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ENVIRONMENT FORUM

Sustainable Development Goals and Indicators for a Small Planet

Part II: Measuring Sustainability



In cooperation with



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Sustainable Development Goals and Indicators for a Small Planet

Part II: Measuring Sustainability

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PREFACE & ACKNOWLEDGEMENTS

This study represents a significant part of the Asia-Europe Environment Forum's (ENVforum) contribution to the global discussion on Sustainable Development Goals (SDGs) by offering the compilation of illustrative indicators that are to be used to measure the three dimensions of sustainable development (environment, political and economic aspects). It is the second part of a three-part study focused on the post-2015 development agenda.

As discussions continue about the creation of a set of SDGs to succeed the Millennium Development Goals (MDGs), this publication aims to advance a set of tools for countries on suggested ways of measuring progress in achieving sustainability in the post-2015 period. It is designed to act as a practical handbook for policy-makers engaged in the challenging task of designing and implementing a set of SDGs that will guide economic, social and environmental development over the forthcoming years.

This publication presents a set of illustrative indicators derived from an analysis of both country level and global and international mechanisms currently in place to measure progress in implementing sustainable policy. The selected ASEM countries for this research were Australia, Bangladesh, China, India, Indonesia, Japan, Republic of Korea and Singapore in Asia and France, Germany, Hungary, Poland, Sweden and Switzerland in Europe.

The mix of organisations in this initiative reflects the ongoing multi-stakeholder dialogues on environment and sustainable development in the two regions. These dialogues are between: regional organisations and regional blocs; individual Asian and European countries; governments and civil society; academic researchers and practitioners; and grassroots and international organisations.

The co-organisers would like to thank the following individuals and institutions, without whom this project would have not been possible: László Pintér from the International Institute for Sustainable Development-Europe (IISD-Europe) and the Central European University (CEU); Dora Almasy from CEU, Sumiko Hatakeyama; Thierry Schwarz and Grazyna Pulawska from the Asia-Europe Foundation (ASEF).

The ENVforum is a partnership initiated by Asia-Europe Foundation (ASEF) with ASEM SMEs Eco-Innovation Center (ASEIC), the Swedish International Development Agency (Sida), the Hanns Seidel Foundation Indonesia (HSF) and Institute for Global Environmental Strategies (IGES), in co-operation with the United Nations Environment Programme (UNEP).

ENVforum Secretariat

LIST OF ABBREVIATIONS

ASEF	Asia-Europe Foundation
ASEIC	ASEM SMEs Eco Innovation Centre
ASEM	Asia-Europe Meeting
BIP	Biodiversity Indicators Partnership
BOD	Biochemical Oxygen Demand
BREEAM	Building Research Establishment Environmental Assessment Methodology
CBD	Convention on Biological Diversity
CEU	Central European University
CPI	Consumer Price Index
DALY	Disability Adjusted Life Years
E.coli	Escherichia coli
EBD	Environmental Burden of Disease
EC	European Commission
EEA	European Environment Agency
EROI	Energy Returned on Energy Invested
ESD	Education for Sustainable Development
Eurostat	Statistical Office of the European Union
FAO	Food and Agricultural Organisation (UN)
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GNI	Gross National Income
HALE	Health Adjusted Life Expectancy
HLP	High Level Panel
HOI	Human Opportunity Index
HSF	The Hanns Seidel Foundation
IAEA	International Atomic Energy Agency
IEA	International Energy Agency
IGES	Institute for Global Environmental Strategies
IHDI	Inequality Adjusted Human Development Index
IISD – Europe	International Institute for Sustainable Development – Europe
ILO	International Labour Organisation
IRENA	International Renewable Energy Agency
IUCN	International Union for Conservation of Nature
LEED	Leadership in Energy and Environmental Design
LRTAP	Long Range Transmission of Air Pollutants

MDG	Millennium Development Goals
MEA	Multilateral Environmental Agreement
MRV	Monitoring, Reporting and Verification
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
OWG	Open Working Group
POP	Persistent Organic Pollutant
POU	Prevalence of Undernourishment
PS4SD	Public Strategies for Sustainable Development
REC	Regional Environmental Centre for Centre and Eastern Europe
RES	Renewable Energy Systems
RICS	Royal Institution of Chartered Surveyors
SCP	Sustainable Consumption and Production
SD	Sustainable Development
SDG	Sustainable Development Goals
SDI	Sustainable Development Indicator
SDSN	Sustainable Development Solutions Network
SEEA	System of Environmental Accounting
Sida	The Swedish International Development Agency
SMEs	Small and Medium Enterprises
SPROADI	Spatial Road Disturbance Index
UN	United Nations
UN DESIPA	United Nations Population Division
UN DESA	United Nations Department of Economic and Social Affairs
UN HABITAT	United Nations Human Settlement Programme
UN SDSN	United Nations Sustainable Development Solutions Network
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNEP-GEMS	UNEP-Global Environment Monitoring System
UNEP-WCMC	UNEP-World Conservation Monitoring Centre
UNESCO	United Nations Organisation for Education, Science and Culture
UNESCO-IHE	UNESCO-Institute for Water Education
UNFCCC	United Nations Framework Convention on Climate Change
UNSD	United Nations Statistical Division
WHO	World Health Organisation

EXECUTIVE SUMMARY

As part of the effort to define a new global development agenda for the post-2015 era, member states of the United Nations (UN) have embarked on a process to identify a set of universally applicable sustainable development goals (SDGs) and targets. While goals and targets will help set a direction for policy at global and national levels, grounding them in facts and evidence and the monitoring of progress will require matching sets of sustainable development indicators (SDIs).

This report offers indicators for 11 illustrative goals and sub-goals based on research in 14 Asian and European countries that was earlier published in the *Part I* report of the *Sustainable Development Goals and Indicators for a Small Planet* initiative of the Asia-Europe Foundation (ASEF), working under a mandate of the Asia-Europe Meeting (ASEM) to assist the development of a universal set of SDGs.

Part I concluded with the selection of an illustrative set of goals and sub-goals, and highlighted the importance of appropriate indicators attached to the goals and sub-goals and the assessment of related data availability. To test how the *Small Planet* goals and sub-goals might be monitored, the present *Part II* research is launched with the aim of identifying the best available indicators.

Indicator selection for *Part II* is based on an extensive review of existing indicators in the 14 countries with global considerations and research efforts also taken into account where country experience was insufficient. In most cases, three indicators are identified for each sub-goal. Where applicable, the indicators are chosen to cover the social, economic and environmental dimensions of sustainable development (SD). In all cases, indicator selection is informed by higher-level principles related to sustainable development measurement and assessment, such as BellagioSTAMP (IISD 2014) and relevant selection criteria such as robustness of the measurement methodology and data availability.

Chapter 1 discusses international monitoring efforts for sustainable development objectives and summarises the main results of the *Part I* report.

Chapter 2 provides methodological insights related to indicator selection.

Chapter 3 presents indicators by *Small Planet* goals and sub-goals. After each sub-goal, there is a short discussion of the pros and cons of the proposed indicators. A more detailed description of each suggested indicator is outlined in Annex 1.

Chapter 4 presents concluding thoughts regarding the process of indicator selection and the applicability of the selected indicators. The selected indicators both show how the 14 countries studied can make use of their existing monitoring and statistical data collection systems when selecting indicators for SDGs relevant for them, and help identify areas where existing information and capacities need to be strengthened. Although the focus of the study is ASEM-member countries, the process and resulting indicators also offer a contribution to the global SDG process and to other countries as they start contemplating the implementation of SDGs relevant at the sub-global level.

1. INTRODUCTION

As part of the effort to define a new global development agenda for the post-2015 era, member states of the United Nations (UN) have embarked on a process to identify a strong and focussed set of universally applicable sustainable development goals (SDGs) and targets. While goals and targets will help set a direction for policy at global and national levels, grounding them in facts and evidence and monitoring progress will require matching sets of sustainable development indicators (SDIs).

Indicators play a role in making sustainable development implementable by defining it in directly or indirectly measurable terms. Indicators can both mirror and guide human values. They can reflect existing human values since “*we measure what we care about*”, but they also amplify the importance of what ends up being measured since “*we care about what we measure*” (Meadows, 1998, p8). Indicators play a role in all stages of governance and strategic management; they can help identify the dimensions and desirable directions of development, inform goal and target setting by providing baselines, and assist detailed programme planning and implementation. Indicators are also required for tracking and evaluating progress, recognising the need for course correction and strengthening accountability.

In recent decades, a growing number of initiatives have been started to create indicators and underlying accounting systems that can help track and report on progress towards sustainable development. At the global level, this included, among others, the indicators designed to monitor the implementation of the Millennium Development Goals (MDGs) (UNGA, 2000), the broad set of Sustainable Development (SD) indicators developed under the aegis of the UN (2006), or efforts to ensure the system of national accounts reflects development concerns beyond the GDP (Coyle, 2014). MDG indicators have become important for regular reporting of progress and evaluating performance. Indicators have also been developed for a range of other global goals and targets, such as those under various multilateral environmental agreements (MEAs), such as the Aichi Biodiversity Targets under the Convention on Biological Diversity or the phase-out targets of the Montreal Protocol on Substances that Deplete the Ozone Layer.

In order to translate SDGs and related quantitative targets into concrete policies and actions, progress must be regularly tracked through appropriate monitoring, reporting and verification systems (MRV), with indicators at the core. SDG indicators are expected to inform policy-making by improving the understanding of relevant trends, by raising awareness about the importance of the underlying sustainability issues and by motivating action for improvement. Indicators for the SDGs, both at the global, and subsequently, at the national and sub-national levels, can build on existing measurement systems, but they have to be tailored to the context of the SDGs and agreed targets. While indicators that match global goals have been developed before, the fact that the SDGs will be universally applicable to both developed and developing countries, mean that they will cover a broader range of sustainability issues and are expected to be under stricter scrutiny than earlier similar indicators. These facts show the scale and nature of the challenge.

Recognising that indicator selection should be an integral part of the SDG process, statistical agencies were involved in the post-2015 process from a very early stage. The UN Statistical Division (UNSD), in particular, issued methodological notes for each thematic area covered by the Open Working Group (OWG) negotiations, in order to ensure that progress monitoring is properly considered throughout the goal setting process.

This report presents the results of *Part II* of the *Sustainable Development Goals and Indicators for a Small Planet* research project of the Asia-Europe Foundation (ASEF), launched under a mandate of the Asia-Europe Meeting (ASEM) to assist the development of a universal set of SDGs. *Part I* presented an iterative methodology to build global goals with both global and national priorities in mind. The work resulted in a set of 11 illustrative goals and sub-goals for 14 countries in the Asia-Pacific region and Europe. The selected countries were: Australia, Bangladesh, China, France, Germany, Hungary, India, Indonesia, Japan, Poland, Republic of Korea, Singapore, Sweden and Switzerland (Table 1: Pinter et al. 2014).

Table 1: The system of 10+1 illustrative SDGs developed in the project for the 14 countries of the Small Planet (Pinter et al. 2014)

Priority Themes	Goal statements	Sub-Goal Statements
1. Poverty and inequality	Poverty and inequality are reduced.	<p>1.1 Intra- and intergenerational social equity for all groups (e.g., women, youth, elderly, indigenous, minorities) is improved.</p> <p>1.2 Everybody is above the national poverty line in 2015 by 2030.</p> <p>1.3 Income inequality and risk of poverty has been significantly reduced with social security system in place.</p>
2. Health and population	Population is stabilised and universal access to basic health services is provided.	<p>2.1 Prevention and healthy lifestyles have significantly contributed to increased healthy life years.</p> <p>2.2 The ratio of active/dependent population has been stabilised.</p> <p>2.3 Affordable and accessible healthcare and insurance are provided, including pre-natal and reproductive care and education.</p> <p>2.4 There is universal access to sanitation and hygiene services.</p> <p>2.5 Demographic changes do not pose a risk to the integrity of natural ecosystems and societies.</p>
3. Education and learning	Education is a major contributor to sustainability transformation.	<p>3.1 Quality primary education and increased access to secondary education for all segments of society and opportunities for lifelong learning are provided.</p> <p>3.2 Skills and societal demands are properly matched throughout all types of qualification.</p> <p>3.3 Awareness and know-how about sustainable development is integrated in curricula and has significantly increased.</p>
4. Quality of growth and employment	Economic growth is environmentally sound and contributes to social well-being.	<p>4.1 Economic growth ensures an acceptable employment rate and decent jobs, and is environmentally sound.</p> <p>4.2 Appropriate financial, monetary and fiscal policies that support macroeconomic stability and resilience are in place.</p> <p>4.3 Social and environmental accounts are in use by all governments, major companies and international institutions.</p> <p>4.4 Externalities are internalised through economic instruments in all sectors.</p>

5. Settlements, infrastructure and transport	Settlements and their infrastructure are liveable, green and well-managed.	<p>5.1 All people have a home and access to basic infrastructure and services.</p> <p>5.2 Urban planning provides liveable cities with clean air and efficient use of land and resources.</p> <p>5.3 Major infrastructure development does not impose risk to the integrity of natural ecosystems and society, and the modal share of environmentally-friendly transport has been increased.</p>
6. SCP and economic sectors	Resource-efficient and environmentally-friendly production and consumption characterise all economic sectors.	<p>6.1 Principles and practices of sustainable lifestyles are applied by the majority of the population.</p> <p>6.2 Culturally and environmentally friendly, responsible, low-impact tourism has become dominant.</p> <p>6.3 Investment and innovation for green and circular economy has been significantly increased.</p> <p>6.4 The increase of waste and pollutants in the environment has been significantly slowed and resource efficiency has been increased.</p>
7. Food security, sustainable agriculture and fisheries	Sustainable agriculture, food security and universal nutrition are achieved.	<p>7.1 Access to affordable, nutritious and healthy foods at sufficiency levels (tackling hunger and obesity and avoiding food waste) is ensured.</p> <p>7.2 Productivity is increased via accelerated conversion to sustainable agriculture, fisheries and forestry.</p> <p>7.3 Effective land-use planning and management are in place and assure equitable access to land.</p> <p>7.4 The quantity and quality of agro-ecosystems are maintained without destroying natural ecosystems.</p>
8. Energy and climate change	Climate change is effectively addressed while access to clean and sustainable energy is significantly improved.	<p>8.1 Everyone has access to sufficient energy and consumption is efficient and sustainable.</p> <p>8.2 The generation of clean and sustainable renewables has increased.</p> <p>8.3 The rate of GHG concentration increases in the atmosphere has been reduced.</p>
9. Water availability and access	Safe and affordable water is provided for all and the integrity of the water cycle is ensured.	<p>9.1 Water consumption of households and all economic sectors is efficient and sustainable.</p> <p>9.2 Infrastructure is available and well-maintained to ensure a sufficient and safe water supply.</p> <p>9.3 The integrity of the water cycle has been achieved through widespread adoption of integrated water resources management.</p>

10. Biodiversity and ecosystems	Part I presented an iterative methodology to build global goals with both global and national priorities in mind.	<p>10.1 A sufficient proportion of all major biomes is under adequate protection.</p> <p>10.2 The rate of extinction of natural and cultivated species has been halted and is on course towards a trend reversal.</p> <p>10.3 All types of natural habitats exist in a quantity and quality sufficient for their healthy functioning.</p>
11. Adaptive governance and means of implementation	Adequate structures and mechanisms are in place to support the implementation of the priorities underlying the SDGs at all levels.	<p>11.1 Long-term integrated visions of sustainable development are developed to guide physical, thematic and sectoral plans.</p> <p>11.2 A sustainable development cooperation framework at the international level is well established.</p> <p>11.3 Policies and plans are co-ordinated to integrate SDGs into decision-making and implementation.</p> <p>11.4 Progress towards the SDGs is tracked, and the relevant information is accessible to all and reviewed on a regular basis.</p> <p>11.5 Illicit flows of money and goods, tax evasion, bribery and corruption are reduced.</p> <p>11.6 The impact of disasters on people and property has been sharply reduced.</p>

Part I concluded by emphasising the crucial issue of the effective monitoring and communication of progress towards goals and sub-goals. The report highlighted the importance of choosing appropriate indicators for the 11 goals and building on earlier designs. It suggested the development of dashboards and sustainable development indicator systems that make use of new information technologies and capitalise on advances in data collection, analysis and presentation methods. As a step towards the development of indicators, data availability for possible indicators for all 11 SDGs in the 14 countries covered was assessed and made available as an insert to the report.

The present *Part II* offers a set of indicators for each goal and sub-goal suggested in *Part I* that can be used to assess the status and monitor the progress towards the goals and sub-goals. Indicator selection is based on an extensive assessment of existing indicators in the 14 countries, but global considerations are also taken into account, in cases where country experience was insufficient. While data availability was an important criterion, indicator selection was not data-driven; it was driven primarily by the underlying substantive issue of any given goal and target. The indicators attached to the 11 *Small Planet* goals both show how countries can make use of their existing monitoring and statistical data collection system when selecting indicators for SDGs relevant for them. It can also help identify areas where existing information and capacities need to be strengthened. Although the focus of the study is the ASEM member countries, the process and resulting indicators also offer a contribution to the global SDG process and to other countries as they begin to contemplate the implementation of SDGs relevant for them.

2. METHODOLOGY

SDGs at the global level are developed in negotiations by UN Member States, with each country taking their national sustainability priorities into account. Recognising the importance of cross-scale linkages as one of its key and unique elements for its *Part I* report, ASEF's SDG process adopted an innovative iterative approach, integrating global-national perspectives to define the SDGs. With this, the selection of global goals was informed by existing national priorities in relevant strategies and integrated development plans (Figure 1).

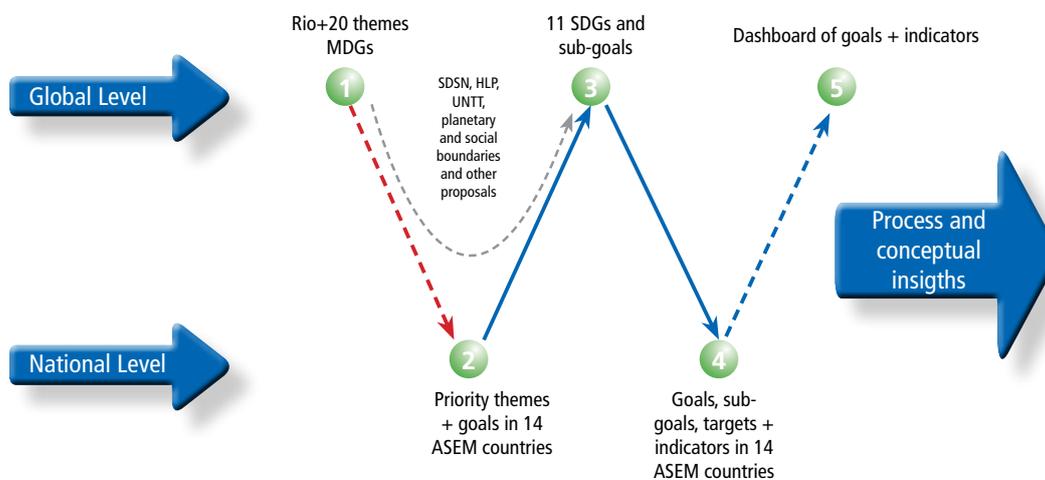


Figure 1: The iterative approach to integrated global-national perspectives in SDG selection (Source: Pinter et al. 2014)

The current *Part II* report follows this iterative approach. It selects indicators from the *Small Planet* country indicator collection included as an annex in *Part I*. In addition, it adds indicators from other suitable sources where the indicators identified in the 14 countries do not sufficiently cover a given sub-goal. The list of major reviewed additional indicator sets is included in the bibliography of this document. In addition, for a few specific issues that have not yet been widely measured, research papers were studied to identify potential indicators that can be developed in the future.

In most cases three indicators were identified for each sub-goal, and where applicable, the indicators were chosen to cover the social, economic and environmental dimensions of sustainable development.

In all cases, indicator selection is informed by higher-level principles related to sustainable development measurement and assessment, such as BellagioSTAMP (IISD 2014) and selection criteria. The most important indicator selection criteria included the following:

- Relevance: is the indicator substantively related to the goal and target?
- Sensitivity: are changes in the issue underlying the goal and target reflected in a corresponding change of the indicator?
- Clarity: is the indicator easy to communicate and intuitive to comprehend for a non-expert audience?
- Data availability: is there access to good quality data with adequate coverage?
- Cost: is the cost of data for the indicator acceptable?
- Scientific and technical credibility: is the indicator sound and supported on scientific and technical grounds?

While indicator selection followed the iterative approach for SDG development, there were some differences due to the starting point on goals and the emphasis on indicators. First, the indicators available for national SD monitoring were reviewed and categorised under the *Small Planet* goals and sub-goals. Secondly, prominent international measurement efforts were reviewed to identify additional indicators applicable for monitoring the *Small Planet* goals and sub-goals. As a third step, the collection of all applicable indicators from national and international sources was distilled down to a few – typically three – which were deemed to best describe each of the sub-goals. Robustness of the measurement methodology and data availability was taken into consideration where such information was available and therefore influenced the selection of indicators.

The following section presents indicators by *Small Planet* goals and sub-goals. After each sub-goal, there is a short discussion of the pros and cons of the proposed indicators. A more detailed description of each suggested indicator is presented in Annex 1. Chapter 4 presents concluding thoughts regarding the process of indicators selection and the applicability of the selected indicators.

3. INDICATORS FOR ILLUSTRATIVE SDGS IN 14 SMALL PLANET COUNTRIES

Goal 1: Poverty and inequality

Goal 1 is aimed at reducing poverty and inequality and includes three sub-goals, as follows:

Box 1: Sub-goals under Goal 1, poverty and inequality

- 1.1 Intra and inter-generational social equity for all groups (e.g. women, youth, elderly, indigenous, minorities) is improved
- 1.2 Everybody is above the national poverty line in 2015 by 2030
- 1.3 Income inequality and risk of poverty has been significantly reduced with social security system in place

1.1 Intra and inter-generational social equity indicators for all groups (e.g., women, youth, elderly, indigenous, minorities)

A wide variety of indicators were identified under sub-goal 1.1 in the *Small Planet* countries. Indicators covered the themes of women’s empowerment, employment of disabled people and older generations as well as participation in social activities, crime and safety measures. It was observed that most of the indicators were only applied in a very limited number of countries, the exception being gender pay gap and senior employment rate indicators, which were considered by many of the more developed countries. In addition, indicators for monitoring inter-generational social equity have not been identified.

Since the *Small Planet* countries only monitored certain aspects of social equity, we suggest considering alternative measures for this sub-goal, which are developed by international organisations, such as the World Bank’s Human Opportunity Index (HOI) and UNDP’s Inequality Adjusted Human Development Index (IHDI) or by non-governmental organisations, as the Global Footprint Network’s bio-capacity indicator. These indices cover a wide variety of social equity topics and therefore can better measure the multifaceted inequality problem. In addition, collection of these indicators seems more feasible via international organisations, since data for monitoring is usually collected via household surveys, which requires significant financial and human resources at the country level.

The HOI measures access of children to basic services and distribution of access under an equality principle, thus reflecting how personal circumstances influence a child’s probability to succeed in life. The IHDI reflects the actual level of human development by measuring countries’ current access to health, education and income and the inequality in the distribution of these (UNDP website). The bio-capacity indicator measures the Earth’s capacity to produce renewable resources, provide land for built-up areas and provide waste absorption services such as carbon uptake (Global Footprint Network website), thus it reflects the opportunity for humans to access a safe and healthy environment.

Table 2: Proposed indicators for sub-goal 1.1

SD dimension	Suggested indicators/indices	Source
Social	Human Opportunity Index (HOI)	World Bank
Economic	Inequality Adjusted Human Development Index (IHDI)	UNDP
Environmental	Overuse of available bio-capacity by the present generation	Global Footprint Network

For all three indicators, a key weakness is the aggregative nature of the measures, in that the indices are composed of several indicators, which are then aggregated into one single composite indicator, so-called index (OECD-EC JRC, 2008). While aggregation is useful to characterise complex themes like social equity, on the other hand, there is also a risk of over-aggregation, which can hide important aspects and dedicate too great a weight to less important issues.

The HOI index is in the early phase of development and data has only been collected for Latin America and the Caribbean. While the IHDI adjusts the Human Development Index (HDI) for inequality in the distribution in income, health and education services, it does not account for overlapping inequalities, in terms of whether the same person faces multidimensional deprivations (UNDP website). The Ecological Footprint only measures one key sustainability dimension, namely whether the Earth's ecosystems have sufficient regenerative capacity to sustain societal changes.

1.2 Everybody is above the national poverty line in 2015 by 2030

A relatively small number of indicators were found in the *Small Planet* countries for sub-goal 1.2. Less advanced and MDG countries use indicators for measuring the percentage of population above the absolute poverty lines (1 USD (PPP) per day). Several countries also considered a further improved version; the poverty-gap ratio, measuring the intensity of poverty by estimating the distance, on average, that the poor are below the poverty line. In more developed countries, poverty measures were linked to budget constraints, late payment of bills, consumption restrictions, housing difficulties, etc. The risk of falling into poverty was also considered by a few of the more advanced countries.

Since many of the countries have already introduced poverty indicators via the MDG process, statistical infrastructure for data collection and analysis is already well established. Thus, we suggest for the *Small Planet* SDIs, the poverty gap ratio (MDG 1.2) to measure the extent of poverty in the society. Another MDG indicator (1.3), for measuring the poorest quintile in national consumption, can be considered to cover the economic dimension of the issue. To provide a more comprehensive picture of this dimension as well as to better reflect the circumstances of developed countries, an indicator for measuring the 'Number of Households with Low Disposable Income' is also proposed for inclusion. This indicator gives an indication about the number of households, whose income for consumption (and savings) after taxes and social transfers are below a certain percentage of the median-adjusted income.

Table 3: Proposed indicators for sub-goal 1.2

SD dimension	Suggested indicators/indices	Source
Social	Poverty gap ratio	MDG 1.2
Economic	Share of poorest quintile in national consumption	MDG 1.3
	Number of households with Low Disposable (Adjusted) Household Income	EU, OECD
Environmental	Not applicable	

Although poverty indicators are extensively applied in developing countries for measuring the share of people in absolute poverty, we found that poverty measures in developed countries are less apparent. This means that there is little consensus about available indicators for measuring poverty in these countries and therefore these indicators are methodologically less robust and due to their limited datasets, not adequate for global comparison.

Number of households with Low Disposable (Adjusted) Household Income includes social transfers and therefore gives a better indication about the real income for consumption (Canberra Group, 2011) but does not reflect monthly non-discretionary expenses (such as monthly rental or utilities costs) and therefore still gives a somewhat distorted picture. In France, an indicator is used for tackling this challenge 'Discretionary income poverty rates', which includes unavoidable expenses and then sets a relative poverty line at 60% of the median household income (Canberra Group, 2011). Since the list of non-discretionary expenses remains under discussion, we suggest the indicator, tracking the number of households with low-disposable household income, as the best available measure in use.

The environmental dimension is not applicable for this topic.

1.3 Income inequality and risk of poverty has been significantly reduced with social security system in place

Various indicators were identified in the *Small Planet* countries for measuring revenue inequalities, the level and the growth of income and wages, household debts and the risk of poverty. These measures were mostly revealed in European countries and Australia. A relatively fewer number of indicators (primarily in the studied Asian countries) were found related to social security systems.

For this sub-goal, two indicators are proposed. Many of the studied countries also use these indicators. The 'at-risk-poverty ratio' was originally developed by the Statistical Office of the European Union (Eurostat) and is extensively used by the European *Small Planet* countries. The Gini-coefficient measures the inequality of income distribution and is used by many of the more advanced *Small Planet* countries. To monitor the social security system we suggest using an International Labour Organisation (ILO) indicator, measuring the number of branches¹ covered by a statutory social security programme (ranging from only one branch to a comprehensive system including eight branches) (ILO, 2012).

Table 4: Proposed indicators for sub-goal 1.3

SD dimension	Suggested indicators/indices	Source
Social	At-risk-of poverty rate after social transfers	EU SDI
Economic	Gini-coefficient level	<i>Small Planet</i> countries
	Number of branches covered by a statutory social security programme	ILO
Environmental	Not applicable	

The Gini-coefficient is a widely used indicator as it is simple ratio measure, independent from the size of the economy and the population of a certain country. The main strengths of this measure is also its main weakness, since it tends to oversimplify the income inequality problem (Cobham and Sumner, 2013). It disregards the absolute value of national and personal income and therefore, the wealthy nation can seem more unequal than a poorer country.

To address these weaknesses, the Palma-measure suggests the ratio of the income of the top 10% to the bottom 40%. While there is no consensus on which measure is better for assessing income inequality tendencies, for the *Small Planet* set suggest the application of the Gini-index as it is commonly used and data is more widely available. In the longer-term, an additional solution to address the recognised weaknesses of the Gini-index could be to consider and compare the results of the both measures, especially in case of contradictory results (Cobham and Sumner, 2013).

Similar to sub-goal 1.2, the environmental dimension is not applicable for this topic.

¹ The ILO defines nine principal insurance branches of social security, namely medical care, sickness, unemployment, old age, employment injury, family, maternity, invalidity and survivors' benefits.

Goal 2: Health and population

Goal 2 aims to stabilise population and ensure universal access to basic health services is provided. It consists of five sub-goals as presented in the box below:

Box 2: Sub-goals under goal 2, Health and Population

- 2.1 Prevention and healthy lifestyles have significantly contributed to increased healthy life years
- 2.2 The ratio of active/dependent population has been stabilised
- 2.3 Affordable and accessible healthcare and insurance are provided including pre-natal and reproductive care and education
- 2.4 There is universal access to sanitation and hygiene services
- 2.5 Demographic changes do not pose a risk to the integrity of natural ecosystems and societies

2.1 Prevention and healthy lifestyles have significantly contributed to increased healthy life years

Under sub-goal 2.1 ‘the life expectancy years at birth indicator’ is measured by almost all *Small Planet* countries. In addition, a few of the more advanced countries use indicators measuring health status and death rates linked to different causes. For the *Small Planet* SDI, we advance the life expectancy at birth indicator. In addition, we recommend the HALE index (health adjusted life expectancy), as developed by the World Health Organisation (WHO). This indicator is used to estimate the average number of years that a person can expect to live in ‘full health’ without disease and/or injury. It indicates the number of years for which a person can be expected to remain an economically active member of the society. In addition, it assesses the performance of the health care system and indicates whether the necessary preventive measures are introduced to reduce the spread of diseases and unhealthy consumption and lifestyle patterns, such as smoking or alcohol consumption. To measure the impacts of environmental pollution on life expectancy, the Environmental Burden of Disease (EBD) indicator is included. The EBD was introduced by WHO as a disability adjusted life years (DALY) indicator, which measures the average number of healthy life years lost in a population due to premature mortality (Prüss-Üstün, 2003). Thus, the EBD accounts for the effects of water and air pollution and several communicable diseases on premature mortality.

Table 5: Proposed indicators for the sub-goals 2.1

SD dimension	Suggested indicators/indices	Source
Social	Life expectancy at birth	WHO
Economic	Health adjusted life expectancy (HALE)	WHO
Environmental	Environmental Burden of Disease – Disability-adjusted Life Years (EBD - DALY)	WHO

In the case of both the simple and the health-adjusted life expectancy indicators, the main challenge is the availability of mortality data in developing countries. As for the EBD indicator, data is not calculated regularly (the last global available dataset is from 2004). Nevertheless, we recommend the EBD as it can reveal the health impact of different (major) environmental risks and therefore can monitor the success of environmental exposure reduction policies (Hänninen et al, 2014).

2.2 The ratio of active/dependent population has been stabilised

Only a limited number of indicators were identified from the studied countries for sub-goal 2.2. These measures related to present and expected dependency ratios as well as population age profiles. For the *Small Planet* SDI set, we include the so-called 'demographic burden' indicator, which measures the percentage of the young and elderly population as indicator for required changes in social services and the dependency ratio, which gives an indication of the economic burden on the working age population.

Table 6: Proposed indicators for the sub-goals 2.2

SD dimension	Suggested indicators/indices	Source
Social	Share of the population below the age 15 and above the age 65 years	UN DESA
Economic	Dependency ratio	UN DESA
Environmental	Not applicable	

The weakness of the two above suggested indicators (age profiling and the dependency ratio) is that they automatically suppose that the people aged more than 15 become active and people above 65 become dependent. Therefore, it is suggested by the UN STAT to consider direct estimates of net producers and net consumers for a more precise analysis of economic dependency. However, these are rarely available and therefore are not suggested for the *Small Planet* SDI set.

The environmental dimension was not applicable for this sub-goal.

2.3 Affordable and accessible healthcare and insurance are provided including pre-natal and reproductive care and education

For sub-goal 2.3, the *Small Planet* countries identified indicators related to pre-natal and reproductive care and education, as well as to health care spending, facilities and services. For the *Small Planet* SDI, we included the maternal and infant mortality rates, which are used by the *Small Planet* countries but also MDG indicators (MDG 4.1, 4.2 and 5.1). In addition, to cover the economic aspects of health care, two indicators are recommended. The first, which is developed and gathered by the ILO, is the percentage of the population covered by law-ensured health care. The second, to measure the affordability aspects of healthcare is the WHO indicator 'proportion of out-of-pocket payments to total health expenditure'. These two indicators are recommended by the ILO to measure the availability and the affordability of healthcare services (ILO, 2012).

Table 7: Proposed indicators for the sub-goal 2.3

SD dimension	Suggested indicators/indices	Source
Social	Maternal mortality rate	MDG 5.1
	Child mortality rate (under age 5)	MDG 4.2
Economic	Percentage of population with health care protection ensured by the law	ILO
	Proportion of out-of-pocket payments to total health expenditure	WHO
Environmental	Not applicable	

Altogether, nine indicators measure the progress towards MDG Goal 4 and 5 for reduced child mortality and improved maternal health. Although all of these indicators are important, for the *Small Planet* SDI set we recommend two of these as headline indicators, measuring the outcomes of policies targeting these areas and the quality of health care services.

There are several ongoing international efforts - WHO (2013), ILO (2012), OECD (2012) - to measure the effective coverage of health care services and thus the quality of the services, but the availability of such data is limited both at the global and the national level (ILO, 2012). The self-reported 'unmet needs for healthcare services' indicator, developed by the EU-SILC project, can give an indication about the effectiveness of access, but due to cultural differences it is not suggested for international comparisons (EC, 2009).

2.4 There is universal access to sanitation and hygiene services

Small Planet countries mostly consider the social dimension of the sub-goal 2.4, universal access to sanitation and hygiene services. They use indicators for measuring the share of population with access to sanitation services and the number of facilities which provide the services. We include the first one in the *Small Planet* SDI set, since this indicator is globally measured and is also an MDG indicator (7.9). In addition, to cover the economic aspects of the issue, we recommend the World Bank indicator ‘water and sanitation charges as percentage of various household income groups’. An important indicator of the quality of the services is the number of *Escherichia coli* (E.coli) bacteria in drinking water, which apart from its obvious health impacts, also has harmful effects on the environment and the health of the eco-system.

Table 8: Proposed indicators for the sub-goal 2.4

SD dimension	Suggested indicators/indices	Source
Social	Percentage of population with access to improved sanitation facilities	MDG 7.9
Economic	Water and sanitation charges as percentage of various household income groups	World Bank
Environmental	E. coli in drinking water	US EPA

While there are numerous indicators to measure microbial water quality, the above-suggested E.coli is considered as the preferred and most reliable and most affordable indicator for the detection of faecal contamination (Odonkor and Ampofo, 2013).

2.5 Demographic changes do not pose a risk to the integrity of natural ecosystems and societies

To measure the pressure of demographic changes on the integrity of natural ecosystems and societies, *Small Planet* countries use indicators for population changes, fertility rates, population density in different territories and migration patterns under sub-goal 2.5. In the *Small Planet* SDI set, the fertility rate indicates the direction of changing social patterns and thus projects the direction of future demographic changes. The net migration rate shows the difference between immigrants and out-migrants in a particular area and describes demographic redistribution of the population influenced by various events, i.e. loss of livelihood, labour migration (UN, 2006). Lastly, the density of population measures whether pressure on the ecosystem resources is increasing or decreasing.

Table 9: Proposed indicators for the sub-goal 2.5

SD dimension	Suggested indicators/indices	Source
Social	Fertility rate	UN SDI
Economic	Net migration	UN DESIPA
Environmental	Population density	UN STAT

These indicators have well-established data collection methodologies and procedures and gathered by the UN DESA. Although data limitations exist, these are not significant. The definition of migration differs between countries, so calculation differences might also exist. In addition, illegal migration is not considered. The population density indicators can be distorting in circumstances where a country has large unpopulated areas and therefore disaggregation at regional level should be considered here.

Goal 3: Education and learning

Education and learning plays a major role in sustainability transformation and as a *Small Planet* goal it encompasses three sub-goals:

Box 3: Sub-goals under goal 3, Education and learning

- 3.1 Quality primary education and increased access to secondary education for all segments of society and opportunities for lifelong learning are provided
- 3.2 Skills and societal demands are properly matched throughout all types of qualification
- 3.3 Awareness and know-how about sustainable development is integrated in curricula and has significantly increased

3.1 Quality primary education and increased access to secondary education for all segments of society and opportunities for lifelong learning are provided

The *Small Planet* countries considered indicators covering different themes for sub-goal 3.1. Apart from measuring the percentage and the length of school enrolment and drop-outs, indicators related to the quality and the infrastructure of education and access to higher education and life-long learning were also identified. To measure progress towards this sub-goal, we include three indicators in the SDI set that are also widely used by the studied countries. The enrolment rate (MDG Indicator 2.1) is suggested to characterize the universality of the access to education. The education attainment indicator (UNESCO) can provide an insight into the length and quality of education by measuring the overall qualification of the society. The 'graduation indicator', the proportion of pupils starting grade 1 who reach last grade of primary (MDG Indicator 2.2), is a good indicator for presenting economic aspects of the sub-goal. In the short term, students who drop out are more likely to face unemployment and/or hold precarious and low-paid jobs. In the long-term, they have a higher social and economic cost, for example a higher demand on the health care system and welfare payments and lower productivity and lower tax revenues (Dale, 2010). Within the framework of the UN Decade of Education for Sustainable Development (ESD), a few *Small Planet* countries monitored whether education programmes for sustainable development have been introduced in the curricula and we recommend this indicator for the *Small Planet* SDI set.

Table 10: Proposed indicators for the sub-goal 3.1

SD dimension	Suggested indicators/indices	Source
Social	Net enrolment rate	MDG indicator 2.1
	Educational attainment, by highest qualification	Eurostat and UNESCO Institute for Statistics
Economic	Proportion of pupils starting grade 1 who reach last grade of primary	MDG Indicator 2.2
Environmental	Development and introduction of education programme for sustainable development	<i>Small Planet</i> countries

The net enrolment and the graduation rate indicators are widely used and their methodology is accepted for cross-country comparison. Data availability may be limited for the education attainment indicator and the differences in education systems among countries should also be taken into consideration.

Various initiatives exist to develop indicators for monitoring Education for Sustainable Development (Tilbury and Janousek, 2006). These initiatives mostly suggest indicators that are qualitative in nature, monitoring the existence of education frameworks and programmes and the available resources and teacher capacities. Due to the lack of widely used quantitative indicators, we advise the use of the indicator measuring whether ESD programmes are introduced in a country, although more appropriate indicators are likely to be developed in the future.

3.2 Skills and societal demands are properly matched throughout all types of qualifications

The coverage of sub-goal 3.2 indicators was rather low in the *Small Planet* countries, suggesting a lack of general capacity in measuring how well the changing job qualification needs are reflected throughout the different levels of education. The ILO Skills Mismatch Indicator reflects the extent to which employment skills match the job demands by calculating the differences between unemployment rates by level of educational attainment (ILO, 2011). In addition, the ratio of youth unemployment can be a direct indicator for measuring the success of education programmes in preparing the youth for entering the job market. While skills are the result of the past and existing educational system, economic entities as well as public institutions can reduce the skills mismatch gap and youth unemployment with appropriate training and life-long education. Thus, the percentage of those adults who participated in a four weeks of training and education can give an indication of efforts targeting life-long learning to improve the employments' skills for constantly changing job requirements.

Table 11: Proposed indicators for the sub-goal 3.2

SD dimension	Suggested indicators/indices	Source
Social	Skills mismatch	ILO
	Proportion of young people unemployed between the ages of 16–25	UNESCO Institute for Statistics
Economic	Participation rate in education and training above 25	Eurostat
Environmental	Not applicable	

While the above suggested three indicators can sufficiently describe the sub-goal, data is not yet available for all countries. In addition, the methodology of the 'skills mismatch' indicator has limitations for country comparability, as noted by ILO (2012). The environmental dimension of the issue could be described with the 'number of green jobs' but we included this indicator under goal 4. At the same time, no indicator was found to measure the match of skills and demands in relation to green jobs.

3.3 Awareness and know-how about sustainable development is integrated in curricula and has significantly increased

The *Small Planet* countries also struggled to measure the extent to which the principles and the know-how of sustainable development are integrated into the curricula and very few indicators were identified. As for the *Small Planet* SDI, we suggest that to assess the knowledge of households on the notion of sustainable development (an indicator identified in France). In addition, the prioritisation and ranking of environmental problems (measured by the PEW Global Survey) can indicate how well the society understands the needs for keeping socio-economic development within the boundaries of the eco-system. To give an indication about the number of those future employees who will have higher capacity to contribute to sustainable development and who can take on green jobs, the number of tertiary graduates in science and technology per 1000 inhabitants (Eurostat) can be measured.

Table 12: Proposed indicators for sub-goal 3.3

SD dimension	Suggested indicators/indices	Source
Social	Public awareness of the notion of sustainable development	France
Economic	Share of tertiary enrolments and graduates at technical and natural sciences faculties in the total number of students (%)	Eurostat
Environmental	Prioritisation of environmental problems	PEW Global Survey

Refined and globally accepted data collection and assessment methodology do not exist for the indicator on measuring ‘the public awareness on the notion of sustainable development’; therefore, the indicator may be criticised for the lack of scientific soundness. Nevertheless, we suggest this indicator for the *Small Planet* SDI, as it can give an initial assessment of societal awareness. Furthermore, additional insights into the issue can be gained by disaggregation of the results by age and education groups. The PEW Global Survey ‘prioritisation of environmental problems’ indicator is also subjective and lacking in robust data collection methods, but can be a powerful indicator of general societal attitudes towards environmental problems. The enrolment rates in tertiary education per faculties is monitored by UNESCO and therefore data for students at technical and natural sciences faculties can be identified for most countries.

Goal 4: Quality of growth and employment

The aim of goal 4 is to ensure that economic growth is environmentally sound and contributes to social well-being. For this purpose, four sub-goals were defined:

Box 4: Sub-goals under goal 4, Quality of Growth

- 4.1 Economic growth ensures an acceptable employment rate and decent jobs, and is environmentally sound
- 4.2 Appropriate financial, monetary and fiscal policies that support macroeconomic stability and resilience are in place
- 4.3 Social and environmental accounts are in use by all governments, major companies and international institutions
- 4.4 Externalities are internalised through economic instruments in all sectors

4.1 Economic growth ensures an acceptable employment rate and decent jobs, and is environmentally-sound

Small Planet countries identified a wide-range of indicators for sub-goal 4.1, including those that measure general and sectoral employment trends, employment conditions, the situation of specific and/or disadvantaged groups and the economic contribution of labour. For the *Small Planet* SDI set, the MDG indicators, employment-to-population ratio (1.5) and the proportion of own-account and contributing family workers (1.7) are used. These two indicators together sufficiently monitor the economically active population and indicate the share of the more vulnerable employment within the total employment, especially if disaggregated and regularly assessed over time (UN 2006). The 'labour productivity per working hours' indicator is an important measure of economic performance as it showcases developments in human capital and work efficiency. Lastly, the number of green jobs in eco-industry sectors indicator, monitored in various *Small Planet* countries, including France, Germany, Republic of Korea and Sweden, reveals employment trends in the field of environmental and resource management and therefore assesses the environmental sustainability of labour policies.

Table 13: Proposed indicators for sub-goal 4.1

SD dimension	Suggested indicators/indices	Source
Social	Employment-to-population ratio	MDG 1.5
	Proportion of own-account and contributing family workers in total employment	MDG 1.7
Economic	Labour productivity as per working hours	ILO
Environmental	Number of green jobs in eco-industries	<i>Small Planet</i> countries

Methodology and data collection is well-established for the employment-to-population ratio, while data gaps and calculation differences might exist in case of the own-account and family workers. The methodology of the labour productivity indicator is also well established and used by most of the countries, however there may be certain limitations in terms of cross-country and historical comparison due to variances in output, employment and working hours estimates (UN, 2006).

While the number of green jobs indicator is an important and useful one, it lacks a systematic and internationally agreed definition, data collection and an assessment method. Further work will be needed to harmonise existing approaches.

4.2 Appropriate financial, monetary and fiscal policies that support macroeconomic stability and resilience are in place

All studied countries considered various indicators for sub-goal 4.2 to measure their economic performance, including GDP/GNI indicators, fiscal, monetary, government spending and public debt measures. Almost all of these are traditional indicators, recommended by international financial and monetary institutions. As for the *Small Planet* SDI set, we recommend three indicators, which together sufficiently describe the sub-goal.

The first is the Consumer Price Index (CPI), which reflects price changes related to living costs, by monitoring the average price of a variety of consumer goods. This index is useful in monitoring inflation, price stability and can be used as national account deflators (UN, 2009). The second is the World Bank's public (or government) debt ratio to Gross Domestic Product (GDP), which is suggested as an indicator assessing the level of long-term financial burden on the society as well as indicating the self-financing capacity of a specific country. The 'adjusted net savings' indicator is included in the set to measure the real national savings remaining after depletion of natural resources and damages caused by emissions are taken into consideration (UN, 2006). The original indicator measured by the World Bank, long-term investment and education expenditures, are also accounted, but we suggest measuring only the environment relevant components (including carbon dioxide damage, net forest depletion and mineral depletion).

Table 14: Proposed indicators for sub-goal 4.2

SD dimension	Suggested indicators/indices	Source
Social	Consumer Price Index	World Bank
Economic	Public debt to GDP	World Bank
Environmental	Adjusted net savings to GNI (including carbon dioxide damage, net forest depletion and mineral depletion)	World Bank

Although the authors of this paper do not reject the application of GDP/GNI indicators, these were deliberately excluded from the above list and replaced with indicators that are more meaningful. Indicators measuring economic growth are frequently over-emphasised, while other factors, ensuring long-term macro-economic stability, tend to be overlooked. The above list therefore consists of a few important 'beyond-GDP' indicators.

All three suggested indicators are collected by the World Bank. The Consumer Price Index is regularly calculated in most of the countries and is increasingly being used for international comparison (UN, 2009). The methodology is also well-established for the 'public debt' indicator, although the adequate level of public debt may differ for countries at different development levels. Out of three suggested indicators, the 'adjusted net savings' has the most methodological and data limitations due to gaps in natural resource and emissions cost accounting but these are expected to be further reduced by the World Bank over time.

4.3 Social and environmental accounts are in use by all governments, major companies and international institutions

Although the authors of the *Small Planet* country considered this topic highly important and dedicated a separate sub-goal for it in line with recommendations from the UN HLP (2013)², no *Small Planet* country introduced indicators to monitor the implementation and the use of social and environmental accounts. In addition, the authors could not identify relevant indicators in use by international or national organisations.

² Illustrative target 9.a Publish and use economic, social and environmental accounts in all governments and major companies

For the *Small Planet* SDI, we recommend three yet-to-be-developed, indicators to monitor companies and government activities. The first indicator is suggested to monitor whether a certain country regularly collects and publishes sustainable development indicators. This can give a general picture about the use of social and environmental accounts by governments. Secondly, since companies are powerful economic actors, it is important to measure whether they integrate social and environmental concerns in their accounting systems. For this purpose, we suggest an indicator, recommended by the UN SDSN (2014), to monitor the share of companies above a certain market value that publishes integrated reporting. To cover the environmental dimension of the sub-goal, in accordance with the UN SDSN suggestion, we recommend monitoring the status of implementation of the System of Environmental Accounting (SEEA) Central Framework. The United Nations Statistical Commission has adopted this framework as an international standard for environmental accounting in 2012 to assess the stocks and changes of environmental assets and their economic value (UN 2014).

Table 15: Proposed indicators for sub-goal 4.3

SD dimension	Suggested indicators/indices	Source
Social	Country regularly monitors and publishes sustainable development indicators	ASEF suggestion
Economic	Share of companies valued at more than [\$1 billion] that publish integrated reporting	UN SDSN suggestion, Indicator 90
Environmental	Country implements and reports on System of Environmental-Economic Accounting (SEEA) accounts	UN SDSN suggestion, Indicator 89

The suggested indicators have not been developed and tested yet. For instance, the range of companies that should publish integrated reporting is yet to be defined. In addition, the collection of sustainable development indicators and the implementation of the SEEA framework would be only semi-quantitative indicators and would not reflect the outcomes of implementation and monitoring.

4.4 Externalities are internalised through economic instruments in all sectors

Only a few of the studied countries considered indicators for sub-goal 4.4. These included the share of tax incomes on energy and environment-related issues. Since international organisations (UNEP, OECD) also recommended these, we suggest inclusion in the *Small Planet* SDI to cover the social and the environmental dimensions of the sub-goal. In addition, the Eurostat indicator, the ‘share of GDP dedicated to environmental protection expenditures’ is included to reflect the economic dimension of the sub-goal as it is a comprehensive measure accounting for relevant expenditures from public sector, industry and environmental service providers.

Table 16: Proposed indicators for sub-goal 4.4

SD dimension	Suggested indicators/indices	Source
Social and environmental	Share of environmental taxes	Eurostat, OECD
Economic	Share of GDP dedicated to environmental protection expenditures	Eurostat

The calculation of the environmental expenditures and environmental tax indicators have not yet been widely adopted and regularly collected outside the European Union and the OECD countries. Thus, in the short term, the availability of these indicators is limited in less advanced countries.

Goal 5: Settlements, infrastructure and transport

Goal 5, which aims to ensure liveable, green and well-managed settlements, infrastructure and transport systems, includes three sub-goals.

Box 5: Sub-goals under goal 5, Settlements, infrastructure and transport

- 5.1 All people have a home and access to basic infrastructure and services
- 5.2 Urban planning provides liveable cities with clean air and efficient use of land and resources
- 5.3 Major infrastructure development does not impose risk to the integrity of natural ecosystems and society, and the modal share of environmentally-friendly transport has been increased

5.1 All people have a home and access to basic infrastructure and services

For sub-goal 5.1, the *Small Planet* countries identified indicators related to housing (including supply, demand, affordability, living quality, etc.) and underlying infrastructure for waste treatment, roads and telecommunication. For the *Small Planet* SDI, we suggest two indicators to measure access to housing and basic infrastructure and services. The first is the 'number of homeless people as per 1000 or 100,000 people', which gives an indication of homelessness in general. In addition, the MDG Indicator (7.10) can indicate the percentage of urban population facing poor living conditions. As an economic indicator, the actual affordability of housing (UN HABITAT) is based on the ratio of median house price to the households' gross disposable income. Lastly, the percentage of buildings with sustainable building certification gives an indication of potential environmental impacts of housing and the trends in green building evolution.

Table 17: Proposed indicators for sub-goals 5.1

SD dimension	Suggested indicators/indices	Source
Social	Number of homeless people per 100 000	EU, Australia
	Proportion of urban population living in slums	MDG 7.10
Economic	Housing affordability indicator	UN HABITAT
Environmental	Percentage of buildings with sustainability certificates (i.e. LEED or BREEAM)	RICS

The number of homeless people has been monitored regularly in many countries (Australia, EU Member States)³, but comparability seems problematic due to differences in definitions and categorisations. The MDG 7.10 indicator has been collected in many developing countries to date and it can also be calculated for developed countries. The methodology of this indicator could be strengthened to assess the extent to which basic services are unavailable (UN, 2006). Data collection for the 'housing affordability' indicator is feasible and the UN HABITAT has already collected such data. The indicator also has methodological limitations that should be taken into consideration in country comparisons. Data on buildings with sustainability certificates has not yet been collected regularly, but one-time surveys have already been undertaken to measure this indicator, i.e. Royal Institution of Chartered Surveyors (RICS) in Europe (2013) or National Green Building Councils elsewhere.

5.2 Urban planning provides liveable cities with clean air and efficient use of land and resources

Under sub-goal 5.2, the studied countries use indicators to measure the rate of urbanisation, the level of air pollution and the effectiveness of the urban transportation system and the well-being of urban citizens. Since the liveability of a certain city depends on a variety of aspects (such as water and air quality, transportation and waste collection), we suggest the Green City Index of the Economist Intelligence Unit, which covers more than 120 major cities globally. Indoor and outdoor air pollution has major health impacts (WHO, 2014). Thus we suggest that the economic impacts of urbanisation (and resulting outdoor and indoor air pollution) is measured via the 'Global Burden of Asthma' that is calculated by the Global Initiative for Asthma. Lastly, a useful indicator for assessing the environmental consequences of urbanisation is the European Environment Agency (EEA) developed 'number of days when the air quality threshold values were exceeded'.

3 The UN United Nations Commission on Human Rights has also published homeless estimates in 2005.

Table 18: Proposed indicators for sub-goal 5.2

SD dimension	Suggested indicators/indices	Source
Social	Green City Index	Economist Intelligence Unit
Economic	Global Burden of Asthma	Global Initiative for Asthma
Environmental	Exceedance days of air quality threshold value	European Environmental Agency

The Green City Index is a highly aggregated measure and as explained previously, such aggregation has its methodological limitations. Nevertheless, this index seems methodologically robust and widely tested and therefore we recommend its application. The developers of the report also highlighted data challenges such as the lack of comparable datasets (Economist Intelligence Unit, 2012). The Global Burden of Asthma indicator is calculated for most of the countries (except in Africa), but as noted by the developers, it has methodological limitations, due to data collection techniques and these should be taken into consideration in case of country comparisons (Masoli, 2005). The European Environmental Agency (EEA) annually calculates the number of days when air quality threshold values were exceeded, and both the methodology and data set are well established (EEA website, 2014). However, for international comparisons, the threshold values need to be identical.

5.3 Major infrastructure development does not impose risk to the integrity of natural ecosystems and society, and the modal share of environmentally-friendly transport has been increased

For sub-goal 5.3, to measure the impacts of infrastructure and transport, the *Small Planet* countries considered the modal share transport indicators, with a special focus on public transportation, as well as physical and digital infrastructure indicators. Since they are widely used (not only by the studied countries) we recommend the modal share of passenger and freight transport to reflect the social and the economic dimensions of the sub-goal. The environmental dimension of this issue can be measured with an introduction of a GIS-based landscape disturbance index.

Table 19: Proposed indicators for sub-goal 5.3

SD dimension	Suggested indicators/indices	Source
Social	Modal split of passenger transport (private vehicles, buses, coaches, rail, air)	Eurostat
Economic	Modal split of goods transport	Eurostat
Environmental	Landscape disturbance index	Germany, Brandenburg

The accuracy and the international comparability of the modal split indicators are considered high. Data is available for the countries of the European Union, while data for other countries is collected by international transport agencies, such as the International Road Federation or the International Union of Railway. Generally, applicable methodology and data is yet to be developed for a landscape disturbance index. A good example is the spatial road disturbance index (SPROADI), which is based on a spatial assessment of road density and corresponding landscape fragmentation as well as traffic intensity. The indicator was tested and applied in Brandenburg, Germany (Freudenberger et al, 2013).

Goal 6: Sustainable Consumption and Production (SCP) and economic sectors

To ensure that all economic sectors are resource-efficient and are characterised by environmentally-friendly production and consumption, four sub-goal areas were identified:

Box 6: Sub-goals under goal 6, SCP and economic sectors

- 6.1 Principles and practices of sustainable lifestyles are applied by the majority of the population
- 6.2 Culturally and environmentally friendly, responsible, low-impact tourism has become dominant
- 6.3 Investment in innovation for green and circular economy has been significantly increased
- 6.4 The increase of waste and pollutants in the environment has been significantly slowed down and resource efficiency has been increased

6.1 Principles and practices of sustainable lifestyles are applied by the majority of the population

Sustainable Consumption and Production (SCP) is a widely discussed topic (especially in the developed countries) and is likely to have a prominent role in the post-2015 development agenda, either as a stand-alone goal or as a cross-cutting theme. In spite of these trends, very few indicators were identified for sub-goal 6.1 in the *Small Planet* countries. These measured household consumption patterns, including organic and healthy consumption patterns. For the *Small Planet* SDI, we suggest using indicators, which although not yet globally available, have already been tested and applied in a few countries. The first is the 'market volume of eco-labelled products', which can measure sustainability considerations in food consumption. The household expenditures can be used to assess the overall level of the consumption by consumption purposes. Lastly, the ecological footprint per capita indicator gives an indication of the environmental burden of individual consumption.

Table 20: Proposed indicators for sub-goal 6.1

SD dimension	Suggested indicators/indices	Source
Social	Sales volumes of organic products	Small Planet Countries
Economic	Household consumption by consumption purposes	EUROSTAT
Environmental	Ecological footprint per capita	Global Footprint Network

Statistical methodology is established and underlying data exist for the sales volume of organic products indicator in many countries. However, no global agency leads the data collection and thus the regular data updates and the comparability of country level data are both problematic. Although limitations exist, the methodology is relatively well-developed and data is regularly available for the household consumption indicator in the EU and the OECD countries, but it does not set a threshold for a sustainable level of consumption. The ideal indicator would be to measure the economic value of overconsumption as an indicator of an unsustainable lifestyle, but methodology for such an indicator is yet to be developed. The ecological footprint indicator has recognised methodological limitations, yet it is a useful measure to assess the environmental consumption of resource consumption. In addition, data is available for all countries via the Global Footprint Network.

6.2 Culturally and environmentally friendly, responsible, low-impact tourism has become dominant

Sub-goal 6.2 is challenging to measure as only a few *Small Planet* countries use indicators for this theme with existing indicators including the measurement of the economic contribution of tourism and the share of ecotourism districts. Within the framework of the European Tourism Indicator System Toolkit for Sustainable Destination (2013), the European Union developed a comprehensive set of indicators (including over 50 key and optional measures). Although many of the indicators are relevant for sub-goal 6.2, we selected three headline indicators that can together provide a general overview. The first indicator is the 'percentage of visitors who note that they are aware of destination sustainability efforts'. This gives an indication of the general trends of possible social and cultural impacts of tourism in destination areas. The percentage of tourism enterprises actively taking steps to source local, sustainable, and fair trade goods and services can measure the extent of local fair trade business connections in tourism-related goods and service supply. Lastly, the environmental dimension of the sub-goal can be described by the percentage of enterprises/establishments in the destination using a voluntary verified certification/labelling.

Table 21: Proposed indicators for sub-goal 6.2

SD dimension	Suggested indicators/indices	Source
Social	The percentage of visitors who note that they are aware of destination sustainability efforts	Eurostat
Economic	Percentage of tourism enterprises actively taking steps to source local, sustainable, and fair trade goods and services	Eurostat
Environmental	Percentage of tourism enterprises/establishments in the destination using a voluntary verified certification/labelling for environmental/quality/sustainability and/or CSR measures	Eurostat

The indicators for the European Tourism Indicators System are collected via questionnaires; however, the data collection is still in the pilot phase (EU, 2013). Thus, methodological and data limitations have not been assessed extensively.

6.3 Investment in innovation for green and circular economy has been significantly increased

A relatively higher number of indicators were identified under sub-goal 6.3 in the *Small Planet* countries in both the European and the Asia-Pacific region. Indicators measured investment in physical and human infrastructure for R&D activities, as well as the outcomes of related investments. For the *Small Planet* SDI set, the share of human resources in science and technology and the total expenditure in R&D can give a good indication of the social and economic investments in development of green and circular economy, while the number of green patents can indicate the outcomes of the innovation efforts.

Table 22: Proposed indicators for sub-goal 6.3

SD dimension	Suggested indicators/indices	Source
Social	Human resources in science and technology	Eurostat and OECD
Economic	Total R&D expenditure (in relation to GDP)	UNESCO
Environmental	Number of green patents	OECD

The above suggested indicators are relatively widely used and measured, although the first and the third only by more advanced countries (Eurostat and OECD). The main methodological limitation is that the above-suggested indicators focus more on the input side of innovation, rather than on the results side. A number of such innovative indicators were identified in Hungary for the National Environmental Technology and Innovation Strategy, including indicators measuring the effects on innovation on reducing environmental pollution and improving material and energy efficiency. However, it was not clear how it could be measured.

6.4 The increase of waste and pollutants in the environment has been significantly slowed down and resource efficiency has been increased

For sub-goal 6.4, *Small Planet* countries extensively measured resource productivity and material intensity as well as waste production and treatment. The 'per capita municipal waste' indicator, which is measured by several of the more advanced *Small Planet* countries, can give an indication of the level of waste produced by each individual at an average level and can indicate how efficient society is in waste treatment (EEA website, 2014). The resource productivity ratio, which is a headline indicator of the European Union Sustainable Development Strategy (EU SDS), shows the effectiveness with which different materials were used for production. The trends of the Persistent Organic Pollutant (POP) emissions levels can reflect the environmental pressure from pollution.

Table 23: Proposed indicators for sub-goal 6.4

SD dimension	Suggested indicators/indices	Source
Social	Municipal solid waste generation per capita	Eurostat
Economic	Resource productivity	Eurostat
Environmental	Persistent Organic Pollutant (POP) emissions trends	UNECE, EEA

Data for the three above indicators is widely available, but mostly in more advanced countries (such as EU and OECD). The data collection methodology for the municipal waste indicator is well-established and applied. The calculation of the resource productivity indicator has some accuracy and comparability limitations as the calculation of domestic material consumption is based on statistical data from Economy-wide Material Flow Accounts, which may be subject to modifications over time (Eurostat website, 2014). For the POP indicator, methodology for the emissions trends can be monitored and compared, since it is reported to the EEA and UNECE under the Long-range Transmission of Air Pollutants (LRTAP) Convention, which obliges parties to reduce their emissions below 1990 levels (EEA website, 2014).

Goal 7: Food security, sustainable agriculture and fisheries

Goal 7 aims to achieve sustainable agriculture, food security and universal nutrition and it includes the following indicators:

Box 7: Sub-goals under goal 7, food security, sustainable agriculture and fisheries

- 7.1 Access to affordable, nutritious and healthy foods at sufficiency levels (tackling hunger and obesity and avoiding food waste) is ensured
- 7.2 Productivity is increased via accelerated conversion to sustainable agriculture, fisheries and forestry
- 7.3 Effective land use planning and management is in place and assures equitable access to land
- 7.4 The quantity and quality of agro-ecosystems are maintained without destroying natural ecosystems

7.1 Access to affordable, nutritious and healthy foods at sufficiency levels (tackling hunger and obesity and avoiding food waste) is ensured

Under this sub-goal, the *Small Planet* countries mostly measured the number of undernourished persons consuming below an accepted caloric value. A few more advanced *Small Planet* countries considered additional indicators for consumption or organic products and for food waste. For the *Small Planet* SDI set, we recommend the MDG 1.9 'Prevalence of Undernourishment' (POU) indicator as it can reflect the percentage of a population that do not have access to a sufficient amount of food every day and food consumption below a minimum level of dietary energy. To reflect the quality of consumed food, the Diet Quality (or Healthy Eating) Index (used in Australia) is advanced as a component indicator measuring the overall quality and healthiness of the diet consumed. The economic dimension of food consumption can be measured by the percentage of related household expenses. In relation to the environmental aspect of the sub-goal, the percentage of food waste, which measures the amount of intentionally discharged but consumption-adequate food during the retail chain process or in household consumption, is included (Gustavsson, 2013). Food waste has a considerable environmental footprint, resulting in energy and raw material losses and in emissions from the production, transport and handling of food.

Table 24: Proposed indicators for sub-goal 7.1

SD dimension	Suggested indicators/indices	Source
Social	Prevalence of Undernourishment	MDG 1.9 indicator
	Diet Quality Index	Small Planet countries
Economic	Household expenditure spent on food	EUROSTAT/OECD
Environmental	Percentage of food waste	FAO

Data is widely available for the MDG 1.9 indicator measuring hunger. However, the methodology has limitations, for instance the underlying food balance sheets might not be accurate. We recommend this indicator for the SDI set as it is widely available, but other indicators might also be considered in the future. As suggested by a Statistical Note prepared for the Open Working Group on SDGs (2014), the FAO 'food insecurity experience scale' and the WHO measured percentage reduction in the number of children under five who are stunted, along with the percentage of overweight children, can also be considered in the future.

Data challenges exist for the other three indicators. The Diet Quality Index has only been calculated for a few countries, most prominently in Australia (Australian Institute of Health and Welfare 2007). The household consumption expenditures on food and beverages are monitored in the more advanced countries, but not necessarily on a regular basis. Lastly, the FAO has collected data at the global and the regional level on food waste, but country level monitoring is rare in general and yet to be extended.

7.2 Productivity is increased via accelerated conversion to sustainable agriculture, fisheries and forestry

Under sub-goal area 7.2, the *Small Planet* countries apply traditional agricultural, forestry and fishery production indicators, but only a few of the indicators measured sustainability aspects. To have a more detailed picture of all three sustainability aspects of the sector, we identify three indicators for the *Small Planet* SDI set. The percentage of certified organic farms, forests and fisheries can give an indication about the share of organic producers in this sector and therefore the societal interest in conversion to sustainability practices. To assess agricultural productivity, the World Bank indicator 'annual growth of value added' of the agriculture sector is included. This reflects agricultural productivity by measuring the annual changes in the net output of the entire sector. Lastly, by monitoring the area under organic farming and sustainably-managed forests and fisheries, the extent of sustainable agricultural land area can be measured.

Table 25: Proposed indicators for the sub-goal 7.2

SD dimension	Suggested indicators/indices	Source
Social	Percentage of certified farm, forest and fishery operators	FAO
Economic	Added value of agriculture (annual per cent growth)	World Bank
Environmental	Area under organic farming or sustainably managed forests or fisheries	FAO

The agriculture value added indicator is calculated annually by the World Bank for the majority of the countries. At the same time, data about certified agricultural operators and area is limited. Although the FAO monitors the number of agricultural operators and organic farm areas, data about sustainably managed fisheries and forestry is much less available.

7.3 Effective land use planning and management is in place and assures equitable access to land

Only a few *Small Planet* countries use indicators to measure the changes in land use and assess relevant certification processes. For the *Small Planet* SDI we suggest measuring the percentage of those who are living off the land to assess the equitability of access to land. Such an indicator is yet to be developed, but the 'percentage of different population groups, with legally recognised evidence of tenure' stands out for the various recommendations. The 'average price value per hectare' indicator can describe the economic value of land and can give an indication of its affordability. Lastly, the FAO agricultural area use change indicator reflects the direction and rate of changes in the agricultural land area. A growth rate can indicate conversion from forests or wetlands while a decreasing rate can be a sign of farmland losses due to urbanisation.

Table 26: Proposed indicators for the sub-goal 7.3

SD dimension	Suggested indicators/indices	Source
Social	Percentage of people with legally recognised evidence of tenure	Global Land Tool Network
Economic	Average farmland value	Eurostat
Environmental	Agricultural area use change	FAO

It is rather challenging to measure this sub-goal due to the limited availability of appropriate indicators and/or underlying datasets. The 'legally recognised evidence of tenure' indicator is recommended for the post-2015 development agenda by the Global Land Tool Network, but the methodology and the dataset is yet to be developed. The land price (or farmland value) indicator is monitored in many countries and Eurostat also collects data for the EU member states. However, this indicator does not fully reveal affordability aspects and therefore the development and the introduction of a land affordability indicator is suggested in the longer-term.

7.4 The quantity and quality of agro-ecosystems are maintained without destroying natural ecosystems

More *Small Planet* countries have indicators for sub-goal 7.4. They measured the state and the size of farmlands, as well as consumption of pesticides and its environmental consequences. For the *Small Planet* SDI, we suggest considering the consumption of pesticides and fertilizers and their impacts on the environment. The consumption of pesticides rate can give an indirect indication of the pressure that the agricultural producers may place on the environment. The fertiliser use efficiency reflects the extent of fertiliser use recovery in agriculture per crop unit and therefore can reflect the economic benefits of fertiliser use. In addition, to measure the direct environmental impacts of agricultural practices, we recommend the Soil Organic Matter as a lead indicator. The organic matter content of soil is a critical soil quality measure and highly determines the level of (un)sustainability of agricultural practices.

Table 27: Proposed indicators for the sub-goal 7.4

SD dimension	Suggested indicators/indices	Source
Social	Consumption of pesticides per arable and permanent crop area	FAO
Economic	Fertiliser use efficiency	FAO
Environmental	Soil Organic Matter	Eurostat

The above-suggested indicators are proxy measures. The health of the agro-ecosystems depends on many factors and therefore the use of other inputs, such as energy, agro-chemicals and water should also be taken into consideration. In addition to the Soil Organic Matter indicator, the nitrate concentration in groundwater and the phosphorus content in lakes are also applicable measures.

Goal 8: Energy and climate change

Goal 8, which aims for effectively addressing climate change while improving access to clean and sustainable energy, includes three sub-goals:

Box 8: Sub-goals under goal 8, energy and climate change

- 8.1 Everyone has access to sufficient energy and consumption is efficient and sustainable
- 8.2 The generation of clean and sustainable renewables has increased
- 8.3 The rate of GHG concentration increase in the atmosphere has been reduced

8.1 Everyone has access to sufficient energy and consumption is efficient and sustainable

For sub-goal 8.1, a variety of indicators were identified in the *Small Planet* countries including measures for energy supply, external dependency of supply, efficiency of energy production and energy consumption. As noted by the OWG Statistical Note, there is no single measure for access to modern energy and it can be a challenge to capture various aspects, such as quality, adequacy, affordability and sustainability. For the *Small Planet* SDI set, as a proxy for energy access in general, a World Bank indicator is suggested to measure the percentage of population, which has access to electricity. In addition, the final energy consumption per capita can give an indication about the consumption patterns of the country and the sustainability on use. As for the economic dimension, the indicator 'energy returned on energy invested' (EROI) can assess the ratio between useful energy outputs and associated energy inputs (Hall, 2012). Lastly, the GHG emissions intensity of energy production can indicate how clean and sustainable is the energy used in the country.

Table 28: Proposed indicators for the sub-goal 8.1

SD dimension	Suggested indicators/indices	Source
Social	Access to electricity (percentage of population)	IEA
	Final energy consumption per capita	IEA
Economic	Energy Returned on Energy Invested (EROI)	Post-Carbon Institute
Environmental	GHG emissions intensity of energy production	World Bank

The above indicators, except the EROI measure, are collected by the International Energy Agency (IEA) and are therefore available for most countries. The methodologies are also well established with few limitations (IAEA, 2005). For measuring energy efficiency, typically the final energy consumption intensity indicator is applied as a proxy measure, but this indicator also depends on other external factors (i.e. weather). The EROI focuses on the energy cost of production and therefore can indicate whether energy production is financially sustainable or not. Although it is a powerful measure and the popularity of EROI calculation is on the rise, data is not widely available.

8.2 The generation of clean and sustainable renewables has increased

A fewer number of indicators were identified in relation to the generation of clean and sustainable renewables. These mostly focused on the energy mix characteristics of the countries. For the *Small Planet* SDI set, we suggest measuring the share of renewables in final energy or in electricity consumption to have a better understanding on RES consumption aspects. The investment in renewable energy sources, which is monitored at the global and regional level by the UNEP-Bloomberg New Energy Finance collaboration, can assess economic interest in non-conventional energy development if compared to the total yearly investments of a certain country. Lastly, the percentage of combustible renewables and waste (as a percentage of total energy use) can serve as a proxy indicator of environmental aspects of renewable energy consumption. Since combustible renewables from natural and industrial sources and municipal waste are the most easily available and most used renewable resources (approximately 70% of the total RES share), these must be processed in a sustainable and efficient way (Demirbas, 2008).

Table 29: Proposed indicators for the sub-goal 8.2

SD dimension	Suggested indicators/indices	Source
Social	Share of renewable energy/electricity generation	IEA, World Bank
Economic	Investment in non-conventional energy sources	UNEP
Environmental	Combustible renewables and waste (% of total energy)	IEA, World Bank

While the methodology for overall energy use is available and data is accessible for most countries, renewable energy statistics have greater data limitations. As the International Renewable Energy Agency notes (IRENA, 2014), OECD members have detailed and refined renewable energy statistics, but data availability about RES deployment is a concern in less developed countries. The share of renewable energy in electricity production is available for most countries but data is patchier for the share of renewables in final energy consumption (REN21, 2013). While electricity generation is relatively easy to calculate, by itself it does not capture whether the share of renewables increases (IRENA, 2014). Monitoring data for the investment in renewable energies is also a challenge. Data on the share of combustible renewables and waste is compiled by the International Energy Agency. However, this indicator can only serve as a proxy indicator, reflecting the scale of the issue, but does not reveal the transformation efficiency, for which a new indicator needs to be developed and introduced in the longer-term.

8.3 The rate of GHG concentration increase in the atmosphere has been reduced

Indicators for Sub-goal 8.3 are also in use in most of the *Small Planet* countries and these measure various GHG and CO₂ emissions trends. Considering that these are widely accepted and globally collected indicators by the United Nations Framework Convention on Climate Change (UNFCCC), we suggest these indicators. The GHG emissions per capita indicator can reflect the average size of the individual carbon footprints in the country. The intensity of GHG emissions can give an indication about the low-carbon competitiveness of a certain economy. Lastly, the carbon footprint per capita can indicate an overall environmental pressure from direct and indirect GHG emissions.

Table 30: Proposed indicators for the sub-goal 8.3

SD dimension	Suggested indicators/indices	Source
Social	GHG/CO ₂ emissions trends total and per capita	UNFCCC
Economic	GHG/CO ₂ emissions trends by sector and per unit of GDP	UNFCCC
Environmental	Carbon footprint	<i>Small Planet</i> countries

Emissions trends data is more complete for industrialised countries and is fragmented elsewhere. In addition, CO₂ emissions or removals from forests and land-use changes have greater calculation uncertainty, which also needs to be taken into consideration. We suggest the carbon footprint methodology, since it looks at the total CO₂ emissions of a country also from indirect sources, such as energy and product imports. However, its methodology is less established and although many (more industrialised) countries are interested in its calculation, data is not available regularly for inter-country comparison.

Goal 9: Water availability and access

Goal 9 aims for ensuring safe and affordable water for all and for the integrity of the water cycle. It encompasses three goals:

Box 9: Sub-goals under goal 9, Water availability and access

- 9.1 Water consumption of households and all economic sectors is efficient and sustainable
- 9.2 Infrastructure is available and well maintained to ensure a sufficient and safe water supply
- 9.3 The integrity of the water cycle has been achieved through widespread adoption of integrated water resources management

A set of indicators for monitoring water sources has been recommended by UN-Water (2013). The authors of this report have taken these recommendations into consideration and many of the suggested indicators are included in the *Small Planet* set. While the methodology is well founded and data is globally available for the majority of these indicators, there are certain limitations, which are expected to be tackled in the medium-term.

9.1 Water consumption of households and all economic sectors is efficient and sustainable

The examined countries considered indicators measuring the amount of water consumed and the efficiency of water use. Since these indicators seem to be widely used, we suggest a selection of these for the Small Planet SDI. The water consumption per capita and the water intensity indicators reflect the socio-economic aspects of the sub-goal in terms of efficiency and sustainability of consumption. To understand the environmental aspects of water use, the UNESCO-IHE water footprint indicator is adopted. It considers both the direct and the indirect water use of a country and not only takes into account the internal but external water consumption (Mekonnen and Hoekstra, 2011).

Table 31: Proposed indicators for the sub-goal 9.1

SD dimension	Suggested indicators/indices	Source
Social	Water consumption per capita (litre/day)	WHO
Economic	Water intensity of the economy	UN Statistical Division
Environmental	Water footprint of national consumption	UNESCO-IHE

The first two indicators have strong methodological foundations and are considered as useful indicators, especially if measured together with other relevant water indicators and if spatial and time disaggregation are considered (UN-Water, 2013). The methodology for the water footprint indicator is established by the UNESCO-IHE and data was calculated for 2005, although regular updates are not yet available (Mekonnen and Hoekstra, 2011).

9.2 Infrastructure is available and well maintained to ensure a sufficient and safe water supply

Water-related infrastructures are mostly assessed by the MDG 7.8 and 7.9 indicators in the studied countries. These measure the share of population with access to improved drinking water and sanitation services. In addition, countries considered indicators for the quality of the drinking water and the physical characters of the existing infrastructure. For the *Small Planet* SDI we suggest including the MDG 7.8 indicator,⁴ which can also be considered as a proxy measure for societal access to safe drinking water. To monitor the economic aspects of the sub-goal, two indicators are suggested. The share of total national expenditure for water supply and sanitation infrastructure can be considered to assess the relative priority of water infrastructure in national spending. The percentage of household income spent on water can be an indirect indicator for the price of water and its affordability. Lastly, the percentage of population connected to municipal wastewater infrastructure can give an indication of the environmental pressure deriving from untreated water use.

4 The indicator measuring the share of population with access to improved sanitation services is included under goal 2 as an important measure for health infrastructure.

Table 32: Proposed indicators for the sub-goal 9.2

SD dimension	Suggested indicators/indices	Source
Social	Percentage of population with access to improved quality drinking water	MDG 7.8 (WHO/UNICEF)
Economic	Water sector share in total public spending	World Bank, UNSTAT
	Percentage of household income spent on water	Eurostat
Environmental	Percentage of households connected to municipal wastewater treatment facilities	OECD, Eurostat

While the MDG 7.8 indicator is globally available, measuring the economic aspects of the sub-goal is more challenging. The World Bank attempts to collect data on public spending for water infrastructures but data is not available for many countries. Eurostat collects data about household expenditures on utilities, including water, but data for the indicator assessing the percentage of household income spent on water is not easily accessible. The rate of municipal waste treatment connectedness is fully available for the EU members and additional (but limited number of) countries via UN Statistical Division. Where available, data quality is good, but its main weakness is that it disregards industrial and other wastewater treatments needs and only focuses on urban sources.

9.3 The integrity of the water cycle has been achieved through widespread adoption of integrated water resources management

The indicators of the *Small Planet* countries for this sub-goal assess the status and the quality of water resources as well as monitoring planning, regulation and restoration efforts. For the *Small Planet* SDI set, we suggest the ‘renewable freshwater resources per capita’ and ‘the intensity of freshwater resource use’ indicators to gain an understanding on the available water resources for different socio-economic purposes and to assess the stress level of water use on the available resources. The UNEP-GEMS water quality index, assessing the content of the biochemical oxygen demand (BOD), nitrates, phosphates and salt content in main water resources system is a good indicator for the environmental quality of water bodies.

Table 33: Proposed indicators for the sub-goal 9.3

SD dimension	Suggested indicators/indices	Source
Social	Renewable freshwater resources per person	FAO AQUASTAT
Economic	Intensity of the use of actual freshwater resources	MDG 7.5
Environmental	Synthetic indicator for the quality of water bodies	UNEP GEMS

The first two indicators are available through the FAO AQUASTAT database; however the methodological limitations (i.e. neglecting regional disparities in water stress) and the variability of country data quality should be taken into consideration (UN-Water, 2013). The UNEP GEMS/Water Programme collects data for the Water Quality Index, but data provision is voluntary and therefore varies in frequency, regularity and geographical coverage.

Goal 10: Biodiversity and ecosystems

Goal 10 aims to ensure the healthy functioning of biodiversity and ecosystems that contribute to human well-being. This goal includes the following sub-goals:

Box 10: Sub-goals under goal 10, Biodiversity and ecosystems

- 10.1 A sufficient proportion of all major biomes is under adequate protection
- 10.2 The rate of extinction of natural and cultivated species has been halted and is on course towards a trend reversal
- 10.3 All types of natural habitats exist in a quantity and quality sufficient for their healthy functioning

As outlined in *Part I* of the report (page 54), recommendations for biodiversity indicators should come from global mechanisms (such as the Aichi targets of the CBD), which ensure a comprehensive and systematic approach towards this issue. Therefore, most of the suggested *Small Planet* indicators are derived from the list being developed by the Biodiversity Indicators Partnership (BIP) established by the Convention on Biodiversity. While some of the indicators are already in use (also in the *Small Planet* countries), others have only been calculated at the global level or been tested in a few countries.

10.1 A sufficient proportion of all major biomes is under adequate protection

Small Planet countries mostly collect indicators for sub-goal 10.1 that assess the extent of areas under different protection schemes, but a few indicators for assessing planning efforts and measuring the outcomes of protection efforts were also identified. For the *Small Planet* SDI, we adopt three indicators for assessing protected areas management. The 'coverage of protected areas' MDG 7.6 indicator can give an indication of the overall size of such an area in the country. The BIP also suggests the overlays of protected areas with biodiversity to track the comprehensiveness of the protection areas and therefore give an indication of the effectiveness of protection. In addition, as the BIP also suggests, the effectiveness of management of protected areas should also be considered. Since there is no common methodology for this latter indicator, we suggest monitoring the percentage of areas designated under the EU Habitat Directive in improving conservation status', which was identified in Germany. The socio-economic dimension of this sub-goal is measured with two additional indicators, which are "the awareness to nature protection areas and the willingness to pay for the use of nature areas."

Table 34: Proposed indicators for the sub-goal 10.1

SD dimension	Suggested indicators/indices	Source
Social	Awareness of protected areas	<i>Small Planet</i> countries
Economic	Willingness to pay for protected areas	<i>Small Planet</i> countries
Environmental	Coverage of protected areas	MDG 7.6
	Protected area overlays with biodiversity	UNEP-WCMC
	Percentage of areas designated under the EU Habitat Directive in improving conservation status	<i>Small Planet</i> countries

Data for the protected area coverage is widely available, while the overlays of protected areas with biodiversity indicators has been developed and monitored by the UNEP-WCMC. There are various methodologies for the management effectiveness indicator and since they are calculated with a bottom-up approach from site assessments, they are not globally available and applicable. The methodology and the dataset for the two additionally suggested indicators are rather weak, since both the awareness and the payment willingness indicators are based on one-time surveys for specific locations (i.e. EEA calculations for the EU). Nevertheless, we included these, since they can represent the socio-economic aspects of the sub-goal and can serve as the basis for further developments.

10.2 The rate of extinction of natural and cultivated species has been halted and is on course towards a trend reversal

Under this sub-goal, it is mostly the more advanced *Small Planet* countries that have indicators for assessing the status of different species and have ways to evaluate protection efforts. A few countries, such as Sweden and Republic of Korea, also follow the developments in monitoring efforts. For the *Small Planet* SDI set, we recommend the application of the International Union for Conservation of Nature (IUCN) Red List of Threatened Species Index and the WWF Living Planet Index, which tracks the annual rate of change in species population. Economic aspects can be measured by the MDG 7.4 indicator ‘proportion of fish stocks within safe biological limits’ as an important indicator for measuring the ecological consequences of overfishing. In addition, the status of internationally-traded animal species, derived from the IUCN Red List of Threatened Species and recommended by the Biodiversity Indicators Partnership (BIP) can also be considered, since wildlife life trade represents a significant market value. In addition, social awareness and involvement can be assessed through public participation rates in biodiversity monitoring.

Table 35: Proposed indicators for the sub-goal 10.2

SD dimension	Suggested indicators/indices	Source
Social	Public participation in biodiversity monitoring	Small Planet countries
Economic	Proportion of fish stocks within safe biological limits	MDG 7.4
	Status of species in trade	BIP
Environmental	Red List of Threatened Species	IUCN
	Living Planet Index	WWF

Data and methodological limitations exist for all of the above-suggested indicators. The indicators measuring the status of species at the global and the regional level, but national data access is problematic. However, because of the work of the BIP, improvements can be expected in the future. For instance, guidelines have been already developed for the Red List of Threatened Species and the Living Planet indices for carrying out assessment at the national level (BIP website). The assessments about public participation in biodiversity monitoring are also scattered, mostly collected at the project level.

10.3 All types of natural habitats exist in a quantity and quality sufficient for their healthy functioning

Compared to the first two sub-goals, *Small Planet* countries have more indicators to measure the health of natural habitats. Identified indicators measure area coverage, quality and changes of different natural habitats as well as monitoring implementation of research, planning and data collection efforts. For the *Small Planet* SDI set, we suggest the MDG 7.1 'forest cover' indicator, which is also measured by most of the *Small Planet* countries. Although this only considers one type of habitat, it can be regarded as a proxy indicator for measuring the existence of natural habitats in general. In addition, an index assessing the biological diversity of certain habitats should also be considered. To assess the public attitudes towards biodiversity, the BIP suggest the development and application of an awareness indicator to measure the percentage of population that is familiar with the term 'biodiversity'.

Table 36: Proposed indicators for the sub-goal 10.3

SD dimension	Suggested indicators/indices	Source
Social	Biodiversity awareness indicator	Small Planet countries
Economic	Economic value of eco-system services	Indicator yet to be developed
Environmental	Proportion of land area covered by forest	MDG 7.4
	Index for biological diversity	Small Planet countries

The robustness of the above suggested indicators vary. Efforts in the *Small Planet* countries (i.e. EU member states) are undertaken to assess overall societal awareness of the notion of biodiversity. As an MDG indicator, the 'forest land area coverage' is available in many countries and its data collection methodology is well founded. At the same time, there is no well-established methodology for indexing biological diversity. For instance, the Simpson and the Shannon diversity indices have been applied for such purposes, but have not been used for policymaking. There are also other simplified solutions, for instance dividing the number of species in an area by the number of individuals in an area. Examples have also been identified in the *Small Planet* countries (i.e. in Germany and Singapore).

It is also crucial to measure the economic value of ecosystem services, but no appropriate indicator has been identified. In the United Kingdom, there are plans to develop an indicator for monitoring the status of habitats and species providing essential services (e.g. water quality, water regulation, carbon capture, pollination and public enjoyment).

Goal +1: Adaptive governance and means of implementation

The +1 *Small Planet* SDG includes six sub-goals, which aim to ensure adequate structures and mechanisms to support the implementation of the priorities underlying the SDGs at all levels. The sub-goals are as follows:

Box 11: Sub-goals under goal +1, Adaptive governance and means of implementation

- 11.1 Long-term integrated visions of sustainable development are developed to guide physical, thematic and sectoral plans
- 11.2 A sustainable development co-operation framework at the international level is well-established
- 11.3 Policies and plans are co-ordinated to integrate SDGs into the decision-making and implementation
- 11.4 Progress towards the SDGs is tracked, and the relevant information is accessible to all and reviewed on a regular basis
- 11.5 Illicit flows of money and goods, tax evasion, bribery and corruption are reduced
- 11.6 The impact of disasters on people and property has been sharply reduced

Objective measurement of governance effectiveness, especially in driving sustainable development, is difficult and existing methodologies frequently lack robustness and scientific soundness. In practice, quite a few governance indicators were found in the *Small Planet* countries, especially for 11.4 and 11.5 sub-goals. However, a few governance related, but sector-specific indicators, were also identified under other goals.

Whereas for other goals (where most of the indicators have a robust data collection methodology), monitoring of governance is often difficult to measure with traditional statistical approaches. In many cases, the calculation of indicators is based on subjective assessments. While it was possible to identify quantitative indicators for sub-goal 1-3 and sub-goal 6, in the case of sub-goal 4 and 5, indicators and indices are difficult to quantify and therefore they are mostly the result of subjective decisions. As the HLP outlines (Bali Communiqué of the High-Level Panel, March 28, 2013), new technologies can accelerate access to open data for all and this may also contribute to closing gaps in terms of monitoring governance capacities.

The pros and cons of specific indicators are not discussed separately in this chapter due to limited information available on the indicator methodologies. The availability of appropriate indicators for monitoring sustainable development governance was also limited and in many cases those suggested are only proxies. During the selection of governance-related indicators we faced both conceptual and methodological limitations: many of the governance indicators considered were not fully relevant enough to monitor the sub-goal, while in other cases the measurement methods or data sources were questionable.

11.1 Long-term integrated visions of sustainable development are developed to guide physical, thematic and sectoral plans

For sub-goal 11.1, indicators were identified to monitor the existence of certain strategies and plans (i.e. Green Growth Vision in Korea or local Agenda 21s in France). For the *Small Planet* SDI set, a suggested indicator is the 'existence of a National Sustainable Development Strategy', in the Republic of Korea. It is also crucial that an up-to-date action plan is in place to support the implementation of the strategy and therefore we suggest monitoring this aspect as well. The penetration of SD strategies to the regional and local level can be monitored by the 'number of regional climate plans and local Agenda 21s' (France). It is also important that the strategic objectives are linked to financial resources and therefore an SDSN proposed indicator 'domestic revenues allocated to sustainable development' is included.

Table 37: Proposed indicators for the sub-goal 11.1

Suggested indicators/indices	Source
Existence of a National Sustainable Development Strategy	Republic of Korea
Number of regional climate plans and local Agenda 21s	France
Domestic revenues allocated to sustainable development as per cent of GNI	SDSN

11.2 A sustainable development co-operation framework at the international level is well-established

More indicators were identified in the *Small Planet* countries for sub-goal 11.2, since monitoring practices have already been established with the introduction of the MDG8 'global partnership for development' goal. Developed countries monitor many of the MDG8 indicators, such as the Official Development Assistance (ODA) to, and the import rates from, developing countries and the rate of foreign direct investments. In addition, indicators were also found to monitor the quantity of research relevant for a certain country (in Indonesia), the share of multilateral treaties that have come into force and the attitude towards development assistance (Switzerland).

For the *Small Planet* SDI set, we suggest considering the MDG 8.1 indicator, percentage of ODA of donors gross national income. However, since the role of ODAs is expected to decrease, this indicator should also consider the share of other funding sources, such as net private grants, as suggested by the SDSN.⁵ Trade is an important part of an international co-operation framework for sustainable development and thus it is suggested that an indicator for the HLP target for 'supporting an open, fair and development-friendly trading system, substantially reducing trade-distorting measures, including agricultural subsidies, while improving market access of developing' is considered. As a proxy indicator for this target, the total estimated agricultural support provided to national producers to increase global competitiveness of the national agriculture could be monitored as percentage of the GNI (MDG 8.8). To measure the willingness for participation in international governance frameworks for sustainable development, 'the number of ratified resource-relevant international treaties' is suggested (Hertie School of Governance, 2013). Lastly, to monitor global co-operation in terms of sustainable development 'the number of countries that have officially adopted SD strategies' is included. Data for this indicator was collected by UN DESA for the year 2010.

Table 38: Proposed indicators for the sub-goal 11.2

Suggested indicators/indices	Source
Official development assistance (ODA) and net private grants as a percentage of a high-income country's GNI	MDG 8.1 and SDSN
Total agricultural support estimate as percentage of GDP	MDG 8.8
Number or ratified treaties dealing with natural resources	Hertie School of Governance
Number of countries that have officially recognised SD strategies	UN DESA

11.3 Policies and plans are co-ordinated to integrate SDGs into the decision-making and implementation

A variety of indicators were identified for sub-goal 11.3, measuring the existence of necessary institutions, the availability of e-government, the confidence in institutions, public participation in governance (via voting or public enquires) and the existence of non-governmental organisations and social activities. The area coverage with spatial development plans indicates a higher level of integrated co-ordination in a country, which takes into account socio-economic, but also environmental aspects. Therefore we suggest this indicator, originally identified in Poland, to be included in the *Small Planet* SDI. It is also important that the relevant institutions implement sustainable development strategies, and programmes are established. For example, such an indicator was identified in China. Lastly, the number of non-governmental organisations in a certain country can be an indicator for citizen involvement in social activities.

⁵ The SDSN proposed to measure not only the ODAs but as well as the amount of net private grants (indicator 95).

Table 39: Proposed indicators for the sub-goal 11.3

Suggested indicators/indices	Source
The share of area covered by the current spatial development plan in the total country geodesic area (%)	Poland
Percentage of required institutions to implement the Agenda 21	China
Number of non-governmental organisations involved in peace and environmental work	Hertie School of Governance

Alternatively, social activities can also be monitored via involvement in civil society organisations through participation and membership. An additional aspect of this sub-goal is the increased public participation in government processes, which is measured by some of the *Small Planet* countries, but was also suggested as a possible target by HLP on the post-2015 development agenda (target 10.c).

11.4 Progress towards the SDGs is tracked, and the relevant information is accessible to all and reviewed on a regular basis

Relatively few indicators were found in the *Small Planet* countries for Sub-goal 11.4 and most of these were related to specific issues, i.e. water or biodiversity issues. Indicators monitored the implementation of physical observatories, development of databases, inventories or impact assessments. To guarantee the public's right to information and access to government data (as suggested by the HLP target 10.d), two components of the World Bank's Country Policy and Institutional Assessment (CPIA) 'Transparency, Accountability and Corruption in the Public Sector Index' are included in the *Small Planet* SDI set. These concern the 'accountability of the executive and other top officials to effective oversight of institutions' and the 'access of civil society to timely and reliable information on public affairs and public policies, including fiscal information'. In addition, the Development Data Group maintains a bulletin board on statistical capacity, which measures the monitoring capacity of national statistical systems in developing countries. In addition, we suggest two additional global-level indicators to be developed and monitored. These are the number of countries, which adopted an SEEA framework and the number of countries, which have a functioning monitoring system for SDG indicators.

Table 40: Proposed indicators for the sub-goal 11.4

Suggested indicators/Indices	Source
Accountability of the executive, and other top officials, to effective oversight of institutions	World Bank CPIA
Access of civil society to timely and reliable information on public affairs and public policies, including fiscal information	World Bank CPIA
Statistical Capacity Index	Development Data Group
Number of countries whose statistical offices adopted and implemented the SEEA framework	ASEF suggestion
Number of countries that have a functioning SDGI tracking and reporting system	ASEF suggestion

11.5 Illicit flows of money and goods, tax evasion, bribery and corruption are reduced

For sub-goal 11.5, *Small Planet* countries considered global measures, such as the Democracy Index of the Economist Intelligence Unit and the Corruption Perceptions Index of Transparency International. In addition, the existence of different control mechanisms (such as e-procurement system or an ombudsman position) is also monitored. We suggest the Corruption Perceptions Index for inclusion in the *Small Planet* SDI set, since it provides an opportunity for global comparison and monitoring of changes over time, even if the underlying methodology is subject to criticism (Andersson and Heywood 2009). In addition, the Gallup World Poll monitored population's general confidence in national governments is also included in the list.

Table 41: Proposed indicators for the sub-goal 11.5

Suggested indicators/indices	Source
Corruption Perceptions Index	Transparency International
Confidence in national governments	Gallup World Poll

11.6 The impact of disasters on people and property has been sharply reduced

Under sub-goal 11.6, several *Small Planet* countries monitor the impacts of disasters on people and property. Indicators focused on general environmental impacts, which can be an indicator of natural disasters in the future (such as sea level change), or the socio-economic impact of natural disasters, such as number of deaths or people affected. Indicators also follow the implementation of preventive measures, such as targeted research activities, early warning systems, related investments and industries, as well as insurances. The Republic of Korea's 'life and property damages caused by natural disasters' indicator is advanced for the *Small Planet* SDI set as it can give an overview of direct consequences of disasters. In addition, the Inter-American Development Bank tested a variety of indices for disaster risk assessment and management (IADB, 2010). For the *Small Planet* SDI set, two of these composite indices are included: the Prevalent Vulnerability Index and the Risk Management Index. The first measures the exposure of a country to natural disasters by prone areas, socioeconomic fragility and social resilience. The second measures the distance between current conditions and targeted benchmarks in risk management activities incorporating six indicators.

Table 42: Proposed indicators for the sub-goal 11.6

Suggested indicators/Indices	Source
Life and property damages caused by natural disasters	Republic of Korea
Prevalent Vulnerability Index	Inter-American Development Bank
Risk Management Index	Inter-American Development Bank

4. CONCLUSION

A key feature of ASEF's *Small Planet* project is to ensure the selection of SDGs is informed by existing national priorities, as expressed in key strategies, plans and programmes. While the existence of a national level goal and target does not automatically mean there is also an associated indicator, our work showed that in many cases indicators and related data are available, although with great variation from country to country. In the case of datasets that are internationally reported, there is usually more uniformity, while in many cases indicators and data are country specific, with limited cross-country availability and thus a limited basis for comparison.

There is a significant difference in terms of data availability between countries based on their level of development. Advanced countries have generally better thematic, spatial and temporal coverage, while fewer indicators were identified from poorer nations. Although this research did not systematically look at underlying issues related to data availability, the discrepancy underlines significant differences in statistical data collection, monitoring and indicator reporting. As with monitoring, reporting and verification are important elements of the SDGs.

While we consider it necessary that less advanced countries expand their monitoring efforts, it is often the case where data collection is based on more sophisticated methods (i.e. household surveys) international monitoring of certain indicators is more efficient than national level data collection.

Due to feasibility and cost-efficiency considerations, available and widely collected indicators were included in the SDI set, even if better indicators may exist. However, for the post-2015 development agenda, assurance is required that new data is only collected for the most suitable indicators. In case of the MDGs, targets were developed first, and later indicators were defined. It is recommended that for the SDGs, monitoring aspects are taken into consideration before targets are set.

We foresee methodological improvements for many of the indicators. Therefore, we expect that for the selected indicators, the listed limitations will be reduced in the future and data availability will also increase.

New data collection methodologies (i.e. GIS-based calculations or internet based surveys) should be considered for further improvements of the indicators. GIS especially in case of the indicators related to land use topics (urban, agriculture, biodiversity), internet based surveys for the social topics i.e. (equity, urban living, sustainable lifestyles and governance effectiveness).

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