

Green growth and the management of natural capital - options for agriculture

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Abstract - Countries develop green growth strategies, and public-private initiatives (e.g. in the domains of energy, bio-based economy, climate, food, waste and mobility) are often part of the strategy. Also, the management of natural capital is essential. It includes the resources and functions related to ecosystems, and agriculture is a key economic activity that is supported by ecosystems. The value of natural capital might not be fully captured in market prices, and bad choices from investments in natural capital can result. Natural capital is a major component of wealth for many developing countries, but has a much smaller share of total wealth in most high-income countries. Proper management strategies for the use of natural capital are important for resource-poor countries, including many high-income OECD countries. Securing long-term resource availability is an important component of greening economics. Improvements in resource efficiency would therefore be essential for agriculture, as a building of greening economies and securing the management of natural capital. Green growth strategies could benefit from measures targeted at the edge of the energy and food sectors.

INTRODUCTION

Several countries developed green growth strategies. Ambitions are to achieve economic growth through greening the economy, and two pathways are identified: first, to decouple physical from economic growth, improve the efficiency of natural resource use and use clean technology to provide jobs, support a low-carbon development path (a low-carbon economy), and second to transform the economy from a linear towards a circular system through the re-use of material and other natural resources (a circular economy).

There are several operational definitions of natural capital. The World Bank defined natural capital 'as the sum of cropland, pasture land, timber forest resources, non-timber forest resources, protected areas and sub-soil assets (oil, natural gas, coal and minerals) (World Bank, 2011). The OECD glossary of statistical terms defines natural capital as '... natural assets in their role of providing natural resource inputs and environmental services for economic production'. WTO (2010) adds to this that natural resources are both 'scarce' and 'economically useful in production and consumption'.

Natural capital is the stock of natural resources provided by nature, and includes natural resources (forests, fish, minerals) that can be extracted, as

well as the endowments yielding ecosystem services. Natural capital is an endowment of nature ('stock') yielding ecosystem services, which can be presented in physical terms (stock of fish) or monetary terms (e.g. present value of the anticipated revenues of the stocks in the next say 25 years). Ecosystem services are the beneficial 'flows' from natural capital (Dominati et al., 2010).

Part of natural capital can reproduced by human activities (e.g. fish farms, plantation of forests), and other parts can only modified by human intervention (e.g. nature for touristic service). It is composed of four types of ecosystem goods and services, including:

- a. *Production services*. Non-renewable resources with provision services (e.g. fossil fuels) that are extracted from ecosystems and finite in nature, and exhaustible resources (e.g. minerals and metals).
- b. *Regulatory services*. Renewable but exhaustible resources that are produced and maintained by ecosystems. This includes provision services of ecosystems (through fish stocks, wood, water, soil) and environmental goods and services that are provided indirectly from the natural environment (e.g. regulatory services through water storage and water purification, pollination, carbon sequestration in soil, agro-biodiversity). Such resources can be rendered finite by over-exploitation.
- c. *Life-support services*. This includes systems from non-renewable and non-exhaustible resources (wind, waves, sun, protection from ozone layer) and ecosystem goods and services that are renewable with provision services like food, fibre, genetic resources, water supply.
- d. *Cultural or immaterial services* (e.g. natural parks) for touristic or recreational use.

DISTRIBUTION OF WEALTH

A more detailed picture on wealth and natural capital will be provided for a range of countries. Table 1 shows the wide variation across countries in their shares of natural capital in national total wealth.

The share of natural capital in total wealth is limited and only around 3% in the EU countries examined, as well as in Japan. The share of natural capital in national wealth is below 5% for several EU-countries (Netherlands, UK, Austria, Belgium, Denmark, France, Greece, Italy, Portugal and Spain). It is between 5% and 10% in Sweden, Finland and Ireland. Agriculture, forestry and energy are the main activities related to natural capital in the countries examined. Biomass production (from

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agriculture and forestry) has a large share in total natural capital in Brazil and China.

Table 1. Natural capital in 2005 (Source: World Bank).

Country	Total wealth (billion USD)	Natural capital per capita (USD)	Share of natural capital in total wealth (%)
Australia	10,547	39,979	7.7
Brazil	14,752	14,978	18.9
China	25,091	4,013	20.9
Japan	70,116	2,094	0.4
USA	217,623	13,822	1.9
Denmark	4,024	19,616	2.6
Germany	45,127	5,716	1.0
Netherlands	9,687	13,193	2.2
Global	707,726	7,119	6.2

LINKING THE FOOD AND ENERGY SECTORS

Green growth strategies could benefit from a bio-based economy, with measures targeted at the edge of the energy and food sectors. Consumer and producer behaviour are critically important for both parts of natural capital and important to maximise the reduction potential of greenhouse gas emissions, also considering international trade. Mutual benefits for the agrofood and energy sectors remain undervalued in green growth strategies.

Nowadays, energy conservation is a widely adopted strategy by countries. The energy sector is key to current green growth strategies, as part of a low-carbon growth strategy. The management of natural capital requires the adoption of measures to increase energy efficiency and resource productivity, and also to design and implement new technologies for renewable energy. Green growth strategies rather focus on new technologies for (non-) renewable energy.

The agrifood sector might enhance greening an economy and be an engine of economic growth. This however requires a green growth strategy to focus at the agrofood chain, that considers interactions between agriculture and the rest of the economy. Cascading is the sequential exploitation of the full potential of a resource during its use, mainly to improve efficiency of resource use. It is an intelligent reuse and recycling strategy adopted in the forest sector to improve resource efficiency and reduce greenhouse gas emissions (Figure 1).

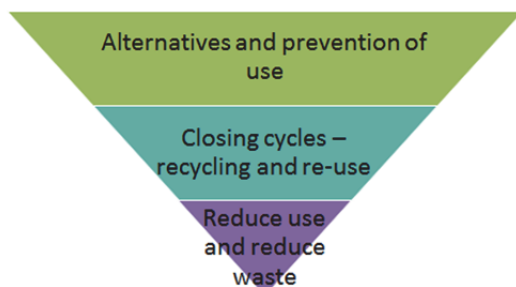


Figure 1. Stages of a circular economy reducing waste, closing cycles and prevention of material use.

The economic lifetime of wood would be increased. Different stages would include use for frames, shelves, recycling, compost and burning. It

is a type of recycling or circular economy (adopting the 'cradle-to-cradle' concept), moving away from 'take-make-dispose', taking resources, make products and eventually dispose them as waste.

CONCLUSIONS

There is no pre-defined route for the design and implementation of a national green growth strategy. To the contrary, countries currently implementing green growth strategies face different economic and environmental challenges and also have wide ranging development paths. However, decoupling physical from economic growth, as well as improvements in energy efficiency and resource productivity are important components of a green growth strategy. Such objectives might be insufficient to secure long-term availability of natural capital and the volatility of its market prices. Smart and innovative initiatives to combine technologies with environmental benefits are developed. For example, the 'green security' project in the Netherlands, to receive residual heat from an artificial fertilizer plant and distribute heat through pipeline of 5 km to nearby greenhouses, which will potentially reduce energy use in glass-houses by 90 per cent. Green deals are set-up as a bottom-up approach to establish green projects. Economically viable initiatives are supported by removing barriers rather than target at public support.

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