

Chapter 1

Conceptual considerations to greening agricultural growth

The OECD conceptual framework for monitoring progress towards green growth focuses on the environmental performance of production and consumption, and on the key drivers of green growth, such as policy instruments and innovation. This chapter briefly describes the OECD conceptual framework and the general principles used to select relevant indicators to monitor progress towards green growth in agriculture. It also provides a synopsis of the proposed indicators.

Green growth is defined as fostering economic growth and development, while sustaining the natural assets base that provides the resources and environmental services on which we rely for our well-being (OECD, 2011a). In response to the global economic downturn as well as recognising that there are biophysical limits to growth, the green growth agenda places renewed focus on the fundamental drivers of growth, including the use of factors of production, environmental innovation and the removal of policy distortions. A green growth strategy can generate a “double dividend” effect – higher growth with lower adverse environmental impact – by improving the efficiency of resource use and increasing investments in natural capital to drive economic growth (OECD, 2011a).

Policies that promote green growth need to be supported with appropriate measurement tools to monitor progress and gauge how well policies are performing in shifting economic activity to a greener path. Green growth indicators can help identify policy opportunities that can improve growth and environmental outcomes, or to identify policies that can address possible trade-offs between green and growth objectives.

Reporting and measuring the progress of green growth is important for the work on policy undertaken by the OECD, other international organisations. The OECD has developed, *inter alia*, a conceptual measurement framework and set of indicators to help governments monitor progress towards green growth (OECD, 2011b); UNEP has developed indicators for green economy policy making (UNEP 2012a, 2012b and 2012c); the World Bank has developed a framework to measure the potential benefits from green growth policies (World Bank, 2012); and the European Commission has developed a *Roadmap to a Resource Efficient Europe* (EC, 2011).

Green growth indicators are used in the OECD to incorporate green growth into its core policy advice. Two areas where green growth indicators figure prominently are the OECD’s *Environmental Performance Reviews* and the *Economic Country Surveys*. Member countries, such as the Czech Republic, Germany, Korea, Mexico, the Slovak Republic and the Netherlands, have already applied the OECD green growth measurement framework to their national economy and produced their own indicator reports using national data. Some of these country reports also include agriculture-related indicators (**Table 1.1**). Similar work is underway in non-member countries, such as Colombia, Costa Rica, Ecuador, Guatemala, Paraguay, Peru and Kyrgyzstan.

The OECD green growth indicator report, *Towards Green Growth: Monitoring Progress – OECD Indicators*, is regularly updated as new data become available (OECD, 2011b; 2014). A green growth indicators database has been created; it contains selected indicators to monitor green growth progress to support policy making and inform the public at large. The dataset covers OECD countries, as well as BRIICS economies (Brazil, Russian Federation, India, Indonesia, China and South Africa), Argentina and Saudi Arabia from 1990 to the most recent years available.

The main objective of this report, therefore, is to develop this framework for the agricultural sector and apply it to selected OECD countries.¹ In particular, it analyses what is needed and then how to build on what we have in terms of economic performance, policy and agri-environmental indicators in order to develop a set of green growth indicators for agriculture.

Table 1.1. Agriculture-related indicators used in the Czech Republic, Korea, the Netherlands and the Slovak Republic

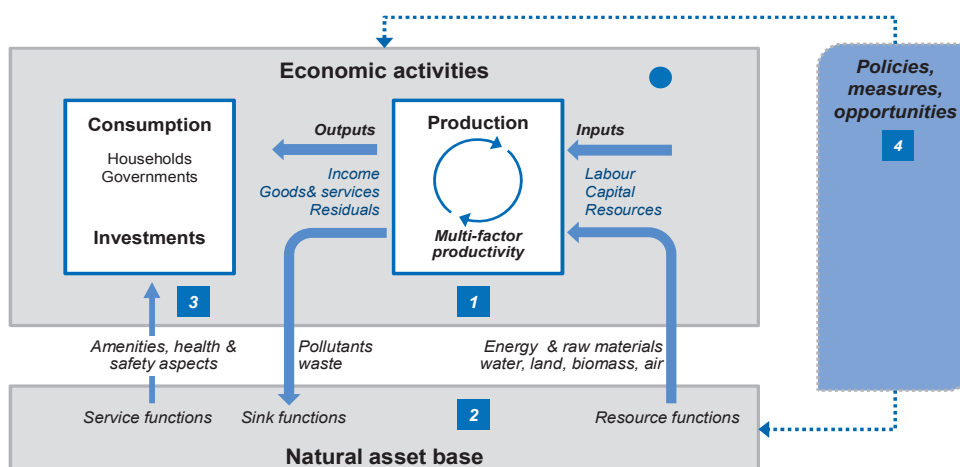
	Environmental and resource productivity	Natural resource base
Czech Republic	Nutrient balances: <ul style="list-style-type: none"> • nitrogen • phosphorus 	Land cover change: <ul style="list-style-type: none"> • agricultural land, pastures and meadows • urban areas and infrastructure • semi-natural habitats Farmland birds
Korea	Consumption of chemical fertilisers	Annual rainfall per capita
Netherlands	Energy efficiency: <ul style="list-style-type: none"> • agriculture • manufacturing • transport • other services Share of renewable energy in total: <ul style="list-style-type: none"> • biomass • wind • other Nutrient balances: <ul style="list-style-type: none"> • nitrogen • phosphorus 	Land conversion into built-up land: <ul style="list-style-type: none"> • agriculture • nature • forest • built-up
Slovak Republic	Nutrient balances	Land use Agricultural land area affected by water and wind erosion, by class of erosion

Source: OECD (2013), *Policy Instruments to Support Green Growth in Agriculture*, OECD Green Growth Studies, OECD Publishing.
doi: [10.1787/9789264203525-en](https://doi.org/10.1787/9789264203525-en).

The OECD green growth measurement framework

The cornerstone of the OECD approach to monitor progress towards green growth is a conceptual framework that reflects the integrated nature of green growth and describes the main aspects that need to be monitored. This approach reflects a production framework of the economic growth theory model, whereby inputs are transformed into outputs. It draws on groups of indicators which capture major aspects of green growth. Particular attention is given to efficiency and productivity issues. The focus is on the environmental performance of production and consumption, and on the drivers of green growth, such as policy instruments and innovation activity (**Figure 1.1** and **Figure 1.2**).

Figure 1.1. OECD green growth measurement framework



Source: OECD (2011), *Towards Green Growth*, OECD Green Growth Studies, OECD Publishing. doi: <http://dx.doi.org/10.1787/9789264111318-en>.

Figure 1.2. Green growth indicator groups and themes

1. The environmental and resource productivity of the economy	<ul style="list-style-type: none"> - Carbon and energy productivity - Resource productivity: materials, nutrients, water - Multi-factor productivity
2. The natural asset base	<ul style="list-style-type: none"> - Renewable stocks: water, forest, fish resources - Non-renewable stocks: mineral resources - Biodiversity and ecosystems
3. The environmental dimension of quality of life	<ul style="list-style-type: none"> - Environmental health and risks - Environmental services and amenities
4. Economic opportunities and policy responses	<ul style="list-style-type: none"> - Technology and innovation - Environmental goods and services - International financial flows - Prices and transfers - Skills and training - Regulations and management approaches
Socio-economic context and characteristics of growth	<ul style="list-style-type: none"> - Economic growth and structure - Productivity and trade - Labour markets, education and income - Socio-demographic patterns

Source: OECD (2011), *Towards Green Growth*, OECD Green Growth Studies, OECD Publishing. doi: [10.1787/9789264111318-en](http://dx.doi.org/10.1787/9789264111318-en).

For each group, a list of indicators was proposed on the basis of existing OECD work and experience (OECD, 2011b; 2014). These four groups of indicators are complemented with generic indicators describing the socio-economic context and characteristics of growth.

This measurement framework was used to develop a proposed list of 25 green growth indicators for OECD countries (OECD, 2011b), originally presented in a 2011 report to ministers along with data for OECD and emerging economies. It was updated in 2014 (*Green Growth Indicators 2014*, OECD, 2014).

Selecting policy-relevant indicators for agriculture

Although the concept of “green growth” is relatively new, “green growth” indicators are not. Most overlap with existing sustainable development and environmental indicators or can be derived from economic, environmental and social statistics that have been collected and compiled by national statistical offices and other national and international bodies. Statistical activities to monitor a country’s progress on green growth can thus be streamlined with existing activities related to social, environmental and economic policy priorities (e.g. national sustainable development strategies, economic-environmental accounting and environmental monitoring).

The OECD has considerable experience in monitoring and evaluating agricultural and agri-environmental policies and approaches. Various databases and indicators have been developed which are relevant to monitoring green growth in agriculture. Moreover, several initiatives have been carried out to foster the adoption of sustainability indicators – which can overlap with green growth indicators – into national and international policies, and data have been collected and organised into so-called “environmental accounts” to help track the potential impact of economic and human activity on the environment (e.g. SEEA).

Moreover, governments in several OECD countries are increasingly aware of the importance to monitor and evaluate their agricultural policies and are devoting considerable efforts to strengthening these. For example, evaluation of the EU’s rural development programmes, which include agro-environmental programmes, is required by legislation within an established framework that comprises quantitative indicators. Less formal approaches are used by other member countries which also use quantitative indicators (OECD, 2009). In addition, several OECD countries have already implemented the OECD Green Growth measurement framework, and some include agriculture-related indicators (e.g. the Czech Republic, Korea, the Netherlands, the Slovak Republic) (OECD, 2013b).

Notwithstanding the experience gained and amount of data collected, there are no existing indicators for the agricultural sector that can track progress towards green growth. Creating a set of indicators to monitor and evaluate progress towards green growth in the agricultural sector is challenging because: 1) approaches that countries are taking towards green growth vary considerably; 2) environmental outcomes in agriculture are determined by multiple factors and there are methodological, measurement and data availability problems in evaluating the environmental impacts of policies; 3) many environmental issues are context-specific and there is no single overarching indicator of environmental performance; 4) not only are the links between the biophysical, economic and policy processes complex, but information on the state of the environment is difficult to collect and interpret; and 5) there is a lack of objective valuations of environmental externalities and public goods. It is therefore difficult to establish quantitative assessments of the cause and effect linkages between policies and green growth performance in a country, and any cross-country comparison would need to be undertaken with great caution (OECD, 2012).

With this in mind, an important consideration in drawing up a set of green growth indicators for agriculture is to identify guiding principles. Ideally, indicators would fulfil the following criteria.

Criterion 1: Capture the nexus between the environment and the economy

As green growth concerns the interaction between environment and the economy, a key element in the choice of a green growth indicator is that it should contain information about the economic growth of the sector and its sources. A key principle is to achieve a balanced coverage of the two dimensions of green growth – “green” and “growth” – and of their main determinants, with particular attention given to indicators capturing the interface between the two. Capturing this nexus is an important – if not the most important – criterion for the selection of a green growth indicator.

Tracking trends in decoupling economic growth from environmental pressures is an important focus and indicators measuring the relationship between growth and environmental impacts are crucial for monitoring green growth. However, while decoupling indicators show whether production has become greener in relative terms, they do not indicate whether pressure on environmental services is decreasing in absolute terms. Absolute decoupling indicators (i.e. the economic indicator is growing, while the environmental indicator is unchanged or decreasing) help to fill this gap, but need to be complemented with information on *absolute levels* of environmental services because of potential thresholds and non-linear changes in the environment. In the absence of such information, little can be said about what the “optimal” rate of decoupling for a given country is or whether the rate needs to be increased or decreased (OECD, 2014).

Criterion 2: Be measurable and comparable across countries

A valid indicator for the OECD must be measurable and applicable to a reasonable number of countries and at different time periods. Definitions and data need to allow for meaningful comparison both across time and countries or regions. Indicators should be based on available data, or that can be made available at a reasonable cost, and that are adequately documented and of known quality.

A related issue is the timeliness of data. One of the biggest challenges is that agri-environmental data and indicators are often not collected and disseminated with the same frequency and speed as the data and indicators on economic performance and on government transfers. An important consideration for an indicator is that it is (or can be) updated regularly.

Immediate measurability, however, is not a necessary condition for inclusion or exclusion of an indicator and some flexibility is required. If, for example, an indicator is considered analytically sound, policy-relevant and can be made available at a reasonable cost it should be included.

Criterion 3: Reflect key global environmental issues

The need to capture the intersection between the environmental and economic dimensions of agricultural production is balanced against the need for indicators to address those areas where environmental concern is greatest. Climate change, biodiversity loss and sustainable management of water resources are generally regarded to be major policy challenges facing both OECD and non-OECD countries. For climate change and energy use, several countries have set quantifiable targets (e.g. reduced greenhouse gases, increased energy efficiency and share of renewable energy) (OECD, 2013a). However, coverage of key global environmental issues should not be the sole selection criterion, especially if the indicator does not capture the link with economic growth.

Criterion 4: Ease of communication for different users and audiences

The definition and interpretation of an indicator must not be ambiguous. Indicators must be transparent and easy to interpret, and any change must be easily understood as being either good or bad for green growth. Ensuring that it is based on the best available science and is analytically sound are key features to ensure the indicator is valid.

Criterion 5: Alignment with the OECD Green Growth measurement framework

The point of departure for designing a sector-specific framework to monitor progress towards green growth in agriculture is the economy-wide framework and the list of green growth indicators developed by the OECD. As noted earlier, the measurement framework proposed by the OECD effectively captures the main dimensions of green growth. Thus, the indicators chosen should be consistent with the OECD framework and should be able to track the economic and environmental performance of the agricultural sector.

In addition to the aforementioned guiding principles, two other criteria have been used in the current exercise:

- Adjustment of indicators to relate them to the national green growth approaches and strategies discussed in the *Policy Instruments to Support Green Growth in Agriculture; A Synthesis of Country Experiences* (OECD, 2013a).
- Indicators should, to the extent possible, be developed based on existing OECD work as well as data from other international organisations.

Proposed indicators and caveats

Given its multidimensional nature, green growth is not adequately captured by a single indicator. For OECD countries, a wide range of indicators related to economic and environmental performance of the agricultural sector as well as indicators describing the policy environment governing the sector should be developed. However, capturing the dynamics of green growth in agriculture and presenting them in terms of quantifiable indicators that could be interpreted unambiguously and easily communicated to policy makers remains a challenging task.

To monitor progress, a small set of indicators able to track the central elements of green growth issues associated with the agricultural sector across OECD member countries is proposed and applied to selected OECD countries. The proposed indicators constitute work in progress and will be further elaborated by OECD over time as data become available and as concepts evolve.

Table 1.2 provides a synopsis of the proposed indicators; the full list is provided by group in each relevant chapter. The proposed set of indicators is comprised of approximately 25 indicators, not all of which are yet measurable. At this stage, only three indicators fulfil all criteria: the indicators related to carbon and energy productivity, and the one related to the potentially most environmentally harmful producer support.

There are important caveats concerning this list. First, the set of indicators is limited in number. It represents a first selection made on the basis of existing work by OECD and member countries' experiences with green growth in agriculture. Gaps exist, both in terms of data availability and quality, as well as at the conceptual level.

Table 1.2. Synopsis of the proposed list of indicators

Topic or issue	Criteria			
	Capturing the nexus between the environment and the economy	Ease of communication to different users and audiences	Reflecting key global environmental issues	Measurable and comparable across countries
Environmental efficiency				
Carbon productivity	***	***	***	***
Nutrient balance intensities	***	***	***	*
Resource efficiency				
Energy productivity	***	***	***	***
Renewable energy	***	***	***	*
Water productivity	***	***	***	*
Material (biomass) productivity	Indicators to be developed			
Environmentally-adjusted multi-factor productivity	***	**	***	*
Natural asset base				
Changes in agricultural land use and cover	***	***	***	**
Environmental quality of life	No indicator is proposed			
Economic opportunities and policy responses				
Potentially most environmentally harmful producer support	***	***	***	***
Environment-related taxes	***	***	***	**
Water pricing	***	***	**	*
Empowering people to innovate in agriculture	***	***		**
Environment-related innovation in agriculture	***	**	***	*
Regulatory instruments	Indicators to be developed			

Secondly, not all of the proposed indicators are relevant across all countries. The emphasis will vary, depending on the overall development status and priorities/particularities of a given country. National circumstances such as socio-economic structure, geography and climate will also influence the relevance, selection and interpretation of specific indicators. Nor are all indicators relevant to the agricultural situation in all countries, but in certain cases others are highly relevant for all countries (for example, indicators on water quality). It should be noted that data for all indicators proposed are national averages, which often encompass wide variations within a country.

Third, as in most other domains of measurement, indicators are often proxies and context-specific and need to be read in conjunction with other indicators on the list.

Fourth, the proposed indicators related to policy tools refer only to market-based instruments and do not include indicators for regulatory instruments. Construction of indicators for regulations is complicated due to the fact that information is often of a qualitative nature and is not easy to compare across countries. Consideration should be given to how indicators on economic instruments can be complemented by indicators on environmental regulation so as to balance international comparisons of policy responses.

Finally, gaps exist and some of the selected indicators are not measurable at present and merit further development. Among the areas identified as having the largest gaps were

indicators concerning green innovation and investment in agriculture, the natural asset base, and the environmental quality of life.

Further improvements in monitoring the progress of green growth in agriculture will largely depend on follow-up work currently underway or planned in the context of the OECD *Green Growth Measurement* agenda, on the finalisation and implementation of the SEEA, and other relevant work, such as the World Bank's Wealth Accounting and Valuation of Ecosystem Services (WAVES) project.

The OECD, UNEP, the World Bank and the Global Green Growth Institute (GGGI) are working together via the Green Growth Knowledge Platform ([GGKP](#)) to help countries advance on the measurement, design and implementation of green growth policies. Where possible and meaningful, the indicators proposed by the various international agencies are being harmonised. A first step towards a common internationally-agreed approach was made in April 2013 with the publication of [Moving towards a Common Approach on Green Growth Indicators](#), prepared jointly by the GGKP member organisations (GGKP, 2013). This common approach is based on the OECD Green Growth measurement framework.

The SEEA is a crucial ingredient of the measurement agenda as it provides an overarching, consistent statistical framework for compiling and presenting economic and environmental data (UN 2014). It constitutes an accounting framework that will ensure consistent basic data for environmental and economic variables. Furthermore, it provides an integrated framework for the compilation of statistics on the various aspects of wider concepts. Its implementation is expected to maximise international comparability and consistency and it will become the primary framework from which green growth indicators will be derived.

Note

1. A similar exercise was performed jointly by the OECD and the International Energy Agency (IEA) for the energy sector, where a set of indicators was proposed (OECD, 2011c).

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