	VI (54 j)
Nutritional status of children	# 4 c	6 (6.27)	VI (54 n)
Prevalence of tobacco use		6	VI (54 o)
Suicide rate		6	VI (54 o)
Morbidity of major diseases such as HIV/AIDS, malaria, tuberculosis	# 18 *; #21 *; # 23 *	6 (6.12)	VI (55)
Gross intake into last year of primary education	Additional	36 (36.4)	II (7 g) X (116)
Net enrolment rate in primary education	# 6	36 (36.4)	II (7 g) X (116)
Adult secondary (tertiary) schooling attainment level		36	II (7 g) X (120)
Life long learning		36	X (123)
Adult literacy rate	# 8 *	36 (36.4)	X (123)
Population growth rate		5 (5.17)	
Total fertility rate	New *	5 (5.17)	
Dependency ratio		5 (5.17)	
Ratio of local residents to tourists in major tourist regions and destinations		7 (7.20)	IV (43)
Percentage of population living in hazard prone areas		7 (7.58)	IV (37)
Human and economic loss due to natural disasters		7 (7.58)	IV (37)
Emissions of greenhouse gases		9 (9.11, 9.14 9.17, 9.20)	IV (38)

CSD Indicator of Sustainable Development	*MDG Indicator*	*Agenda 21 chapter*	*JPOI chapter*
Carbon dioxide emissions	# 28 a *	9 (9.11)	IV (38)
Consumption of ozone depleting substances	# 28 b	9 (9.23)	IV (39)
Ambient concentration of air pollutants in urban areas		9 (9.11, 9.14 9.17)	IV (39); VI (56)
Land use change		10 (10.5)	
Land degradation		14 (14.45)	IV (41)
Land affected by desertification		12	IV (41)
Arable and permanent cropland area		14	IV (40)
Fertilizer use efficiency		14 (14.85)	IV (40)
Use of agricultural pesticides		14 (14.75)	IV (40)
Area under organic farming		14	IV (40)
Proportion of land area covered by forests	# 25	11 (11.12)	IV (45)
Percent of forest trees damaged by defoliation		11	IV (45)
Area of forest under sustainable forest management		11 (11.12)	IV (45)
Percentage of total population living in coastal areas		17	IV (32)
Bathing water quality		17	IV(33)
Proportion of fish stocks within safe biological limits	New	17 (17.46, 17.75)	IV (31)
Proportion of marine area protected	# 26 *	15 (15.5 g), 17	IV (32 a)
Marine trophic index		17 (17.46, 17.75)	IV (32 a)
Area of coral reef ecosystems and percentage live cover		15 (15.5 g), 17	IV (32 d)
Proportion of total water resources used	New	18	IV(25 e, 26)
Water use intensity by economic activity		18	IV(26)
Biochemical oxygen demand in water bodies		18 (18.39)	IV(25 d)
Presence of faecal coliforms in freshwater		18 (18.39 c)	IV(25 d)
Wastewater treatment		18 (18.39)	IV(25 d)
Proportion of terrestrial area protected, total and by ecological region	# 26 *	15 (15.5.g)	IV (44)

CSD Indicator of Sustainable Development	*MDG Indicator*	*Agenda 21 chapter*	*JPOI chapter*
Management effectiveness of protected areas		15 (15.5.g)	IV (44)
Area of selected key ecosystems		15 (15.5.g)	IV (44)
Fragmentation of habitats		15	IV (44)
Abundance of selected key species		15 (15.5.g)	IV (44)
Change in threat status of species	New *	15 (15.5.h)	IV (44)
Abundance of invasive alien species		15	IV (44)
GDP per capita		2 (2.34)	X (83)
Investment share in GDP		2 (2.34)	X (83)
Savings rate		2 (2.34)	X (83)
Adjusted net savings as percentage of GNI		2 (2.34)	X (83)
Inflation rate		2 (2.34)	X (83)
Debt to GNI ratio		2 (2.34), 33 (33.14 e)	X (83, 89)
Employment-population ratio	New	7, 14, 24	II (10 b)
Vulnerable employment	New*	7, 14, 24	II (10 b)
Labor productivity and unit labor costs	New *	14	II (10 a)
Share of women in wage employment in the non-agricultural sector	# 11	24	II (7 d)
Number of internet users per 100 population	# 48	40	V (52)
Fixed telephone lines per 100 population	# 47 a	40	V (52)
Mobile cellular telephone subscribers per 100 population	# 47 b	40	V (52)
Gross domestic expenditure on R&D as a percent of GDP		35	X (113)
Tourism contribution to GDP		11(11.21), 13 (13.15)	IV (43)
Current account deficit as percentage of GDP		2 (2.9, 2.34)	X (83, 92)
Share of imports from developing countries and from LDCs		2 (2.9)	V (47), X (92)
Average tariff barriers imposed on exports from developing countries and LDCs	# 39 *	2 (2.9)	V (47), X (92, 93)
Net Official Development Assistance (ODA) given or received as a percentage of GNI	# 33 *; # 36 *; # 37 *	33 (3.13)	X (85)

CSD Indicator of Sustainable Development	*MDG Indicator*	*Agenda 21 chapter*	*JPOI chapter*
Foreign direct investment (FDI) net inflows and net outflows as percentage of GDP		33 (33.15)	X (84)
Remittances as percentage of GNI		33	X (83)
Material intensity of the economy		4 (4.18)	III (15)
Domestic material consumption		4	III (15)
Annual energy consumption, total and by main user category		4	III (20)
Share of renewable energy sources in total energy use		4	III (20 c, d, e)
Intensity of energy use, total and by economic activity	# 27 * (dropped)	4 (4.18)	III (20 h)
Generation of waste		21 (21.8)	III (22)
Generation of hazardous waste		20 (20.11)	III (23)
Waste treatment and disposal		21 (21.17)	III (22)
Management of radioactive waste		22 (22.3)	III (35)
Modal split of passenger transportation		4	III (21)
Modal split of freight transport		4	III (21)
Energy intensity of transport		4	III (21)

D. CSD Indicators of Sustainable Development, Agenda 21 and the Johannesburg Plan of Implementation

The CSD indicators are deeply rooted in Agenda 21 where their development is mandated. Even though later editions of the CSD indicators do not follow the structure of Agenda 21 as the first edition did, the indicators are still very closely related to it. Table 3 references all the chapters of Agenda 21 as they relate to each CSD indicator. If a CSD indicator specifically addresses objectives or activities described in Agenda 21, the paragraph is additionally listed in brackets. Table 3 also correlates the CSD indicators to the Johannesburg Plan of Implementation (JPOI), adopted in 2002 at the World Summit of Sustainable Development in Johannesburg. Due to the integrative nature of sustainable development, both major conference outcome documents list certain objectives and activities in multiple places (see appendices 1 and 2 for a comprehensive list of their chapters). For simplicity reasons, Table 3 only lists key references. It is not meant to be a complete reference.

Since almost all CSD indicators directly or indirectly correlate to Agenda 21 and the JPOI, using the CSD indicators as basis for national indicators of sustainable development can assist countries in monitoring national implementation of their international commitments too. In this regard, the CSD indicators are useful for measuring the outcome of policies towards achieving sustainable development goals. However, they are not suited for measuring the implementation of specific actions contained in these major agreements on sustainable development.

IV. Applying CSD Indicators of Sustainable Development

This chapter offers some guidance on how the CSD indicators can be utilized by countries for the development or revision of national indicator sets. As deviations from the previous set of CSD indicators are modest, countries with national indicator sets in place may wish to consider the new set during a regular review of their indicators rather than on an ad-hoc basis. The chapter starts with an overview of selection criteria that should be taken into account. It then presents a simple tool that can help countries to adapt CSD indicators to national conditions. Finally, the chapter offers an example of the application of CSD indicators to national development strategies.

A. Indicator selection

The selection of indicators is to a large extent determined by the purpose of the indicator set. From their inception, the overarching purpose of the CSD indicators has been to inform policy at the national level. In addition to using indicators to assess overall progress towards sustainable development, many countries successfully use them to measure success within the framework of their national sustainable development strategy (NSDS).

Aside from their purpose, there are other important criteria for selecting indicators for sustainable development. From the beginning, the CSD indicator guidelines and methodologies have recommended that indicators for sustainable development are: [8]

1. primarily national in scope;
2. relevant to assessing sustainable development progress;
3. limited in number, but remaining open-ended and adaptable to future needs;
4. broad in coverage of Agenda 21 and all aspects of sustainable development;

[8] United Nations, Indicators of Sustainable Development: Guidelines and Methodologies, Second Edition, UN Sales Publication No. E.01.II.A.6 (New York, September 2001).

5. understandable, clear and unambiguous;
6. conceptually sound;
7. representative of an international consensus to the extent possible;
8. within the capabilities of national governments to develop; and
9. dependent on cost effective data of known quality.

The first criterion emphasizes the importance of using the indicators for national level assessment. Criteria two through four, taken together, pose a challenge. The indicators should be both limited and sufficiently comprehensive to capture the multidimensional nature of sustainable development. If too many indicators are used, the results become unwieldly and difficult to interpret. As discussed earlier, the CSD indicator set began with 134 indicators, but testing by countries led to a drastic reduction. The introduction of smaller core sets within the larger set makes sustainable development indicators more manageable. Size will also be influenced by purpose: in general, as the purpose of the indicators narrows, their number decreases.

Indicators need to be clear and unambiguous. Clarity of purpose and audience will instruct indicator clarity. Ambiguity is relative to context. For example, in a country with low food security, an increase in arable and permanent cropland may be seen as positive, whereas in a country with agricultural overproduction due to subsidization it could be negative. The existence of voluntary targets for indicators at the national level, for example within the context of an NSDS or other strategy processes, will help to avoid such ambiguity. In many cases, linkages among thematic issues easily lead to potential conflicts. For example, high GDP growth is generally considered a positive sign of economic development, but it is often associated with higher energy consumption, exploitation of natural resources and negative impacts on environmental resources. In many cases, it has also positive impacts on poverty alleviation. These potential conflicts should not be seen as sign of ambiguity. Rather, such cases reinforce the need to interpret results in a balanced and integrated manner.

Indicators should always be conceptually sound. However, especially in new areas of interest, the demand for an indicator may precede its development. In such cases, it may be advisable to bookmark the indicator with a generic description and increase efforts to develop its conceptual underpinnings. In the meantime, a proxy indicator may be used as long as there is suffi-

cient evidence that it is able to capture relevant phenomena that do not skew the results.

The CSD indicators were developed through a collaborative approach that involved Member States, United Nations system organizations, other intergovernmental organizations and non-governmental organizations. Therefore, they are based on a broad and informal consensus among international organizations. A major advantage for countries in adopting CSD indicators appropriate to their national conditions is the opportunity to learn from the expertise, experience and perspective of a broad range of actors. For indicators that are used to measure international commitments such as the MDGs, international comparability is essential. In the years since the CSD pioneered the work on sustainable development indicators, many countries have applied the CSD indicators and adapted them to their specific needs. To assist in this process, the methodology sheets of the CSD indicators available on the accompanying CD and on the DSD homepage contain in many cases alternative indicators that may be more applicable to a particular national context.

National capability may refer to the institutional capacity not only to monitor and collect data but also to interpret and synthesize it into information useful for decision-making. Over the past decade, the increased emphasis on information-based decision making has led to improved efforts to build capacity in this regard especially in developing countries.[9] The continuation and acceleration of these efforts will further enhance the applicability of indicators of sustainable development.

Despite major advances over the last decade, data availability and reliability continue to be a problem in many countries. To increase cost effectiveness, the CSD indicators often require data that are routinely collected either by national statistical services or through international processes, for example through the routine work of United Nations specialized agencies or in the MDG context. Many indicators rely on data contained in national accounts, and progress made in the adoption of the system of national accounts (SNA) will also improve data availability. Implementation of the system of environmental-economic accounting (SEEA) will not only further increase availability of data and indicators, but also massively improve the possibility for further

[9] For a very useful and free-of-charge tool to manage development data that has been developed in cooperation with the United Nations system, see *http://www.devinfo.org*.

integrated analysis of the indicators, which is necessary for developing appropriate policy interventions.

B. Adapting CSD Indicators of Sustainable Development for national sets

The CSD indicators meet the criteria described. Nonetheless, countries may wish to tailor the indicators to respond to national needs and circumstances. This section presents a tool that could be useful for such adaptation. It is a simple matrix, with data availability and relevance as the two dimensions in which countries can place the CSD indicators in order to check their suitability and their need for adjustment. It should be stressed that other indicator sets that could be used as a basis for national sustainable development indicators should be adapted as well. Therefore, this tool could, for example, also be useful if MDG indicators, sustainable development indicators used by other countries, or national indicator sets used for other purposes are used as additional reference.

As discussed in the previous section, data availability is a critical issue. In general, data required for the CSD indicators are available at the national level from a variety of institutions that collect and manage the data, but there may be some gaps. National statistical offices are the major data source in most countries. In general, this holds for national and satellite account data, census data as well as data derived from major surveys. Other ministries and government agencies are also major data sources, especially for data from surveys or administrative records. Regional and international organization also collect and manage data from various national sources, and could be consulted directly in cases where the data are not readily available at the national level. National reports to intergovernmental processes, including multilateral environmental agreements, are often another data source, in some cases only weakly linked to regular national statistical procedures. The methodology sheets of the CSD indicators on the accompanying CD contain generic information on both national and international data sources that should facilitate the assessment of CSD indicators with regard to availability at the national level.

In adapting CSD indicators to national sets, it may be useful to classify each indicator in one of four categories of data availability: fully available; potentially available; related data available; and not available.

The first category is obviously the preferred one. The second one, indicators with potentially available data, contains those cases where data could be made available within a reasonable timeframe and with reasonable costs. Existing regular surveys can often be extended to include a few additional questions. Moreover, this category would encompass indicators for which there are plans to increase capacity for data collection, storage and management. The third category contains those indicators where important data are missing, but there are data that could be used to compute related indicators. For example, in the absence of data on the use of vehicles (such as kilometres traveled), administrative data on car registrations could be used to construct an indicator (e.g., registered cars by 100,000 inhabitants). Investment in data collection, including capacity-building, will result in more data being available. This cost will need to be weighed against the potential loss in planning and decision-making capacity brought about by using a related, but less accurate indicator.

Relevance is the second dimension of the adaptation matrix. Again, the introduction of four different categories in which CSD indicators can be placed could be useful: relevant; related indicator relevant; relevant but missing; irrelevant.

Most indicators should be relevant and fall into the first category. The second category covers indicators that are not themselves directly relevant for the purpose, but are closely related to relevant indicators. It may also contain national indicators that address the same issue as CSD indicators but measure it differently. For example, the CSD indicators contain a number of indicators measuring objective dimensions of the health status (disease prevalence, nutritional status, immunization), but some countries use instead a subjective indicator on people's satisfaction with the health status, based on survey data. There may also be CSD indicators where the underlying issue is closely related, but not identical to a national issue. For example, countries whose strategies include regional trade integration may want to monitor the share of trade with regional partners rather than share of trade with developing countries.

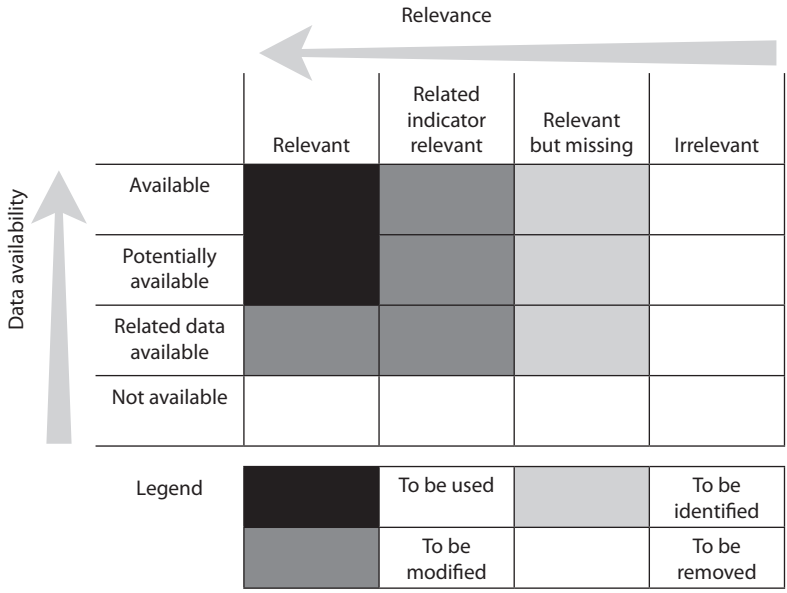
The third category encompasses relevant issues that are not covered by the CSD indicators either because they are relevant and available to a few countries only or because of the desire to keep the CSD set relatively small. Examples include food safety, participation in public decision-making processes or linguistic diversity. Indicators for these issues would have to be taken from other avail-

able indicator sets. Alternatively, underlying issues rather than concrete indicators may be inserted. In general, though, this third category is expected to have few entries.

The last category—irrelevant indicator—would contain indicators covering issues that are not meaningful in context, for example the indicator of coastal population would be irrelevant for landlocked countries.

Figure 1 shows how the two dimensions, data availability and relevance, can be combined in a simple matrix in which the CSD indicators can be placed.

Figure 1:
Matrix for adapting CSD Indicators of Sustainable Development



The black boxes contain those CSD indicators that can be incorporated without any changes to national indicators. The dark grey boxes are for those CSD indicators that have to be modified for a given country, either because there exist related and more relevant or specific indicators or because data for the original indicator cannot be made available. The light grey boxes contain those indicators important for a country but not included in the CSD set. The task of identifying appropriate indicators could then include assessing the availability of data. As indicated above, the number of indicators in those boxes should be

quite small. The remaining blank boxes would include any CSD indicators that a country does not consider useful.

Adapting the CSD indicators to national conditions may also require adapting the framework. The thematic framework of the CSD indicators is very flexible in this regard. Sub-themes, or even themes, can easily be merged or split as needed. Aligning the indicator framework with the framework chosen for a national sustainable development strategy is also feasible in most cases.

C. Indicators as tools for measuring sustainable development processes at the national level

National strategies are important mechanisms to translate national goals of sustainable development into concrete policies and actions. Their central role has already been recognized by virtually all countries in Agenda 21 and countries agreed on time-bound targets to develop and implement national sustainable development strategies (NSDS) at the Special Session of the UN General Assembly on the review of Agenda 21 in 1997[10] and in the Johannesburg Plan of Implementation.[11,12]

An NSDS can be defined as "a coordinated, participatory and iterative process of thoughts and actions to achieve economic, environmental and social objectives in a balanced and integrative manner."[13] Whereas no 'blueprint' for a strategy is feasible or desirable, there is agreement on the five principles that distinguish an NSDS: (1) country ownership and commitment; (2) integrated economic, social and environmental policy across sectors, territories and generations; (3) broad participation and effective partnerships; (4) development of the necessary capacity and enabling environment; and (5) focus on outcomes and means of implementation.

Because NSDS are defined by their process and principles, the actual name of the strategy is not important. It may be a national development strategy, a

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[10] Programme of Action for the Further Implementation of Agenda 21, paragraph 24.

[11] JPOI, Chapter XI, para 162 (b).

[12] Updated information on progress made in fulfilling the commitment to make progress in the formulation, elaboration and implementation of such strategies by 2005 can be found at http://www.un.org/esa/sustdev/natlinfo/nsds/nsdsMap.htm.

[13] UN DESA (2002), Guidance in Preparing a National Sustainable Development Strategy: Managing Sustainable Development in a new Millennium, DESA/DSD/PC2/BP13.

poverty reduction strategy, a MDG-based strategy or any similar comprehensive and multi-sectoral strategy, as long as it conforms to the criteria of an NSDS. The Johannesburg Plan of Implementation explicitly recognizes this; countries in general are encouraged not to run parallel strategy processes: it is wasteful of resources and confusing in outcome.

Indicators, in general, play a major role in various stages of an NSDS: Assessment, monitoring, reporting and evaluation. Moreover, taking indicators into account during the formulation stage also helps ensuring that the NSDS is concrete and measurable. The CSD indicators, in particular, are valuable tools in all these stages of an NSDS.

Given their broad coverage of sustainable development issues, their national orientation, and detailed methodological description, CSD indicators can easily be adapted to national conditions, and as such, become valuable tools for assessing national sustainable development goals.

Monitoring is necessary for the effective implementation of a strategy, and it helps prevent the strategy from becoming a mere list of intentions. Monitoring facilitates the adjustment of policy interventions to changing conditions during implementation. It promotes a culture of learning, providing a basis for improved strategies in subsequent iterations, and it enhances the performance of key actors in implementation by allowing for better accountability. Moreover, together with appropriate reporting procedures, monitoring promotes public interest and information on sustainable development.

One can distinguish three broad areas of an NSDS that require monitoring: (1) actions and activities included in the NSDS; (2) impact of the NSDS; and (3) overall progress towards sustainable development. Indicators for monitoring task (1) are outside the scope of this publication. They could be seen as management indicators and will typically closely follow the formulation of the strategy and action plans. Ensuring accountability of actors and stakeholders is a main purpose of actively using such indicators. Indicators for monitoring tasks (2) and (3) are closely related, because the objective of the NSDS is to make development more sustainable. They differ especially with regard to coverage. As an NSDS typically identifies priorities and targets, not all issues relevant for sustainable development will be included in a focused strategy. Monitoring of issues outside the strategy, however, is still warranted as it can assist the adjustment of an NSDS during the implementation cycle.

The CSD indicators, adapted to national situations, can play a mayor role in monitoring tasks (1) and (2). However, in adapting the indicators for monitoring the impact of the strategy, additional selection criteria should be considered. Indicators should also be responsive to policies and actions included in the strategy. In many cases, a further breakdown of CSD indicators by target group increases the responsiveness. Moreover, monitoring indicators should be timely. Therefore, indicators relying on large surveys and censuses that are conducted infrequently and that require long processing times require special attention in this regard. In these cases, simple surveys, concentrating on main target groups only, may offer timely indicators for monitoring the strategy impact.

Appropriate reporting mechanisms for disseminating monitoring results are critical for generating feedback from stakeholders that leads to improved strategies and their implementation. In this regard, it is important that reporting is adapted to the varying needs of the different target audiences, including the public-at-large, stakeholder organizations, parliaments, political decision-makers, and, in many developing countries, external donors. Different but coherent reporting formats may be used to address these audiences effectively.

Monitoring results can be integrated into broader NSDS progress reports. Main findings are usually contained in executive summaries intended to address policy-makers. Most reports go beyond the values of the chosen indicators and include analytical information, often of direct policy relevance. Extent, methods and format of the analysis differ according to the audience. It may be advisable to include a basic analysis in the standard NSDS reports, but to conduct more detailed analysis with less frequency. Short brochures using indicators to demonstrate strategy implementation are an effective and user-friendly means of addressing the public-at-large. Simple symbols, such as arrows or traffic-lights, indicating progress or regress by indicator can be used to communicate progress on sustainable development in a country. In many countries, the internet can be an effective means of reporting on updated indicator values. For many developing countries, the existence of multiple project-specific reporting requirements attached to different externally funded development projects often poses additional organizational and institutional challenges.

Evaluation is a critical part of an NSDS as it assesses whether the strategy was effective in meeting its goals and targets; whether it was implemented efficiently; and whether it is likely to have long-lasting impact. Unlike monitoring,

which is a continuous effort, evaluation is conducted only periodically. Major revisions or expiration of the NSDS will typically involve an evaluation, but intermediate evaluations are also advisable, depending on the timeframe of the NSDS, changes in external conditions, uncertainty over linkages between policies and sustainable development outcomes and resources available. As an NSDS often includes a list of activities or projects whose funding requires specific evaluations, it is important that overall evaluation of the strategy makes full use of these project-specific evaluations. However, these do not substitute for an overall strategy evaluation, as only the latter can incorporate policy linkages and address the question whether priority areas are set appropriately.

The indicators used for monitoring the NSDS evidently play an important role in the evaluation, as they allow establishing whether the strategy has achieved its targets. However, in order to answer the question of effectiveness, evaluation also has to validate, and often to quantify, the assumed linkages between NSDS actions and development outcomes and impacts. Given the complexity and the continuing limits of understanding sustainable development, this particular challenge is unlikely to provide definite answers.

For assessing the effectiveness of the NSDS, the evaluation has, in principle, to include an assessment of alternative policy interventions. Therefore, multiple methods such as comparisons with non-target groups, cross-country comparisons, or econometric modeling are likely to be employed.

V. A word on indicator frameworks

Indicators of sustainable development at the national level are often developed through dynamic interactive processes and dialogues among a wide range of stakeholders, including government representatives, technical experts and civil society representatives. The process allows participants to define sustainability from their own perspectives, taking locally relevant aspects as well as their own value systems into account.

Conceptual frameworks for indicators help to focus and clarify what to measure, what to expect from measurement and what kinds of indicators to use. Diversity of core values, indicator processes and sustainable development theories have resulted in the development and application of different frameworks. The main differences among them are the ways in which they conceptualize the key dimensions of sustainable development, the inter-linkages among these dimensions, the way they group the issues to be measured, and the concepts by which they justify the selection and aggregation of indicators.

A. Driving force-state-response frameworks

The initial set of 134 CSD indicators, published in 1996, was organized in a driving force, state and response (DSR) framework, a variation of the pressure-state-response framework. Each indicator in the DSR framework is classified as a driving force, state, or response. Driving force indicators describe processes or activities that have a positive or a negative impact on sustainable development (for example pollution or school enrolment). State indicators describe the current situation (for example nutritional status of children or land covered by forests), whereas response indicators reflect societal actions aimed at moving towards sustainable development. The first CSD indicators were additionally grouped according to the dimensions of sustainable development—social, economic, environmental as well as institutional, and matched to the relevant chapters of Agenda 21.

Whereas variations of the pressure-state-response framework continue to be used in more environmentally oriented indicator sets, the revision of the CSD indicators in 2001 discontinued the DSR framework mainly because it

was not suited to addressing the complex interlinkages among issues; the classification of indictors into driving force, state or response was often ambiguous; there were uncertainties over causal linkages; and it did not adequately highlight the relationship between the indicators and policy issues. Consequently, the second CSD indicators, which were still organized along the four dimensions of sustainable development, were embedded in a more flexible theme/sub-theme framework.

B. Issue- or theme-based frameworks

Issue- or theme-based frameworks are the most widely used type of frameworks, especially in official national indicator sets. In these frameworks, indicators are grouped into various different issues relating to sustainable development. The issues or themes are typically determined on the basis of policy relevance. Most countries in all regions of the world that have developed national sustainable development indicators have based them on a thematic framework. This is also true of regional strategies and indicator programmes, such as the indicators used in the Baltic 21 Action Programme, the Mediterranean Sustainable Development Strategy and the Sustainable Development Indicators for the European Union.

A main reason for the prominence of thematic frameworks is their ability to link indicators to policy processes and targets. This provides a clear and direct message to decision-makers and facilitates both communicating with and raising the awareness of the public. A thematic framework for indicators is also well suited to monitor progress in attaining the objectives and goals stipulated in national sustainable development strategies. It is flexible enough to adjust to new priorities and policy targets over time.

C. Capital frameworks

There are other approaches to measuring sustainable development. Among them, the capital approach has found a lot of attention. It attempts to calculate national wealth as a function of the sum of and interaction among different kinds of capital, including not only financial capital and produced capital goods, but also natural, human, social and institutional capital. This requires that all forms of capital be expressed in common terms, usually in monetary terms.

The frameworks for sustainable development indicators based on this approach vary, but, in general, they all try to identify first what development is, and, second, how development can be made sustainable. This draws attention "to what resources we have at our disposal today, and towards the issue whether we manage these in ways that make it possible to maintain and further develop the resource base over time."[14]

Explicit in the capital approach is the notion of substitutability between different types of capital, which is indeed a complex issue. There are clear examples of substitutability—machines for human labor, renewable for non-renewable sources of energy, synthetics for some natural resources. And future technological innovation and human ingenuity may greatly expand the scope. However, there may also be assets that are fundamental and for which no substitution is possible. This could include, for example, a reasonably stable climate or biological diversity.

There remain many challenges to using a capital framework. Among them are disagreement about how to express all forms of capital in monetary terms; problems of data availability; questions about substitution; and the integration of intra-generational equity concerns within and across countries. Nonetheless, the concept of using capital as a way to track sustainable development could be a powerful tool for decision-making, and work in this area should be encouraged.

D. Accounting frameworks

Indicator systems based on accounting frameworks draw all indicators from a single database allowing for sectoral aggregation and using consistent classifications and definitions. The most prominent example in this regard is the System of Integrated Environmental and Economic Accounting (SEEA) pioneered by the United Nations Statistical Commission with the International Monetary Fund, the World Bank, the European Commission and OECD. The SEEA extends national accounting to environmental aspects through a satellite system of accounts. It is, thus, clearly linked to the standard system of national accounts

[14] Knut H. Alfsen, and Thorvald Moe, "An International Framework for Constructing National Indicators for Policies to Enhance Sustainable Development. Background paper prepared for the UN Expert Group meeting on Indicators of Sustainable Development, 13-15 December 2005, p. 7.

(SNA). The SEEA includes accounts expressed in monetary terms as well as accounts in physical terms. It allows for the construction of a common database from which some of the most common sustainable development indicators in the economic and environmental spheres can be derived in a consistent manner. Several countries are using the SEEA, and it is in the process of being proposed as an international statistical standard.[15]

Integrated national account frameworks such as the SEEA were not set up specifically to address sustainable development and therefore do not, at least not yet, take into account two of the four pillars of sustainable development—the social and institutional pillars Nevertheless, some of these concerns are being addressed through efforts both to expand the system by incorporating human capital and to explore the possibility of linking the frameworks with social accounting matrices (SAM) which have been developed in consistency with the national accounts.[16]

Implementation of the SEEA would improve systems of sustainable development indicators embedded in capital frameworks as well as those based on thematic frameworks. In case of capital frameworks, the SEEA facilitates moving from modeled and estimated data towards directly obtained capital measures. For thematic frameworks, the SEEA is especially useful if the indicators are used for monitoring and evaluation of development strategies. By basing indicators in a consistent database allowing for meaningful sectoral and spatial disaggregation, progress towards specific targets included in a strategy as well as cross-sectoral impacts can be consistently assessed.

In this new edition, the CSD indicators further strengthen the relationship with the SEEA by increasingly adopting definitions and classifications contained in the SEEA and in many cases by introducing sectoral breakdowns based on standard classifications.

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[15] See United Nations et al (2003), SEEA Handbook, for the details on the SEEA and United Nations Statistical Commission (2006), report E/2006/24 and especially document E/CN.3/2006/9 for procedural aspects.

[16] Laszlo Pinter, Peter Hardi and Peter Bartelmus, "Indicators of Sustainable Development: Proposals for a Way Forward Discussion Paper prepared under a consultant agreement on behalf of the UN Division for Sustainable Development. Expert Group Meeting on Indicators of Sustainable Development, 13-15 December 2005 (New York). Document No. UNDSD/EGM/ISD/2005/CRP.2.

E. Aggregated indicators

There have been several efforts to develop aggregated indicators to capture elements of sustainable development. Most aggregate indicators are primarily used for raising public awareness and receive notable attention in the media. Rather than offering a comprehensive view of sustainable development, many of these indicators are specifically focussed on the environmental dimension of sustainable development and resource management.

Examples of such indicators include the Ecological Footprint, the Environmental Sustainability Index (ESI) and the Environmental Performance Index (EPI). The Ecological Footprint, originally developed by Wackernagel and Rees (1996)[17], translates human resource consumption and waste generation in a country or any other entity into a measure of biological productive land and water and relates it to a measure of biological capacity. Both ESI and EPI have been developed by the Center for Environmental Law and Policy at Yale University and the Center of International Earth Science Information Network (CIESIN) at Columbia University in collaboration with the World Economic Forum and others. The ESI, integrates 76 data sets—tracking natural resource endowments, past and present pollution levels, environmental management efforts and the capacity of a society to improve its environmental performance—into 21 indicators and finally into a single index. [18] The EPI aggregates 16 indicators related to resource depletion, pollution, environmental impact and energy efficiency into an index aimed at measuring policy impact. [19]

More comprehensive aggregated indicators on sustainable development include the Adjusted Net Saving and the Genuine Progress Indicator (GPI). Adjusted Net Saving was developed by the World Bank. It is calculated by subtracting monetary values for resource depletion and damage caused by air pollution from traditional net savings derived from national accounts, and adding expenditures on education.[20] This indicator is also included in the set of CSD indicators in the economic development theme. The GPI, developed and main-

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[17] Wackernagel, M. and W. Rees (1996), Our Ecological Footprint: Reducing Human Impact on the Earth, New Society Publishers, Gabriola Island. See also http://www.footprintnetwork.org.

[18] See *http://www.yale.edu/esi/* for details.

[19] See *http://www.yale.edu/epi/* for details.

[20] Methodologies, publication an data on this indicator are available on the website of the World Bank, see *http://go.worldbank.org/3AWKN2ZOY0*.

tained by Redefining Progress, modifies GDP by adding economic contributions of household and volunteer work, but subtracting factors such as crime, pollution, and family breakdown in order to arrive at a measure of well-being.[21] It is related to the Index of Sustainable Economic Welfare (ISEW) developed by Daly and Cobb (1989).[22]

All these indicators face significant challenges to aggregation related to data availability, methodologies, selection of variables and, in case of indexes, weighing of the variables. Nonetheless, this ongoing work represents important attempts to aggregate a broad range of variables in order to convey a message that is easy for both decision-makers and civil society to understand.

F. Other indicator approaches

There are other approaches to using indicators for sustainable development outside of formal frameworks. For example, there is a trend to construct issue-specific sets of sustainable development indicators. At the national level, these are most likely to be used by ministries or NGOs to track policy implementation and to inform the public. At the international level, prominent examples include biodiversity indicators developed to measure progress towards the internationally agreed target of significantly reducing the loss of biodiversity by 2010[23], the energy indicators of sustainable development[24], or the sustainable tourism indicators[25].

There is also increasing use of headline indicators by both countries and organizations. These tend to be small core sets of indicators closely linked to policy priorities that provide quick and visible signals to policy-makers and to the general public. Headline indicators usually co-exist with larger sets of indicators for more comprehensive policy-making and monitoring. A potential prob-

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21 See *http://www.redefiningprogress.org/newprograms/sustIndi/gpi/index.shtml*.

22 Daly, H. and J.B. Cobb (1989), For the common good: Redirecting the economy toward the community, the environment and a sustainable future, Beacon Press, Boston.

23 See Convention on Biological Diversity (2002) and World Summit of Sustainable Development (2002) for the exact text. Work on the indicators is coordinated by the 2010 Biodiversity Indicators Partnership (www.twentyten.net).

24 See IAEA et al. (2005), Energy Indicators for Sustainable Development: Guidelines and Methodologies.

25 See United Nations World Tourism Organization (2004), Indicators of Sustainable Development for Tourism Destinations: A Guidebook.

lem with headline indicators in that they could be used for politics, rather than policy; that is, their choice could reflect current political priorities rather than significant issues influencing future sustainability. Used correctly, however, headline indicators are excellent means of attracting media attention, raising public awareness and supplementing pedagogical materials for primary and secondary education.

VI. Description of CSD Indicators of Sustainable Development

This chapter contains a short description of all CSD indicators. Detailed information is available in the methodology sheets contained in the accompanying CD-Rom as well as on the internet at *http://www.un.org/esa/sustdev/natlinfo/indicators/isd.htm*

A. Poverty

PROPORTION OF POPULATION LIVING BELOW NATIONAL POVERTY LINE

Sub-theme: Income poverty **Core indicator**

Brief definition: The proportion of the population with a standard of living below the poverty line as defined by the national government. National estimates are based on population-weighted subgroup estimates derived from household surveys.

Description: The indicator (also known as national poverty rate) is a standard measure of poverty, especially income poverty. It provides information on progress towards poverty alleviation, a central objective and requirement of sustainable development. The national poverty rate is one of the core measures of living standards and it draws attention exclusively towards the poor.

PROPORTION OF POPULATION BELOW $ 1 PER DAY

Sub-theme: Income poverty

Brief definition: The proportion of the population having per capita consumption of less than $1.08 a day, measured at 1993 international prices.

Description: The population below $1 a day provides a uniform measure of absolute poverty for the developing world, using data from nationally representative household surveys. Progress against absolute poverty is now a widely accepted yardstick for assessing the overall performance of developing economies.

RATIO OF SHARE IN NATIONAL INCOME OF HIGHEST TO LOWEST QUINTILE

Sub-theme: Income inequality

Brief definition: The ratio of the share in national income (or consumption) accruing to the highest 20 percent of the population to the share accruing to the lowest 20 percent.

Description: The indicator shows the extent of inequality in income distribution within a country. Inequality in outcomes such as income or consumption and inequality in opportunities hinder human development and are detrimental to long-term economic growth. Poor people generally have less voice, less income, and less access to services than wealthier people. When societies become more equitable in ways that lead to greater opportunities for all, the poor stand to benefit from a "double dividend." Empirical studies suggest that the impact of growth on poverty reduction is greater when initial income inequality is lower.

PROPORTION OF POPULATION USING AN IMPROVED SANITATION FACILITY

Sub-theme: Sanitation **Core indicator**

Brief definition: Proportion of population with access to a private sanitary facility for human excreta disposal in the dwelling or immediate vicinity. Improved sanitary facilities range from simple but protected pit latrines to flush toilets with sewerage.

Description: The provision of adequate sanitation is necessary for poverty alleviation and to protect human health and the environment. The indicator monitors progress in the accessibility of the population to sanitation facilities, a basic and essential social service. Accessibility to adequate excreta disposal facilities is fundamental to decrease the faecal risk and frequency of associated diseases. When broken down by geographic (such as rural/urban zones) or social or economic criteria, it also provides tangible evidence of inequities.

PROPORTION OF POPULATION USING AN IMPROVED WATER SOURCE

Sub-theme: Drinking water **Core indicator**

Brief definition: Proportion of population with access to an improved drinking water source in a dwelling or located within a convenient distance

from the user's dwelling. Improved drinking water sources include bottled water; rainwater; protected boreholes springs and wells; public stand-pipes and piped connections to houses.

Description: The provision of adequate sanitation is necessary for poverty alleviation and to protect human health and the environment. The indicator monitors progress in the accessibility of the population to improved water sources. Accessibility to improved water sources is fundamental to decrease the faecal risk and frequency of associated diseases. It is also a universal human development indicator. When broken down by geographic (such as rural/urban zones) or social or economic criteria, it also provides tangible evidence of inequities.

SHARE OF HOUSEHOLDS WITHOUT ELECTRICITY OR OTHER MODERN ENERGY SERVICES

Sub-theme: Access to energy **Core indicator**

Brief definition: Share of households without access to electricity, and share of households using 'traditional' non-commercial energy options, such as fuelwood, crop wastes and dung, as primary fuel for cooking and heating.

Description: The indicator monitors progress in accessibility and affordability of modern energy services including electricity. Electricity and other modern energy services are an essential component of providing basic social services. Lack of access to modern energy services contributes to poverty and deprivation and limits economic development. Furthermore, adequate, affordable and reliable energy services are necessary to guarantee sustainable economic and human development.

PERCENTAGE OF POPULATION USING SOLID FUELS FOR COOKING

Sub-theme: Access to energy

Brief definition: Percentage of population using solid fuels as source for cooking. Solid fuels include biomass fuels, such as wood, charcoal, crops or other agricultural waste, dung, shrubs and straw, and coal.

Description: The indicator covers multiple sustainable development issues. Most importantly, the use of solid fuels in households is a proxy for indoor air pollution, which is associated with increased mortality from

pneumonia and other acute lower respiratory infections among children as well as increased mortality from chronic obstructive pulmonary disease and lung cancer (where coal is used) among adults. High demand for biomass fuels to meet household energy needs can contribute to deforestation and subsequent land degradation. The indicator also measures access to modern energy services, central to poverty alleviation and sustainable development in general.

PROPORTION OF URBAN POPULATION LIVING IN SLUMS

Sub-theme: Living conditions **Core indicator**

Brief definition: The proportion of urban population lacking at least one of the following five housing conditions: Access to improved water; access to improved sanitation facilities; sufficient, not overcrowded, living area; structural quality/durability of dwellings; security of tenure.

Description: This is a key indicator measuring the adequacy of shelter. Overcrowding, inadequate housing, lack of water and sanitation are manifestations of poverty. They deprive residents from their human rights, are associated with certain categories of health risks and are often detriments to future development. An increase of this indicator is sign of deteriorating living conditions in urban areas. Disaggregating the indicator by type of housing conditions gives further information on the severity of inadequate living conditions.

B. Governance

PERCENTAGE OF POPULATION HAVING PAID BRIBES

Sub-theme: Corruption **Core indicator**

Brief definition: Percentage of population having been asked or having complied to expectation by government officials to pay a bribe for his or her services.

Description: The indicator measures prevalence of corruption among government officials through crime surveys. A decline of this indicator is a sign of progress on the corruption component of good governance. Good governance is essential for sustainable development.

NUMBER OF RECORDED INTENTIONAL HOMICIDES PER 100,000 POPULATION

Sub-theme: Crime **Core indicator**

Brief Definition: Number of intentional homicides recorded in criminal (police) statistics. Countries with sufficiently reliable crime statistics may wish to expand the indicator by including violent crimes, such as assault, rape and/or robbery.

Description: The indicator measures the development of intentional homicides over time. Intentional homicides, as well as violent crimes, have a very significant negative impact on sustainable development. The phenomenon of crime compromises human dignity, creates a climate of fear and erodes the quality of life. The indicator can also be used as a measure for the adherence to the rule of law, a component of good governance.

C. Health

UNDER-FIVE MORTALITY RATE

Sub-theme: Mortality **Core indicator**

Brief definition: Under-five mortality rate refers to the probability of dying before age 5. It is expressed as deaths per 1,000 live births.

Description: This indicator measures the risk of dying in infancy and early childhood. In high-mortality settings, a large fraction of all deaths occurs at ages under 5 years. Under-five mortality levels are influenced by the availability, accessibility and quality of health services; education, particularly of mothers; access to safe water and sanitation; poverty and nutrition, among other factors.

LIFE EXPECTANCY AT BIRTH

Sub-theme: Mortality **Core indicator**

Brief definition: The average number of years that a newborn could expect to live, if he or she were to pass through life subject to the age-specific death rates of a given period.

Description: The indicator measures how many years on average a newborn is expected to live, given current age-specific mortality risks. Life

expectancy at birth is an indicator of mortality conditions and, by proxy, of health conditions.

HEALTHY LIFE EXPECTANCY AT BIRTH

Sub-theme: Mortality

Brief definition: The average equivalent number of years of full health that a newborn could expect to live, if he or she were to pass through life subject to the age-specific death rates and ill-health rates of a given period.

Description: Healthy life expectancy (HALE) provides a summary of overall health conditions for a population, which are in turn an integral part of development. HALE captures both fatal and non-fatal health outcomes and provides a more complete picture of the impact of morbidity and mortality on populations, than life expectancy alone.

PERCENT OF POPULATION WITH ACCESS TO PRIMARY HEALTH CARE FACILITIES

Sub-theme: Health care delivery **Core indicator**

Brief definition: Proportion of population with access to primary health care facilities. Primary health care is defined as essential health care made accessible at a cost the country and community can afford, with methods that are practical, scientifically sound and socially acceptable.

Description: The indicator monitors progress in the access of the population to primary health care. Accessibility of health services, going beyond just physical access, and including economic, social and cultural accessibility and acceptability, is of fundamental significance to reflect on health system progress, equity and sustainable development.

IMMUNIZATION AGAINST INFECTIOUS CHILDHOOD DISEASES

Sub-theme: Health care delivery **Core indicator**

Brief definition: The percent of the eligible population that have been immunized according to national immunization policies. The definition includes three components: (i) the proportion of children immunized against diphtheria, tetanus, pertussis, measles, poliomyelitis, tuberculosis and hepatitis B before their first birthday; (ii) the proportion of children

immunized against yellow fever in affected countries of Africa; and (iii) the proportion of women of child-bearing age immunized against tetanus.

Description: This indicator monitors the implementation of immunization programs. Good management of immunization programmes is essential to the reduction of morbidity and mortality from major childhood infectious diseases, and is integral to the achievement of sustainable development.

CONTRACEPTIVE PREVALENCE RATE

Sub-theme: Health care delivery

Brief definition: This indicator is generally defined as the percentage of women of reproductive age (15-49 yrs) using any method of contraception at a given point in time. It is usually calculated for women married or in union of reproductive age, but sometimes for other base population, such as all women of reproductive age at risk of pregnancy.

Description: The measure indicates the extent of couples conscious efforts and capabilities to control their fertility. Contraceptive prevalence is also an indicator of access to reproductive health services, an important element of primary health care. Reproductive health programmes, which include family planning, are among the factors that promote changes in demographic behaviour and trends, which in turn affect sustainability and development. The health benefits of contraceptive use include the ability to prevent unwanted pregnancies, thereby reducing the resort to induced abortion as well as potential complications of pregnancy and the risks of maternal mortality.

NUTRITIONAL STATUS OF CHILDREN

Sub-theme: Nutritional status **Core indicator**

Brief definition: Percentage of underweight (weight-for-age below -2 standard deviation (SD) of the WHO Child Growth Standards median) among children under five years of age; percentage of stunting (height-for-age below -2 SD of the WHO Child Growth Standards median) among children under five years of age; and percentage of overweight (weight-for-height above +2 SD of the WHO Child Growth Standards median) among children under five years of age.

Description: The purpose of this indicator is to measure long term nutritional imbalance and malnutrition resulting in undernutrition (assessed by underweight and stunting) and overweight. Anthropometric measurements to assess growth and development, particularly in young children, are the most widely used indicators of nutritional status in a community.

MORBIDITY OF MAJOR DISEASES SUCH AS HIV/AIDS, MALARIA, TUBERCULOSIS

Sub-theme: Health status and risks **Core indicator**

Brief definition: Prevalence and/or incidence of major diseases such as HIV/AIDS, malaria, tuberculosis. The indicator is measured separately for relevant major diseases, typically in cases per 100,000 people.

Description: The indicator measures the morbidity caused by major diseases. The goals of sustainable development can only be achieved in the absence of a high prevalence of debilitating diseases. HIV/AIDS, malaria, tuberculosis and other diseases are major impediments to sustainable development, especially in many developing countries. The indicator also provides information on the success of measures to fight major diseases. For that purpose, especially over a longer horizon, measuring death rates of major diseases is also important.

PREVALENCE OF TOBACCO USE

Sub-theme: Health status and risks

Brief definition: The indicator is defined as the percentage of the population aged 15 years or older that daily smokes any tobacco product. It is calculated from the responses to individual or household surveys that are nationally representative.

Description: Prevalence of current daily tobacco smoking among adults is a measure useful to determine of the economic and future health burden of tobacco use, and provides a primary basis for evaluating the effectiveness of tobacco control programmes over time. Tobacco is an undisputable health threat causing 5.4 million deaths in 2005, and representing the second risk factor for mortality worldwide. Tobacco consumption is costly and contributes to poverty and associated health inequalities at the individual and national levels. Studies have shown that prevalence is higher among the poor illustrating a negative association between prevalence and household income

and/or wealth. The cost of treatment of tobacco-caused diseases is high and falls heavily on the finances of poor households and countries. Premature deaths from tobacco-related diseases also lead to productivity losses.

SUICIDE RATE

Sub-theme: Health status and risks

Brief definition: The number of deaths from suicide and intentional self-harm per 100 000 people.

Description: The indicator is an important proxy for the prevalence of mental health disorders in a country, as mental health disorders, especially depression and substance abuse, are associated with 90% of all suicides. Mental health disorders are a major impediment to the well-being of populations in developed and developing countries. People with these disorders are often subjected to social isolation, poor quality of life and increased mortality. These disorders are the cause of staggering economic and social costs.

D. Education

GROSS INTAKE RATE INTO LAST YEAR OF PRIMARY EDUCATION

Sub-theme: Education level **Core indicator**

Brief definition: Total number of new entrants in the last grade of primary education, regardless of age, expressed as a percentage of the population of the theoretical entrance age to the last grade of primary education. The indicator is also called Primary Completion Rate.

Description: The indicator measures whether or not the entire eligible school age population has access to school and whether or not they complete the full primary cycle. Universal primary education is an important goal of the international sustainable development agenda. Education is a process by which human beings and societies reach their fullest potential. It is critical for promoting sustainable development and improving the capacity of people to address environment and development issues.

NET ENROLMENT RATE IN PRIMARY EDUCATION

Sub-theme: Education level **Core indicator**

Brief definition: The indictor is the ratio of the number of children of official school age (as defined by the national education system) who are enrolled in primary school to the total population of children of official school age.

Description: The indicator shows the proportion of children of primary school age who are enrolled in primary school. Net enrolment refers only to children of official primary school age, and excludes children of other age groups enrolled in primary school age as well as children of primary school age enrolled in other levels of education. Universal primary education is an important goal of the international sustainable development agenda

ADULT SECONDARY (TERTIARY) SCHOOLING ATTAINMENT LEVEL

Sub-theme: Education level **Core indicator**

Brief definition: Adult Secondary Schooling Attainment Level is defined as the proportion of the population of working age (25-64 years) which has completed at least (upper) secondary education. Adult Tertiary Schooling Attainment Level is defined as the proportion of the population of working age (25-64 years) which has completed at least the first stage tertiary education.

Description: These indicators provide measures of the quality of the human capital stock within the adult population of approximately working age. For instance, those who have completed upper secondary education can be expected either to have an adequate set of skills relevant to the labour market or to have demonstrated the ability to acquire such skills.

LIFE LONG LEARNING

Sub-theme: Education level

Brief definition: Percentage of the population aged 25 to 64 in education or training.

Description: The indicator measures the extent to which working-age population is engaged in learning activities. Life-long learning is essential to sustainable development. As society shifts towards sustainable production and consumption patterns, workers and citizens who are willing to develop and adopt new technologies and organisation techniques as workers, as well

as new attitudes and behaviour as citizens and consumers will be needed. The scale and quality of human resources are major determinants of both the creation of new knowledge and its dissemination.

ADULT LITERACY RATES

Sub-theme: Literacy **Core indicator**

Brief definition: The proportion of the adult population aged 15 years and over that is literate.

Description: This indicator provides a measure of the stock of literate persons within the adult population who are capable of using written words in daily life and to continue to learn. It reflects the accumulated accomplishment of education in spreading literacy. Any shortfall in literacy would provide indications of efforts required in the future to extend literacy to the remaining adult illiterate population.

E. Demographics

POPULATION GROWTH RATE

Sub-theme: Population change **Core indicator**

Brief definition: The average annual rate of change of population size during a specified period. It is often reported separately for urban and rural areas.

Description: The population growth rate measures how fast the size of population is changing. If reported separately for urban and rural area, it provides a measure of urbanization. The high growth of urban populations, caused by rates of natural increase (excess of births over deaths) in urban areas, migration from rural to urban areas and the transformation of rural settlements into urban places, is of concern in many countries. In settings where the conditions for sustainable agricultural and rural development are not in place, high rates of rural population growth could negatively affect the use of land, water, air, energy and other resources.

TOTAL FERTILITY RATE

Sub-theme: Population change

Brief definition: The average number of children (live births) a cohort of women would have at the end of their reproductive period if they were sub-

ject to the age-specific fertility rates of a given period. Its calculation assumes that there is no mortality. The total fertility rate is expressed as children per woman, and can be disaggregated into various age-specific fertility rates.

Description: Fertility is one of the variables that directly affect population change. In many countries, lower fertility has improved the ability of families and governments to make a better use of scarce resources, combat poverty, protect and repair the environment, and set the conditions for sustainable development. On the other hand, countries experiencing below-replacement fertility levels (below 2.1 children per woman) could face rapid population ageing and, eventually, decreasing population size. Adolescent fertility (births to women under 20 years of age) constitutes a matter of concern for many governments, specially in regions still experiencing relatively high fertility. Early childbearing entails a much greater risk of maternal death, while the children born to young mothers tend to have higher levels of morbidity and mortality.

DEPENDENCY RATIO

Sub-theme: Population change **Core indicator**

Brief definition: The dependency ratio relates the number of children (0-14 years old) and older persons (65 years or over) to the working-age population (15-64 years old).

Description: Dependency ratios indicate the potential effects of changes in population age structures for social and economic development, in particular regarding social support needs. A high dependency ratio indicates that the economically active population and the overall economy may face a greater burden in supporting the young and/or older economically dependent populations. It is also normally disaggregated into children dependency ratio and old-age dependency ratio.

RATIO OF LOCAL RESIDENTS TO TOURISTS IN MAJOR TOURIST REGIONS AND DESTINATIONS

Sub-theme: Population change

Brief definition: The number of visitors (tourists and same day visitors) divided by the number of local residents in tourist regions and destinations. It can be reported separately for the whole year and for peak seasons or days.

Description: The ratio can indicate total and seasonal pressure on the environmental and social resources of host regions and populations. While tourism represents a key source of income and employment in most tourist receiving regions and destinations, it also exerts considerable pressure on the environmental and socio-cultural resources of host populations, especially in peak periods. Negative environmental and social impacts of tourism can be prevented and mitigated with appropriate planning, management and monitoring of tourism activities, following integrated approaches and sustainability principles.

F. Natural hazards

PERCENTAGE OF POPULATION LIVING IN HAZARD PRONE AREAS

Sub-theme: Vulnerability to natural hazards **Core indicator**

Brief definition: The percentage of national population living in areas subject to significant risk of prominent hazards: cyclones, drought, floods, earthquakes, volcanoes and landslides. The indicator may be calculated separately for each relevant prominent hazard. The risk of death in a disaster caused by natural hazards is a function of physical exposure to a hazardous event and vulnerability to the hazard. The indicator measures the risk at sub-national scale by using historical and other data on hazards and on vulnerability. The sub-national risk levels are then aggregated to arrive at national values.

Description: This indicator contributes to a better understanding of the level of vulnerability to natural hazards in a given country, thus encouraging long-term, sustainable risk reduction programs to prevent disasters. High vulnerability means higher exposure to natural catastrophes in the absence of disaster reduction measures. Disasters caused by vulnerability to natural hazards have a strong negative impact on the development process in both industrialized and developing countries.

HUMAN AND ECONOMIC LOSS DUE TO DISASTERS

Sub-theme: Disaster preparedness and response

Brief definition: The number of persons deceased, missing, and/or injured as a direct result of a disaster involving natural hazards; and the amount of economic and infrastructure losses incurred as a direct result of the natural

disaster. The indicator may be expressed as percentage of total population (for human loss) and of GDP (for economic loss).

Description: The indicator provides estimates of the human and economic impact of disasters. Disasters involving natural hazards can have devastating short and long-term impacts on the society and the economy of any country, adversely affecting progress towards sustainable development.

G. Atmosphere

CARBON DIOXIDE EMISSIONS

Sub-theme: Climate change **Core indicator**

Brief definition: Anthropogenic emissions, less removal by sinks, of carbon dioxide (CO_2). In addition to total emissions, sectoral CO_2 emissions can be considered. The typical sectors for which CO_2 emissions/removals are estimated are energy, industrial processes, agriculture, waste, and the sector of land use, land-use change and forestry (LULUCF).

Description: This indicator measures the emissions of carbon dioxide, which is known to be the most important, in terms of impact on global warming, anthropogenic greenhouse gas (GHG). A doubling of the CO_2 concentration in the atmosphere is believed to cause an increase in the global mean temperature of 1.5 to 4.5°C, which is expected to have a very negative impact on economic, social and environmental conditions in most countries of the world.

EMISSIONS OF GREENHOUSE GASES

Sub-theme: Climate change

Brief definition: Anthropogenic emissions, less removal by sinks, of the main greenhouse gases (GHGs) carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6). Emissions of CH_4, N_2O, HFCs, PFCs and SF_6 can be converted to CO_2 equivalents using the so-called global warming potentials (GWPs) provided in assessments of the Intergovernmental Panel on Climate Change.

Description: This indicator measures the emissions of the six main GHGs which have a direct impact on climate change, less the removal of the main

GHG CO_2 through sequestration as a result of land-use change and forestry activities. An increase of greenhouse gas concentration in the atmosphere contributes to global warming, which is a major global challenge to sustainable development. For countries that have committed to reduce or stabilize their GHG emissions under the Kyoto Protocol of the United Nations Framework Convention on Climate Change, the indicator also provides information on the fulfilment of this global commitment.

CONSUMPTION OF OZONE DEPLETING SUBSTANCES

Sub-theme: Ozone Layer Depletion **Core indicator**

Brief definition: This indicator shows the consumption trends for ozone depleting substances (ODSs) controlled under the Montreal Protocol on Substance that Deplete the Ozone Layer, thereby allowing inference of the amounts of ODSs being eliminated as a result of the protocol.

Description: This indicator depicts the progress towards the phase out of ODSs by the countries which have ratified the Montreal Protocol on Substances that Deplete the Ozone Layer and its Amendments. The phase-out of ODSs, and their substitution by less harmful substances or new processes, will lead to the recovery of the ozone layer, whose depletion has adverse effects on human health, animals, plants, micro-organisms, marine life, materials, biogeochemical cycles, and air quality.

AMBIENT CONCENTRATION OF AIR POLLUTANTS IN URBAN AREAS

Sub-theme: Air quality **Core indicator**

Brief definition: Ambient air pollution concentrations of ozone, particulate matter ($PM_{10,}$ and $PM_{2,5}$, if those are not available: SPM, black smoke), sulphur dioxide, nitrogen dioxide, lead. Additional air pollutants are carbon monoxide, nitrogen monoxide and volatile organic compounds including benzene (VOCs). The priority is collection of the indicator in large cities.

Description: The indicator provides a measure of the state of the environment in terms of air quality and is an indirect measure of population exposure to air pollution of health concern in urban areas. Improving air quality is a significant aspect of promoting sustainable human settlements.

H. Land

LAND USE CHANGE

Sub-theme: Land use and status

Brief definition: The indicator measures changes of the distribution of land uses within a country over time. Broad land use categories are: Arable land, permanent cropland, permanent pasture, forests and woodland, built-up areas, other. Finer classifications may be chosen, if available and appropriate.

Description: The indicator provides information on changes in the productive or protective uses of the land resource to facilitate sustainable land use planning and policy development. Such information is useful in identifying opportunities to protect land uses or promote future allocation aimed at providing the greatest sustainable benefits for people. Economically, changes in land use will, for example, result in changes in possible agricultural production and influence employment opportunities. From an environmental point of view, unsustainable land use is an important factor in land degradation, may pose a threat to ecosystems, and lead to natural habitat loss and landscape changes.

LAND DEGRADATION

Sub-theme: Land use and status

Brief definition: The share of land which due to natural processes or human activity is no longer able to sustain properly an economic function and/or the original ecological function. Degraded land includes land affected by soil erosion, deterioration of the physical, chemical and biological or economic properties of soil and/or long-term loss of natural vegetation.

Description: The indicator measures the extent of land degradation, which is an impediment to sustainable development in general, and to sustainable agriculture in particular. In many developing countries it is a major cause of poverty and further environmental damage due to overuse of national resources. The indicator can also be seen as an overall measure of the reduction in quality of land resources.

LAND AREA AFFECTED BY DESERTIFICATION

Sub-theme: Desertification

Brief definition: The proportion of land in drylands that is affected by desertification. Desertification is defined as land degradation in arid, semi-arid, and dry sub-humid areas resulting from various factors, including climatic variations and human activities.

Description: The indicator describes the extent and severity of desertification at the national level. For dryland areas, desertification is a central problem in sustainable development. While many dryland ecosystems have generally low levels of absolute productivity, maintenance of that productivity is critical to the present and future livelihood of many hundreds of millions of people. Combating desertification is, therefore, a central sustainable development goal for large areas of the world.

ARABLE AND PERMANENT CROP LAND AREA

Sub-theme: Agriculture **Core indicator**

Brief Definition: Arable and permanent crop land is the total of "arable land" and "land under permanent crops". Arable land is the land under temporary crops, temporary meadows for mowing or pasture, land under market and kitchen gardens and land temporarily fallow (for less than five years); and land under permanent crops is the land cultivated with crops that occupy the land for long periods and need not be replanted after each harvest.

Description: This indicator shows the amount of land available for agricultural production and, *inter alia*, the cropland area available for food production. In many developing countries, rising food and fibre demand and a decline in farm sizes forces small farmers to extend cultivation to new areas, which are fragile and not suitable for cultivation. Crop intensification, which has contributed significantly to agricultural growth in recent years, can ease the pressure on cultivating new lands but farm practices adopted for raising yields can also, in some situations, damage the environment. This indicator is of value to land planning decision making.

FERTILIZER USE EFFICIENCY

Sub-theme: Agriculture

Brief definition: The indicator measures the extent of fertilizer use recovery in agriculture per crop unit. Data on the quantities of fertilizers used are converted into the three basic nutrient components and aggregated. The three components are nitrogen (N), phosphorous (P_20_5), and potassium (K_20). Nutrient components of crops and their by-products are based on their standardized chemical composition.

Description: This indicator shows the potential environmental pressure from inappropriate fertilizer application. Intensive fertilizer application is linked to nutrient losses that may lead to eutrophication of water bodies, soil acidification, and potential contamination of water supply with nitrates. In many countries, intensification of agricultural production is a response to increases in food demand and in the scarcity of agricultural land. It is necessary that this intensification keeps negative impacts to the resource base and the wider environment within bounds so that the sustainability of the system is not threatened.

USE OF AGRICULTURAL PESTICIDES

Sub-theme: Agriculture

Brief definition: Use of pesticides in metric tons of active ingredients per unit of agricultural land area.

Description: This indicator measures the use of pesticides in agriculture, which is linked to the intensification of agriculture. Whereas pesticides may increase agricultural production, they pose challenges to health and environment. Pesticides tend to accumulate in the soil and in biota, and residues may reach surface and groundwater through leaching. Humans can be exposed to pesticides through food.

AREA UNDER ORGANIC FARMING

Sub-theme: Agriculture

Brief definition: Ratio of total utilized agricultural area occupied by organic farming to total utilized agricultural area. Organic farming involves holistic production management systems, for crops and livestock, emphasizing the

use of management practices in preference to the use of off-farm inputs. The indicator may be extended to cover organic forestry and aquaculture.

Description: This indicator shows the importance of organic farming. Organic farming contributes to reducing environmental loading on soil and water resources and pressure on biodiversity. The reduction of use of pesticides, herbicides and other chemicals, combined with enhanced management of natural resources, not only improves the health of ecosystems but also fosters the health of animals and people and increases income generation and communities' self-reliance.

PROPORTION OF LAND AREA COVERED BY FORESTS

Sub-theme: Forests **Core indicator**

Brief definition: The indicator measures the share of forest area in total land area. When possible the area of primary forest should also be reported on. The *forest area* is defined as "land spanning more than 0.5 hectares with trees higher than 5 metres and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. The indicator may further distinguish between primary and other forests. The primary forest area is defined as "Naturally regenerating forest of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed".

Description: The indicator allows for monitoring changes in the area covered by forests over time. A continuing and fast decreasing forest area in a country might be an alarm signal of unsustainable practices in the forestry and agricultural sector. Forests provide many significant resources and functions including wood products and non-wood products, recreational opportunities, habitat for wildlife, conservation of biological diversity, water and soil, and play a crucial role in the global carbon cycle. They support employment and traditional uses. Primary forests are usually associated with high levels of biological diversity, particularly in tropical regions. The area of primary forest is an important indicator of the status of the forest ecosystem as a whole.

FOREST TREES DAMAGED BY DEFOLIATION

Sub-theme: Forests

Brief definition: This indicator is defined as the percentage of trees on forest and other wooded land in the defoliation classes moderate, severe and

dead. Defoliation is needle or leaf loss in the assessable crown as compared with a reference tree.

Description: The purpose of the indicator is to provide information on the state of forest defoliation. The extent of defoliation provides an indication of the health of forests. Defoliation is influenced by a combination of climatic factors (especially drought), soil conditions, atmospheric pollution and forest pathogens. The indicator, thus, provides information on the impact of policies which reduce the occurrence of such influencing factors, in particular air pollution.

AREA OF FOREST UNDER SUSTAINABLE FOREST MANAGEMENT

Sub-theme: Forests

Brief definition: This indicator will measure the forest area that is under sustainable forest management. It can be based on a variety of information, including data on forest health, the extent to which forests fulfill targets related to their environmental, economic and social functions and on forest management practices.

Description: The indicator will provide information on forest management practices. Sustainable forest management for a variety of uses is essential to achieving sustainable development. It is a critical means to eradicate poverty, to significantly halt deforestation and to halt degradation of natural resources and the loss of biodiversity.

I. Oceans, seas and coasts

PERCENTAGE OF TOTAL POPULATION LIVING IN COASTAL AREAS

Sub-theme: Coastal zone **Core indicator**

Brief definition: Percentage of total population living within a 100 kilometres from the coast and 50 meters above sea level. Other combinations of distance-to-coast and elevation may be used as definition of coastal zones. Another approach is to measure the population living in river delta areas, which are important areas at the land-ocean interface.

Description: This indicator measures the concentration of population in coastal areas, typically due to the economic benefits that accrue from access

to ocean navigation, coastal fisheries, tourism and recreation. The indicator quantifies an important driver of coastal ecosystem pressure, and it also quantifies an important component of vulnerability to sea-level rise and other coastal hazards. Among the most important pressures are habitat conversion, land cover change, pollutant loads, and introduction of invasive species. A high population concentration in the low-elevation coastal zone (defined as less than 10 meters elevation) increases a country's vulnerability to sea-level rise and other coastal hazards such as storm surges.

BATHING WATER QUALITY

Sub-theme: Coastal zone

Brief definition: The indicator describes the changes over time in the quality of designated bathing waters (inland and marine) in terms of compliance with standards for microbiological parameters (total coliforms and faecal coliforms) and physicochemical parameters (mineral oils, surface-active substances and phenols).

Description: The indicator provides important information on the environmental status of coastal waters. Violation of bathing quality standards poses health risks for the population as well economic risks to the tourism sector. The indicator also provides information on the effectiveness of environmental regulation, especially with regard to wastewater and marine pollution caused by ships.

PROPORTION OF FISH STOCKS WITHIN THEIR SAFE BIOLOGICAL LIMITS

Sub-theme: Fisheries **Core indicator**

Brief definition: Percentage of fish stocks exploited within their level of maximum biological productivity, i.e., stocks that are either "Underexploited", "Moderately exploited" or "Fully exploited" according to formal stock assessments based on a FAO procedure. Stocks that are "Overexploited", "Depleted" and "Recovering" are outside their maximum biological productivity.

Description: The indicator provides information on the state of exploitation of fishery resources at the global, regional and national levels. It measures the level of sustainable production from capture fisheries, an important element of food security. It is based on formal stock assessments,

derived from national and, for shared fish stocks, regional catch and effort statistics.

PROPORTION OF MARINE AREA PROTECTED

Sub-theme: Marine environment **Core indicator**

Brief definition: The indicator is defined as the share of national marine area (territorial water plus exclusive economic zones) that has been reserved by law or other effective means to protect part or all of the enclosed environment. The indicator may be disaggregated by management category of the protected areas. It could be calculated separately for different marine ecological regions, if appropriate classification systems are available.

Description: The indicator represents the extent to which marine areas important for conserving biodiversity, cultural heritage, scientific research (including baseline monitoring), recreation, natural resource maintenance, and other values, are protected from incompatible uses. Protected marine areas are essential for maintaining marine ecosystem diversity, in conjunction with management of human impacts on the environment.

MARINE TROPHIC INDEX

Sub-theme: Marine environment

Brief definition: The marine trophic index measures the change in mean trophic level of fisheries landings by region and globally. Trophic level is defined as the position of an organism in the food chain, and ranges from a value of 1 for primary producers up to a level of 5 for marine mammals and humans.

Description: In addition to being an indicator of the sustainability of fisheries, the marine trophic index provides a measure of ecosystem integrity. Declining trophic levels result in shortened food chains, leaving ecosystems less able to cope with natural or human-induced change. The long term sustainability of fisheries is, in turn, directly linked to human livelihoods and well-being. Excessive fishing is the most widespread and dominant human impact on ocean ecosystems and is a major impact on marine biodiversity. The lowered biomasses and fragmented habitats resulting from the impacts of fishing are predicted to lead to local extinctions especially among large, long-lived, slow growing species.

AREA OF CORAL REEF ECOSYSTEMS AND PERCENTAGE LIVE COVER

Sub-theme: Marine environment

Brief definition: The indicator measures trends in the extant area of coral reefs (a 'key ecosystem' for many countries), and the percentage live cover of those reefs. Key ecosystems are those ecosystems for which it is most important to measure changes in extent, or those ecosystems for which it is possible to measure changes in extent.

Description: The indicator illustrates the effectiveness of national measures designed to conserve marine biological diversity and ensure its use is sustainable. In many countries, coral reefs contain rare or locally endemic or threatened species, are of particularly high species richness, represent rare or unusual habitat, are severely reduced in area relative to their potential original extent, are under a high degree of threat, and/or are of high actual or potential economic importance.

J. Freshwater

PROPORTION OF TOTAL WATER RESOURCES USED

Sub-theme: Water quantity **Core indicator**

Brief definition: Total annual volume of groundwater and surface water withdrawn from its sources for human use (in the agricultural, domestic and industrial sectors), expressed as a percentage of the total volume of water available annually through the hydrological cycle (total renewable water resources). The terms water resources and water use are understood as freshwater resources and freshwater use.

Description: The indicator shows the degree to which total renewable water resources are being exploited to meet the country's water demands and is thus a measure of water scarcity. Scarce water could have negative effects on sustainability constraining economic and regional development, and leading to loss of biodiversity. It is an important measure of a country's vulnerability to water shortages.

WATER USE INTENSITY BY ECONOMIC ACTIVITY

Sub-theme: Water quantity **Core indicator**

Brief definition: The indicator is defined as cubic metres of water used per unit of value added (in US $) by economic activity. Water used by an economic activity consists of the sum of (i) water directly abstracted from the environment either permanently or temporarily for own use and (ii) water received from other industries including reused water. Value added (gross) by economic activity is defined as in the National Accounts as the value of output less the value of intermediate consumption.

Description: This indicator measures the intensity of water use in terms of volumes of water per unit of value added. It is an indicator of pressure of the economy on the water resources. Over time, it shows whether a country has decoupled decouple water use from economic growth. The indicator also provides information on progress in implementation of integrated water resources management plans.

PRESENCE OF FAECAL COLIFORMS IN FRESHWATER

Sub-theme: Water qualitity **Core indicator**

Brief definition: The proportion of freshwater resources destined for potable supply containing concentrations of faecal coliforms which exceed the levels recommended in the World Health Organization (WHO) Guidelines for Drinking-water Quality.

Description: The indicator assesses the microbial quality of water available to communities for basic needs. It identifies communities where contamination of water with human and animal excreta at source or in the supply poses a threat to health. Diarrhoeal diseases, largely the consequence of faecal contamination of drinking-water supplies, are the major cause for morbidity and mortality in many developing countries, especially among children. Frequent diarrhoeal episodes, even without fatal consequences, disrupt children's development and education, which, in the longer term, can have serious consequences for sustainable development.

BIOLOGICAL OXYGEN DEMAND (BOD) IN WATER BODIES

Sub-theme: Water quality

Brief definition: BOD measures the amount of oxygen required or consumed for the microbiological decomposition (oxidation) of organic material in water.

Description: The purpose of this indicator is to assess the quality of water available to consumers in localities or communities for basic and commercial needs. It is also one of a group of indicators of ecosystem health. The presence of high BOD may indicate faecal contamination or increases in particulate and dissolved organic carbon from non-human and animal sources that can restrict water use and development, necessitate expensive treatment and impair ecosystem health. Human ill health due to water quality problems can reduce work capability and affect children's growth and education. High levels of oxygen consumption pose a threat to a variety of aquatic organisms, including fish.

WASTEWATER TREATMENT

Sub-theme: Water quality

Brief definition: Proportion of wastewater that is treated, in order to reduce pollutants before being discharged to the environment, by level of treatment (primary, secondary or tertiary).

Description: This indicator assesses the potential level of pollution from domestic and industrial/commercial point sources entering the aquatic environment, and monitors progress towards reducing this potential within the framework of integrated water resources management. It helps to identify communities where wastewater treatment action is required to protect the ecosystem. Untreated or insufficiently treated wastewater can result in increased nutrient levels, high levels of organic matter and hazardous substances, posing threats to aquatic ecosystems and human health.

K. Biodiversity

PROPORTION OF TERRESTRIAL AREA PROTECTED, TOTAL AND BY ECOLOGICAL REGION

Sub-theme: Ecosystem **Core indicator**

Brief definition: The indicator is defined as the share of terrestrial area that has been reserved by law or other effective means to protect part or all of the enclosed environment. It can be calculated separately for different terrestrial ecological regions. The indicator may also be disaggregated by management category of the protected areas.

Description: The indicator represents the extent to which areas important for conserving biodiversity, cultural heritage, scientific research (including baseline monitoring), recreation, natural resource maintenance, and other values, are protected from incompatible uses. It shows how much of each major ecosystem is dedicated to maintaining its diversity and integrity. Protected areas are essential for maintaining ecosystem diversity in countries and ecological regions, in conjunction with management of human impacts on the environment.

MANAGENT EFFECTIVENESS OF PROTECTED AREAS

Sub-theme: Ecosystem

Brief definition: This indicator will measure the effectiveness with which protected areas are being managed based on information about the context, planning and design, resource inputs, management processes, delivery of goods and services, and conservation outcomes of protected areas.

Description: Management effectiveness of protected areas is an important indicator of how well protected areas are conserving biodiversity. This is critical as most nations use protected areas as a cornerstone of biodiversity conservation. However, to determine whether this is a successful strategy it is necessary to know not only about the area and systems they cover, but also whether these are effectively managed.

AREA OF SELECTED KEY ECOSYSTEMS

Sub-theme: Ecosystem

Brief definition: This indicator measures the extant area of identified key ecosystems. Ecosystem refers to the plants, animals, micro-organisms and physical environment of any given place, and the complex relationships linking them into a functional system. Key ecosystems can be defined as either those ecosystems for which it is most important to measure changes in extent, or those ecosystems for which it is possible for measure changes in extent.

Description: The indicator assesses the relative effectiveness of measures for conserving biodiversity at ecosystem level. It is a tool to estimate the need for specific conservation measures to maintain the biological diversity in a country or region. Key ecosystem require attention and specific policy measures as they contain rare or locally endemic or threatened species, are of particularly high species richness, represent rare or unusual habitat, are severely reduced in area relative to their potential original extent, are under a high degree of threat, and/or are of high actual or potential economic importance.

FRAGMENTATION OF HABITAT

Sub-theme: Ecosystem

Brief definition: This indicator measures the fragmentation of identified key habitats. For forests and other terrestrial habitat types the patch size distribution of habitats may be derived from vegetation information systems. For river fragmentation, defined as the interruption of a river's natural flow by dams, inter-basin transfers or water withdrawal, fragmentation can be assessed based on number, placement and amount of water stored behind dams.

Description: The fragmentation of habitats caused by human activities has significant, largely negative implications for their native biodiversity, through the effects of area reduction, edge exposure and isolation, as well as through interruption of ecosystem processes and associated ecosystem degradation. The indicator has the potential to illustrate the effectiveness of national measures designed to conserve biological diversity.

CHANGE IN THREAT STATUS OF SPECIES

Sub-theme: Species **Core indicator**

Brief definition: This indicator is an index based on the number of species in each category of the IUCN Red List (Least Concern, Near Threatened, Vulnerable, Endangered, Critically Endangered, Extinct in the Wild, Extinct), and the number of species changing categories between assessments as a result of genuine improvement or deterioration in status. The indicator is an adaptation of the IUCN Red List Index, the best known and most accepted methodology for assessing trends in the status of threatened species at a global level.

Description: The indicator allows monitoring the extinction risk of species over time. Extinct and endangered species constitute a major loss of biodiversity, which plays a critical role in overall sustainable development. The indicator also illustrates the effectiveness of local, national, regional and global measures to protect endangered species.

ABUNDANCE OF KEY SPECIES

Sub-theme: Species

Brief definition: This indicator uses estimates of population trends in selected species to represent changes in biodiversity, and the relative effectiveness of measures to maintain it. The indicator can be applied to individual species groups (e.g. birds, butterflies), or can be aggregated to incorporate a number of taxa (e.g. in a fashion similar to the Living Planet Index), according to data availability and indicator applicability.

Description: The indicator allows monitoring the abundance of species over time. The indicator illustrates the effectiveness of national measures designed to limit the loss in biodiversity.

ABUNDANCE OF INVASIVE ALIEN SPECIES

Sub-theme: Species

Brief definition: The indicator measures the number of invasive alien species in a given country or region. An invasive alien species is a species introduced outside its normal distribution whose establishment and spread modifies ecosystems, habitats, or species.

Description: The indicator measures an important threat to biodiversity. Invasive alien species (IAS) may threaten native species as direct predators or competitors, as vectors of disease, by modifying the habitat, or altering native species dynamics. IAS have been a major cause of extinctions, especially on islands and in freshwater habitats. Species introductions caused by humans may be intentional (e.g. species released for hunting or biological control), but more commonly are unintentional (e.g. introduced with traded goods such as lumber, in the ballast water of ships, or for the pet trade).

L. Economic development

GROSS DOMESTIC PRODUCT PER CAPITA

Sub-theme: Macroeconomic performance **Core indicator**

Brief definition: Levels of gross domestic product (GDP) per capita are obtained by dividing annual or period GDP at current market prices by population. A variation of the indicator could be the growth of real GDP per capita which is derived by computing the annual or period growth rate of GDP in constant basic producers' or purchasers' prices divided by corresponding population. GDP is the sum of value-added of all production units including all taxes and subsidies on products which are not included in the valuation of output.

Description: The indicator is a basic economic growth indicator and measures the level and extent of total economic output. It reflects changes in total production of goods and services. It is a powerful summary indicator of economic development, even though it does not account for social and environmental cost of production and consumption.

INVESTMENT SHARE IN GROSS DOMESTIC PRODUCT

Sub-theme: Macroeconomic performance **Core indicator**

Brief definition: This indicator refers to the share of investment in total production. It is obtained by calculating gross capital formation as percentage of gross domestic product. Gross capital formation (investment) is defined as the total value of gross fixed capital formation plus changes in inventories and acquisitions less disposal of valuables. Gross fixed capital formation is the total value of produced assets used in the production process for more than one year.

Description: The investment ratio gives an indication of the relative importance of investment as opposed to, for example, consumption. Acquisitions of capital goods provide important information on future economic performance of a society by widening and deepening the capital stock. The indicator measures, thus, an important element of the sustainable development process, especially in developing countries with low amounts productive capital.

GROSS SAVINGS

Sub-theme: Macroeconomic performance

Brief definition: The indicator is defined in national accounts as gross disposable income (i.e. gross national income plus the balance of current transfers with the rest of the world). If available, the alternative net savings, i.e. gross savings less capital depreciation, may provide superior information. Both gross and net savings may be expressed as rates, i.e. as gross (net) savings divided by gross (net) disposable income.

Description: The indicator measures the part of income available for investment or, possibly, capital transfers to the rest of the world. It provides important information on domestic means of implementation for sustainable development. If calculated as net savings, it is an important indicator for future net wealth.

ADJUSTED NET SAVINGS AS PERCENTAGE OF GNI

Sub-theme: Macroeconomic performance

Brief definition: Adjusted net savings is defined as net savings (i.e. gross national income less capital depreciation plus the balance of current transfers with the rest of the world), plus expenditures for education, less depletion of a variety of natural resources (oil, minerals, forests) and less pollution damage (damage from urban air pollution and carbon dioxide emissions). The indicator is then computed by dividing adjusted net savings by gross national income.

Description: The indicator modifies traditional net savings in order to derive an aggregate savings concept more commensurate to sustainable development. A negative adjusted net savings rate can be interpreted as a reduction in total wealth of the economy, thus implying unsustainability. Education expenditures are added as they can be seen as investments in human capital.

Depletion of natural resource is deducted to reflect the decline in asset values associated with their extraction and harvest. Pollution damages are deducted as they reduce human and real capital.

INFLATION RATE

Sub-theme: Macroeconomic performance

Brief definition: The indicator is defined as the cost of living as measured by the annual percentage increase of the consumer price index. Consumer price indices are based on a representative basket of goods and services purchased by consumers in an economy. Composition and relative weights of the basket are reviewed periodically.

Description: The indicator measures inflation, which if too high hampers economic growth. High and unanticipated inflation increases uncertainty and leads to inter-and intra-temporal misallocation of resources as long as prices are not fully flexible. Inflation, especially if unanticipated, has often unwanted distributional effects, as it reduces real income of fixed income earners and shifts wealth away from creditors to debtors. Very high and accelerating inflation rates may be caused by excessive financing of public debts through seignorage and can be sign of unsustainable public finances.

DEBT TO GROSS NATIONAL INCOME RATIO

Sub-theme: Sustainable public finance **Core indicator**

Brief definition: The indicator can be defined as the total amount of outstanding debt issued by the general government divided by gross national income. Total debt consists of external debt (debt held by non-residents) and internal debt (held by residents). For countries where external debt is a major concern, the indicator can alternatively or additionally be defined as total external debt (private and public) divided by GNI.

Description: With regard to public debt, the indicator is a standard measure of public finance. Debt constitutes a burden for future generations as it reduces the amount available for their consumption and investments. High and increasing debt ratios can be seen as an indication of unsustainable public finances. With regard to external debt, this is one of the indicators that measures the burden of servicing the external debt of a country in relation to its total income (GNI). While external borrowing is a method of supplement-

ing savings and financing the investment gap in a country, an unsustainable external debt burden will choke development.

EMPLOYMENT-TO-POPULATION RATIO

Sub-theme: Employment **Core indicator**

Brief definition: The employment-to-population ratio is defined as the proportion of a country's working-age population that is employed. It is typically disaggregated by sex and by age group.

Description: The employment-to-population ratio provides information on the ability of an economy to create employment. Employment, as opposed to unemployment, is viewed as the desired portion of the economically active population (labour force). Employment-to-population ratios are of particular interest when broken down by sex, as they can provide information on gender differences in labour market activity in a given country. For policy purposes, employment-to-population ratios of youth and old are particular relevant.

VULNERABLE EMPLOYMENT

Sub-theme: Employment

Brief definition: The indicator is defined as the share of own-account workers and contributing family members in total employed people. The indicator is based on the broader indicator 'status in employment' which distinguishes between three categories of the total employed. These are: age and salaried workers (also known as employees); self-employed workers (employers, own-account workers and members of producers' cooperatives); contributing family workers (also known as unpaid family workers). The indicator may be broken down by sex.

Description: This indicator provides information how many persons are vulnerable to economic risk because of weak institutional employment arrangements. Own-account workers and contributing family members are regarded as especially vulnerable as they have by definition no formal work arrangements and are therefore more likely to have a low degree of job security and to lack access to social security. The indicator provides information on the informalization of labor markets, which may be associated with increasing and persistent poverty. High values of the indicator may also indicate a large agricultural sector in terms of employment, often associated with low labour productivity and economic growth rates.

LABOUR PRODUCTIVITY AND UNIT LABOUR COST

Sub-theme: Employment **Core indicator**

Brief definition: Labour productivity is defined as output (in constant prices) per unit of labour. The indicator can be reported for the total economy as well as for different sectors. Both hours worked and number of persons employed can be used as unit of labour. Unit labour cost is defined as labour compensation per unit of gross value added produced. Total labour compensation includes gross wages and salaries of employees and other costs of labour that are paid by employers, including employers' contributions to social security and pension schemes.

Description: Positive changes in labour productivity measure the part of economic growth due to more effective work by those who are employed. Driving forces behind labour productivity include the accumulation of machinery and equipment, improvements in organization as well as physical and institutional infrastructures, improved health and skills of workers ("human capital") and the generation of new technologies. Unit labor cost represents a direct link between productivity and the cost of labour used in generating output. A rise in a country's unit labour cost represents an increased reward for labour's contribution to output. However, a rise in labour cost that is higher than the rise in labour productivity, especially in tradable goods producing sectors, may indicate a decrease in international competitiveness, if other costs are not adjusted in compensation.

SHARE OF WOMEN IN WAGE EMPLOYMENT IN THE NON-AGRICULTURAL SECTOR

Sub-theme: Employment **Core indicator**

Brief definition: The indicator is the share of female workers in wage employment in the non-agricultural sector expressed as a percentage of total wage employment in that same sector. The *non-agricultural sector* includes industry and services.

Description: The indicator shows the extent to which women have access to paid employment, which will affect their integration into the monetary economy. It also indicates the degree to which labour markets are open to women in industry and services sectors which affects not only equal employment opportunities for women but also economic efficiency

through flexibility of the labour market and the economy's capacity to adapt to changes over time. Promoting gender equality and the empowerment of women thus eliminating all forms of gender-based discrimination in labour markets is essential to defeating poverty and fostering sustainable development.

NUMBER OF INTERNET USERS PER POPULATION

Sub-theme: Information and communication technologies **Core indicator**

Brief definition: The indicator is computed by first dividing the number of Internet users by total population, and then multiplying by 100. Internet users are those who use the Internet from any location. The Internet is defined as a world-wide public computer network that provides access to a number of communication services including the World Wide Web and carries email, news, entertainment and data files. Internet access may be via a computer, Internet-enabled mobile phone, digital TV, games machine etc. Location of use can refer to any location, including work.

Description: The number of Internet users is a measure of Internet access and use. As an information distribution system, the Internet and its usage provide opportunities for bringing education and information within the reach of all. It can significantly shorten time lags as well as open up a new range of information resources. It also provides significant, new economic opportunities as well as possibilities for more environment-friendly options for the marketplace.

FIXED TELEPHONE LINES PER 100 POPULATION

Sub-theme: Information and communication technologies

Brief definition: The indicator is derived by dividing the number of fixed telephone lines by total population and multiplying by 100.

Description: This indicator is one of the broadest and most common measurements of the degree of telecommunication development in a country. Telecommunication is critical to support sustainable development and is closely linked to social, economic, and institutional development. It provides those in rural and remote areas with closer contact to the outside world. It is also a critical factor for many economic activities and improves exchange of information among citizens. Modern communications are considered to be relatively benign to the environment, as they are potential substitutes for

transport and induce relatively low levels of environmental pollution. The indicator is also used as a general infrastructure indicator.

MOBILE CELLULAR TELEPHONE SUBSCRIBERS PER 100 POPULATION

Sub-theme: Information and communication technologies

Brief definition: The indicator is derived by dividing the number of mobile cellular subscribers by total population and multiplying by 100.

Description: This indicator is one of the broadest and most common measurements of the degree of telecommunication development in a country. Telecommunication is critical to support sustainable development and is closely linked to social, economic, and institutional development. In many developing countries, mobile telephony has overtaken fixed telephony in its importance as means of communication.

GROSS DOMESTIC EXPENDITURE ON RESEARCH AND DEVELOPMENT AS A PERCENT OF GROSS DOMESTIC PRODUCT

Sub-theme: Research and development

Brief definition: Gross domestic expenditure on scientific research and experimental development (R&D) expressed as a percentage of Gross Domestic Product (GDP). Gross domestic expenditure on R&D (GERD) activities are defined as the total intramural expenditure on research and development performed on the national territory during a given period. This includes both current costs and capital expenditures.

Description: This ratio provides an indication of the level of financial resources devoted to R&D in terms of their share of the GDP. R&D is essential for expanding the knowledge basis and developing new and improved products in the economy. It is a critical component of future economic growth. Moreover, R&D on issues relevant for sustainable development increases the scientific basis for informed decision-making in this area.

TOURISM CONTRIBUTION TO GDP

Sub-theme: Tourism **Core indicator**

Brief definition: The indicator is defined as the sum of the value added (at basic prices) generated by all industries in response to internal tourism

consumption and the amount of net taxes on products and imports included within the value of this expenditure. It is based on tourism satellite account (TSA), a satellite account to standard national accounts that serves as the international standard on tourism statistics.

Description: GDP generated by visitor consumption is the most comprehensive aggregate illustrating the economic relevance of tourism. There is increasing consensus on the importance of tourism as a strategic sector in the national economy insofar as it provides an essential contribution to the economic well-being of the resident population, contributes to the economic objectives of governments and shows its possible role as a relevant player in moving towards a more innovative economy.

M. Global economic partnership

CURRENT ACCOUNT DEFICIT AS PERCENTAGE OF GDP

Sub-theme: Trade **Core indicator**

Brief definition: The indicator is the balance of the current account divided by gross domestic product. The current account is part of the balance of payments and contains financial transactions of economic value between residents and non-residents of an economy. In the 5th edition of the balance of payment manual, the current account components are the balance of trade in goods and services, balance of income (compensation of employees working abroad and income from foreign investments) and current transfers (workers remittances and government transfers).

Description: Current account balance is part of the measure of an economy's savings. Along with net capital transfers and acquisition/disposal of non-produced, non-financial assets, the current account balance represents the net foreign investment or net lending/borrowing position of a country vis-à-vis the rest of the world. Persistent current account deficits or surpluses indicate a macroeconomic instability that is not conducive to sustained economic growth and, therefore, to sustained means of implementation of sustainable development goals. A current account deficit has to be financed through an increase in financial and non-financial liabilities vis-à-vis the rest of the world or a decrease in reserve assets. Repayment of these liabilities decreases the resources future generations have available for consumption and investment.

SHARE OF IMPORTS FROM DEVELOPING COUNTRIES AND LDCS

Sub-theme: Trade

Brief definition: The indicator is defined as the share of merchandise imports from least-developed countries (LDCs) and from other developing countries in total imports into the reporting countries in a given year.

Description: Trade can play a major role in achieving sustainable development. Exports from developing countries and from LDCs constitute a major source of external financing for sustainable development of those countries. For developed country importers, the indicator is one measure of the relative importance of North-South trade, whereas for developing country importers it is a measure of South-South trade. The indicator also provides information on the implementation of international commitments to increase the trade opportunities of developing countries.

AVERAGE TARIFF BARRIERS IMPOSED ON EXPORTS FROM DEVELOPING COUNTRIES AND LDCS

Sub-theme: Trade

Brief definition: The indicator can be defined as the simple average tariff imposed by country on exports from least-developed countries (LDCs) and from other developing countries to the country. The indicator can be disaggregated by product groups. The simple average tariff is the unweighted average of the effectively applied rates at the most detailed tariff line level. Trade-weighted averages may also be used to compute this indicator.

Description: Trade can play a major role in achieving sustainable development. Tariff barriers imposed on exports from developing countries and LDCs may hinder the sustainable development in those countries. Especially if compared with tariffs imposed on exports from developed countries, the indicator provides information on whether the tariff structure of a country is commensurate with fair trade principles. As the basket of exported goods for many developing countries and especially LDCs is relatively small, the indicator may be further broken down into product groups.

NET OFFICIAL DEVELOPMENT ASSISTANCE GIVEN OR RECEIVED AS PERCENTAGE OF GROSS NATIONAL INCOME

Sub-theme: External financing **Core indicator**

Brief definition: This indicator is defined as the total ODA given or received as a share of GNI of the source or recipient country, respectively, net of repayment of principal. When ODA flows by donor countries are measured, ODA comprises bilateral disbursements of concessional funds to developing countries and multilateral institutions. When ODA receipts by developing countries are measured, ODA comprises disbursement of concessional finance from both bilateral and multilateral sources. ODA consists of grants and concessional loans.

Description: The indicator is a measure of the size of flows that are both concessional, and aimed mainly at promoting development and welfare of developing countries. ODA remains an important source of external means of implementation for sustainable development in many developing countries. For donor countries, the indicator provides information on the adherence to the internationally agreed target of ODA to be at least 0.7 % of GNI. For developing countries, the indicator provides information on the contribution of foreign countries to sustainable development as well as on their dependency on foreign aid.

FOREIGN DIRECT INVESTMENT (FDI) NET INFLOWS AND NET OUTFLOWS AS PERCENTAGE OF GDP

Sub-theme: External financing

Brief definition: This indicator is defined as the share of foreign direct investment (FDI) net inflows and of FDI net outflows in GDP. FDI is investment made to acquire a lasting interest in or effective control over an enterprise operating outside of the economy of the investor. *FDI net inflows* and net outflows include reinvested earnings and intra-company loans, and are net of repatriation of capital and repayment of loans.

Description: The indicator shows the provision of external financing resources in the form of direct investments at home from foreign investors and abroad from domestic investors. For many developing countries, FDI inflows are a major and relatively stable source of external financing and thereby provide important means of implementation of sustainable develop-

ment goals. In many cases, FDI also contributes to the transfer of technology and management skills. Conversely, FDI outflows have the potential to improve sustainable development in receiving countries. Sustained increases in FDI inflows are often a sign of an improved general investment climate.

REMITTANCES AS PERCENTAGE OF GNI

Sub-theme: External financing

Brief definition: The indicator is defined as total current private transfers received by residents in a country plus compensation of employees earned by nonresident workers and migrants' transfers divided by Gross National Income (GNI).

Description: This indicator shows the extent of financial benefit for a country from temporary and permanent movements of its residents who are able to work abroad. For many countries, remittances are a major and stable source of external financing and thereby provide important means of implementation of sustainable development goals. As a result of increased globalization the importance of remittances has been rapidly increasing in the last decade.

N. Consumption and production patterns

MATERIAL INTENSITY OF THE ECONOMY

Sub-theme: Material consumption **Core indicator**

Brief definition: The indicator is defined as the ratio of Domestic Material Consumption (DMC) to Gross Domestic Product (GDP) at constant prices. DMC is defined as the total amount of materials (measured by weight) directly used in the economy (used domestic extraction plus imports), minus the materials that are exported.

Description: The indicator provides a basis for policies to decouple the growth of the economy from the use of natural resources in order to reduce environment degradation resulting from primary production, material processing, manufacturing and waste disposal. Reducing the material intensity of production and consumption of goods and services is essential to environmental protection and resource conservation. Reductions in intensity of

material use can be achieved by more efficient use of natural resources in production and consumption, by recycling used and waste material, and by shifts in consumption patterns to less material intensive goods and services.

DOMESTIC MATERIAL CONSUMPTION

Sub-theme: Material consumption

Brief Definition: Domestic Material Consumption (DMC) is defined as the weight of the total amount of materials directly used in the economy (used domestic extraction plus imports), minus the materials that are exported. Materials may be broken down by type of material (minerals, biomass, fossil fuels).

Description: DMC is a useful indicator, as it provides an assessment of the absolute level of use of resources. Primary production of raw materials, processing of the materials into products, and ultimate disposal of the waste material has major environmental impacts. The indicator provides a basis for policies to increase the efficient use of raw materials in order to conserve natural resources and reduce environment degradation resulting from primary extraction, material processing, manufacturing and waste disposal.

ANNUAL ENERGY CONSUMPTION, TOTAL AND BY MAIN USER CATEGORY

Sub-theme: Energy **Core indicator**

Brief definition: The indicator is defined as the total energy consumption (total primary energy supply or total final consumption) in the economy (in tonnes of oil equivalents). It can be broken down by main user category.

Description: This indicator measures the level of energy use and reflects the energy-use patterns in the economy overall and in different sectors. Energy is a key factor in economic development and in providing vital services that improve quality of life. Although energy is a key requirement for economic progress, its production, use and by-products have resulted in major pressures on the environment, both by depleting resources and by creating pollution.

SHARE OF RENEWABLE ENERGY SOURCES IN TOTAL ENERGY USE

Sub-theme: Energy

Brief definition: The share of renewable sources in total primary energy supply or total energy consumption. Renewable energy sources are divided into non-combustible (geothermal, hydro, solar, wind, tide and wave) and combustible renewables and waste (biomass, animal products, municipal waste and industrial waste). Non-renewables are fossil fuels (coal, crude oil, petroleum products, gas) and nuclear.

Description: The promotion of energy, and in particular of electricity from renewable sources of energy, is a high priority of sustainable development for several reasons. Energy from renewables can increase energy security and lead to diversification of energy supply. It reduces environmental degradation caused by non-renewable energy sources, contributes to the mitigation of climate change and reduces the depletion of natural resources.

INTENSITY OF ENERGY USE, TOTAL AND BY ECONOMIC ACTIVITY

Sub-theme: Energy

Brief definition: The indicator is defined as energy use (of the economy in total and of the main sectors) divided by gross domestic product (or value added in case of a sector).

Description: Declining trends in overall energy use relative to GDP (or value added) indicate that the economy is able to improve its energy efficiency and, hence, to decouple economic growth from energy consumption. Improving energy efficiency has beneficial effects on energy security and reduces pressures from economic activities on the environment.

GENERATION OF HAZARDOUS WASTES

Sub-theme: Waste generation and management **Core indicator**

Brief definition: The total amount of hazardous wastes generated per year through industrial or other waste generating activities, according to the definition of hazardous waste as referred to in the Basel Convention and other related conventions.

Description: The indicator provides a measure of the extent and type of industrialization in a country and the nature of industrial activities including

technologies and processes generating hazardous wastes. The generation of hazardous wastes has a direct impact on health and the environment. Normally, long-term exposure is required before harmful effects are seen. Reduced generation of hazardous wastes may indicate reduced industrial activities in a country, introduction of cleaner production in the industrial processes, changing patterns in consumers' habits, or changes in national hazardous waste legislation.

GENERATION OF WASTE

Sub-theme: Waste generation and management

Brief definition: The amount of all waste, both hazardous and non-hazardous, generated by selected main groups of industries or sectors of the economy, expressed per capita and per unit of value added (in US $) by economic activity (at constant prices).

Description: The main purpose is to show the trend in the generation of waste produced by different human activities. Waste represents a considerable loss of resources both in the form of materials and energy. The treatment and disposal of the generated waste may cause environmental pollution and expose humans to harmful substances and bacteria, and therefore impact on human health. Waste generated per unit of value-added shows if there is decoupling of waste generation from economic growth.

WASTE TREATMENT AND DISPOSAL

Sub-theme: Waste generation and management

Brief definition: Percentage of waste which is recycled; composted; incinerated; and landfilled on a controlled site.

Description: The indicator measures the proportion of waste generated which is recycled, composted, incinerated, or landfilled on a controlled site. It gives an indication of the environmental impact of waste management in the country. The proper treatment and disposal of waste is important from an environmental and social viewpoint but can be an economic burden on industries, municipalities and households. The amount of waste recycled and composted reduces the demand for raw materials, leading to a reduction in resource extraction. There may also be a benefit of increased income generation for the urban poor through recycling schemes.

MANAGEMENT OF RADIOACTIVE WASTE

Sub-theme: Waste generation and management

Brief definition: Progress in the management of radioactive waste is measured against key milestones related to both the processing of waste into forms suitable for either safe storage or for placement into a designated endpoint (the "form factor") and to the placement of waste into an endpoint facility ("endpoint factor"). Radioactive waste from various sources, such as nuclear power generation and other nuclear fuel cycle related activities, radioisotope production and use for applications in medicine, agriculture, industry and research, is considered.

Description: The purpose of the indicator is to represent the progress in managing the various radioactive wastes that arise from the nuclear fuel cycle and/or from nuclear applications. It provides a measure of both the current status of radioactive waste management at any time and the progress made over time towards the overall sustainability of radioactive waste management. Radioactive waste, if not properly managed, can have a direct impact on health and the environment through exposure to ionizing radiation.

MODAL SPLIT OF PASSENGER TRANSPORT

Sub-theme: Transport **Core indicator**

Brief definition: The indicator measures the share of each mode (passenger cars, buses and coaches, and trains) in total inland passenger transport, measured in passenger-km.

Description: The indicator provides information on the relative importance of different modes for passenger transport. The use of cars for passenger transportation is generally less energy efficient and has greater environmental and social impacts, such as pollution, global warming as well as a higher accident rate, than mass transit.

MODAL SPLIT OF FREIGHT TRANSPORT

Sub-theme: Transport

Brief definition: The indicator measures the share of each mode (road, rail and inland waterways) in total inland freight transport, measured in tonne-km.

Description: The indicator provides information on the relative importance of different modes for freight transport. Road transport is less energy-efficient and produces more emissions per tonne-kilometer than either rail or inland waterways transport. Therefore, the use of road for freight transport has greater environmental and social impacts, such as pollution, global warming, as well as a higher accident rate, than either rail or inland waterways transport.

ENERGY INTENSITY OF TRANSPORT

Sub-theme: Transport

Brief definition: The indicator is defined as fuel used per unit of freight-kilometer (km) hauled and per unit of passenger-km traveled by mode.

Description: The indicator measures how much energy is used for moving both goods and people. Transport serves economic and social development through the distribution of goods and services and through personal mobility. At the same time, transport is a major user of energy, mostly in the form of oil products, which makes transport the most important driver behind growth in global oil demand. Energy use for transport therefore contributes to the depletion of natural resources, to air pollution and to climate change. Reducing energy intensity in transport can reduce the environmental impacts of this sector while maintaining its economic and social benefits.

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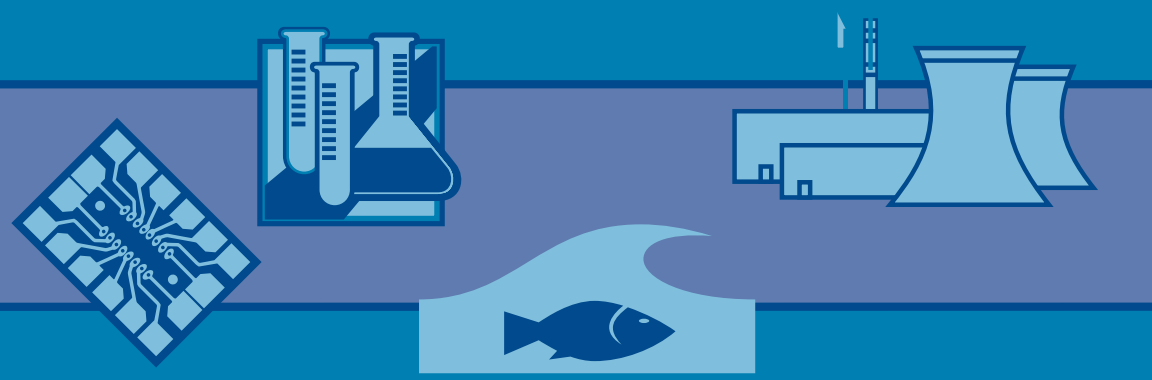

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