

Eawag Seminar Invitation

Global Resources Outlook 2019: no Climate and Biodiversity Success Without a Better Use of Natural Resources

Speaker **Prof. Bruno Oberle, EPFL, Switzerland**

When **November 15, 11.00 – 12.00 a.m.**

Where **Forum Chriesbach, room C20, Eawag Dübendorf**

Abstract **Global Resources Outlook 2019
IRP, International Resource Panel**

Executive Summary

The international community has set large goals for global prosperity and protecting the planet, including the achievement of the Sustainable Development Goals and environmental conventions such as the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement, the Convention on Biological Diversity (CBD), and the United Nations Convention to Combat Desertification (UNCCD). Progress towards these ambitions is in our grasp – but a fundamental change in how natural resources are used around the world is necessary to succeed in reaching these objectives. Natural resources are used to build infrastructure and drive economic progress, but they also have consequences as the use of resources can have negative impacts for the environment and human wellbeing.

Fundamental change is embodied in the principles of sustainable consumption and production, which addresses the entire life cycle of economic activities from the extraction of natural resources, through the production and use phase of products and goods, and finally to the disposal of resources. Harnessing this change will promote a sustainable transition to a world where economic development is pursued, but negative impacts to the environment and humans are reduced in absolute terms, indicating decoupling.

Decoupling occurs when resource use or a pressure on the environment or human wellbeing grows at a slower rate than the activity causing it (relative decoupling) or declines while the economic activity continues to grow (absolute decoupling) (IRP, 2011). While past IRP reports have focused largely on decoupling resource use and impacts from economic growth, this report also considers another dimension of decoupling: wellbeing decoupling. Wellbeing decoupling means increasing the service provided or satisfaction of human need per unit of resource use.

The Drivers-Pressures-State-Impact-Response (DPSIR) framework is one type of systems approach that can be used to analyze how society is using natural resources and what the different implications of this use are. This report is structured along the DPSIR framework, starting with Chapter 2 describing the drivers and trends of materials, land, and water resources use and explaining how these create pressures on the environment. Chapter 3 continues the analysis through the lens of life cycle assessments. It takes the results from Chapter 2 on the pressures of natural resource use and calculates the environmental impacts generated from the extraction and processing of these natural resources. Chapter 4 then provides two different outlooks – one based on *Historical Trends* and the other modelling the effects of concerted policy and societal actions that could drive a transition *Towards Sustainability*. Finally, Chapter 5 reflects on the messages of chapters two through four, and then offers recommendations to policymakers, the private sector, and civil society that can support innovations for environmental challenges and sustainable consumption and production.

Drivers, Pressures, and Natural Resource Use Trends

Since the 1970s, which is the starting date of the analysis in this report, global population has doubled and global Gross Domestic Product (GDP) has grown fourfold. These trends have required large amounts of natural resources to fuel economic development and human wellbeing. Indeed, there has not been a prolonged period of stabilization or decline in global material demand in the last 50 years. Rather, global resource extraction has grown rapidly in that time. Extraction reached 92.1 billion tons in 2017, compared to 27.1 billion tons in 1970.

Global material extraction has also become slightly more concentrated over the last five decades with ten economies responsible for over 68 per cent of global extraction in 2017, compared to around 64 per cent in 1970. Upper-middle income economies dominate extraction of resources, even on a per capita basis, accounting for 56 per cent of the global total. Two key dynamics are at play here: an increasing demand to build up new infrastructure, especially in developing and emerging economies, and the outsourcing of the more materials and energy intensive stages of production chains by higher income countries to lower income but transitioning countries.

However, the global share of domestic material consumption of low-income countries has remained unchanged at below 3 per cent, despite the highest population growth rate amongst the different income categories. Further, looking at the material footprint per capita, the high-income countries maintain the highest material footprint consumption of approximately 27 tons, which is 60 per cent higher than the upper-middle income group and more than ten times the level of the low-income group.

For water, a slight relative decoupling of water use from population growth began in the 1990s, but global water use is increasing and 30 per cent of global river basin area has been under severe and mid water stress in 2010.

Environmental Impacts of Natural Resource Use

Natural resource extraction and processing¹ make up approximately 50 per cent of the total greenhouse gas (GHG) emissions. Resource-related impacts on water stress and biodiversity loss due to land use are even more significant at over 90 per cent. If the rising trend in resource-related impacts persists, the goals of the Paris agreement will become difficult to meet and the achievement of the Sustainable Development Goals, including SDG 15.5 to halt biodiversity loss, will be put at risk.

Moreover, an estimated 11 per cent of existing species will be globally and irreversibly extinct due to global land use activities. The consumption of water contributes to water stress, threatening the sustainable supply of freshwater to humans and ecosystems (UNEP SETAC, 2016). Agriculture is the main water consumer in the global economy and accounts for approximately 85 per cent of global water stress. Other impacts of resource use include eutrophication and eco-toxic effects caused by the overuse of fertilizers in certain areas – and which can ultimately lead to biodiversity loss.

The good news is that between 2000 and 2015, there was a relative decoupling of resource-related environmental impacts from GDP and a moderate relative decoupling of impacts from the extracted mass of resources. However, impacts still increased on an absolute scale, including global average per capita climate change and health impacts. Climate change impacts increased by a factor of 1.4 between 2000 and 2011, following a similar trend to that of total extracted mass of resources, which increased by a factor of 1.6. During the same time frame, water and land use-related impacts also increased, but by a lesser degree (indicatively, by a factor 1.2 for water stress) due to increased productivity in food production. Further, action is needed to also reach absolute decoupling and remain within planetary boundaries.

Resource-related value added has doubled, although impacts and value creation are not equally distributed around the globe. Per capita impacts of high-income regions are between three and six times larger than those of low-income regions. This pattern is a result of globalization, with high-income countries specializing in high value-added product development and management activities while resource-intensive added manufacturing is located in low-cost countries.

Capital investments for the buildup of infrastructure were the main driver of resource use in emerging economies, while in industrial economies consumer goods dominate final demand. While general trends exist, such as increased impacts with increased income, there are also cases of low-emission households within high-income segments showing that decoupling is possible.

Two Outlooks for Resource Use

The analysis and modelling results presented in this report represent a first attempt to develop coherent scenario projections for resource efficiency and sustainable production and consumption that decouple economic growth from environmental degradation as called for by

¹ Chapter 3 describes the impacts of natural resource extraction and processing, and in selected cases, extends this coverage to the economy-wide impacts.

SDG 8.4 and SDG 12.2. This decoupling seeks to meet essential human needs for food, water, energy, and shelter (represented by SDGs 2, 6, 7, and 9) while protecting the natural and social capital (represented by SDGs 13, 14, 15, and 17) that underpins all life and earth system functions.

Well-chosen and coordinated sustainability actions – particularly resource efficiency and sustainable consumption and production policies – can achieve significant decoupling, while increasing economic growth and more equitable distribution of income and access to resources. Ambitious actions modelled in the *Towards Sustainability* scenario see incomes and resource-based services increase significantly across all groups of countries, while environmental pressures and impacts fall dramatically. This contrasts starkly with the outlook under *Historical Trends*, which has similar projected increases in income, but higher resource extractions, and escalating and clearly unsustainable environmental pressures – including rising greenhouse gas emissions, increasing pressures on water sensitive ecosystems, and reduction in the quality and extent of forests and other native habitats. Notably, under *Historical Trends*, global resource extraction grows to 190 billion tons by 2060, compared to 143 billion tons under *Towards Sustainability* – which is 25 per cent lower than historical trends. Decision- and policymakers today can work to achieve this ambitious outcome.

A Societal Response to Determine Our Shared Future

Obstacles, such as environmental challenges and fundamentally driving change in the current consumption and production systems, come with opportunities. In particular, transformations in how natural resources are extracted, processed, used, and then finally disposed of around the world can be harnessed through collective action by governments, the private sector, and civil society organizations.

To actualize the assumptions made in the *Towards Sustainability* scenario in a useful way for decision- and policymaking, real world examples of policy implementation that are aligned with the assumptions made in the model are presented in the report. Moreover, eight approaches for multi-beneficial policy making are outlined. A separate Summary for Policy Makers is available on the International Resource Panel website² that explains in detail the most relevant findings for policymakers.

Among the eight strategies is the use of indicators and targets at all levels of governance that inform national plans for a sustainable use of natural resources and that enable governments to identify priorities and proceed in a coordinated way. Transitions to sustainability will require multiple complementary measures that together effectively achieve the domestic objectives. The set of policy instruments employed will differ in context and scope depending on the national situation from country to country. In all cases, the policy mixes developed to improve the use and management of natural resources should be closely coordinated with policies for climate mitigation and adaptation and biodiversity protection. It is further noted that the circular economy promotes value-retention and environmental impact reduction while simultaneously reducing costs and creating economic opportunities, thus contributing to resource efficiency and sustainable consumption and production.

² www.resourcepanel.org

Further, engaging in dialogue to connect with citizens, civil society, and the private sector builds consensus. International exchanges and cross-country cooperation can accelerate the transition and support national decisions, contributing to creating a level playing field for businesses and goods, allowing the navigation of obstacles, promoting shared experiences, and finding ways to leapfrog. While it is clear impact decoupling and improving resource efficiency should be an internationally pursued effort with the involvement of all countries, both the different responsibilities and capabilities of countries will have to be taken in account in an adequate manner. These different aspects call for a global discussion.

The final message of this report should be one of hope and optimism. While additional research is needed, an extensive knowledge base about natural resources use, their pressures, and their impacts exists. Existing or feasible technologies can be applied in the short term across all sectors and countries to improve natural resource use and management. Emerging business models and best practices that embrace the circular economy and leapfrogging technologies generate enormous resource and economic savings, while still driving development. Policy- and decision-makers have tools at their disposal to advance transformative change. Importantly, this involves national actors working together across borders to achieve this change. Using the results from this report, multi-stakeholder collaboration, and innovative solutions, we can resource the future we want.