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## Articulating natural resources and sustainable development goals through green economy indicators: A systematic analysis



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### ABSTRACT

Natural Resources are essential inputs for economic and social development. However, unsustainable resource use has led to environmental degradation and resource depletion, endangering the well-being of humanity and the environment. The 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs) represent a plan of action to address these issues. The Green Economy (GE) concept is described by various institutions as a vehicle to move towards sustainable resource management. This paper demonstrates the linkages between SDGs and Natural Resources through the systematic analysis of 494 GE indicators, derived from 12 distinct frameworks focusing on GE or on Green Growth. This articulation provides insights to gain an improved understanding of the links between SDGs and Natural Resources and interpret their inherent complexity. GE indicators focus unevenly on SDG, although each SDG is related to at least one resource category. Two complementary typologies were applied to the Materials subcategory to highlight additional characteristics, leading to the proposal of an adaptable analytical framework for the assessment of sustainability issues and GE transitions.

### 1. Introduction

Natural resources are fundamental building blocks of socio-economic systems from the local to the global scale and shape the well-being of humanity, the environment and the economy (IRP, 2017a). Unsustainable Natural Resource use has however led to environmental degradation, to the point that human actions have become the main driver of environmental change in the global Earth system and are putting pressure on multiple planetary boundaries (Rockström et al., 2009). Given the crucial role played by Natural Resources (NRs) in economic activities (Bakshi et al., 2011), there is global consensus on the need to sustainably manage NRs so that the planet may support the needs of the present and future generations (UN, 2015), while avoiding excessive disruption of local and global environmental systems (IRP, 2017b).

In 2015, the international community devised the 2030 Agenda for Sustainable Development, a plan of action for people, planet and prosperity, addressing the issues of environmental degradation and resource depletion that exacerbate the challenges faced by humanity. In this context, the 2030 Agenda contains a set of seventeen integrated and indivisible Sustainable Development Goals (SDGs), 169 associated targets and as of end 2017, 232 indicators, intended to stimulate action

over the 2015–2030 time period in areas of critical importance for humanity and the planet (UN, 2017).

In practice, even if the interconnection between NRs and Sustainable Development has been noted since many years (MA, 2005; Stern Review, 2007; Intergovernmental Panel on Climate Change (IPCC, 2007), the relations between NR-based frameworks and the 2030 Agenda for Sustainable Development are far from explicit. To date, very few studies have explored how such an integration can be concretely achieved at a systemic scale and within a common conceptual or evaluative framing. Bringezu et al. (2016) conceptually crossed SDGs with resource use “challenges and risks”, while Hák et al. (2016) combined both concepts with additional frameworks.

The concept of Green Economy (GE) is often defined as one “that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities” (UNEP, 2011) and is seen by the EEA as a requirement for sustainably managing natural resources (EEA, 2012). Being inextricably linked to both SDGs and NRs, GE could serve as a pathway to sustainable resource management with the objective to meet the needs of present and future generations. The pertinence of this triangulation is also illustrated by the bibliometric analysis carried out by Loiseau et al. (2016). According to these authors, “sustainable development” and “resources”

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are the two most frequent keywords related to the GE concept in the scientific literature since 1990. Thus, GE may be the “mortar” needed to assemble these two concepts and solidify the resulting composite framework. However, there is no universally accepted definition for the GE concept, which has led to a multiplicity of definitions and related frameworks, including some focusing on the concept of Green Growth (GG) (OECD, 2017).

The present paper addresses the following research questions:

- How SDG and NR typologies may be coherently and efficiently articulated for improving current measurement systems?
- What SDG-NR interlinkages characterize the GE concept? Are they consistent with the existing definitions of the GE concept?
- How can the large amount of available indicators and concomitant frameworks be more effectively used for improved governance in the fields of sustainability and green transitions?

To handle such questions, this research used a particular perspective on indicators, derived from measurement frameworks focusing on the GE or GG concept. Indicators are most often conceived as parameters that provide information about the state of a system (UN, 1997). Depending on the context in which they are used, indicators can be relatively broad, encompassing multiple components, as well as very detailed specific attributes, representing the specific data that is collected (Heink and Kowarik, 2010). Moving “from data to information” (Stanners et al., 2007), this research recognizes indicators as epistemological markers presenting a particular “story” through embedded ideas, discourses or arguments (Stanners et al., 2007; O’Connor and Spangenberg, 2008). Indicators are thus not exclusively seen as parametrical descriptions or through the explicit data they provide, but also through their underlying signification, as pieces of a “conversation” (Bell and Morse, 2001). When conceived in that way, indicators may be remarkably useful to elucidate which features and aspects better characterize ambiguous concepts, as well as to detangle complex inter-related issues (Merino-Saum, 2015).

The paper is structured as follows. Section 2 presents the methodology applied. Section 3 sheds a light on all the data gathered through our indicators screening and their subsequent analysis. Section 4 consists of the quantitative results obtained through data analysis; the focus progressively moves from (i) SDGs to (ii) NRs and is finally placed on an (iii) articulation of these two concepts through a specific focus on material resources. Section 5 provides a discussion based on previous results. Section 6 concludes.

## 2. Conceptual framing and methodological issues

### 2.1. The GE concept, at the crossroads of SDGs and NRs

The proximity between GE and Sustainable Development was explicitly and rapidly underlined when the former re-emerged in the late 2000s through the *Green Economy Initiative* (2008) and the *Global Green New Deal* (2009), both of them launched by UNEP. Indeed, the GE was institutionally presented as a “vehicle” to deliver Sustainable Development (UNEP, 2012), and was even perceived by some authors as a “child” of Sustainable Development (Jacobs, 2012) whose birth derived more from pragmatic choices than from a clear conceptual differentiation. As UNEP (2011) points out in its widely quoted *Green Economy Report*, “moving towards a GE must become a strategic economic policy agenda for achieving Sustainable Development”. GE is thus often presented in the scientific literature as an institutional tentative to: (i) overcome the decreasing traction that Sustainable Development was experiencing over the first decade of current century (Jacobs, 2012); (ii) promote rapid action at times of crisis (Bina and La Camera, 2011); and (iii) build a consensus in the occasion of Rio+20 (Bina, 2013).

In more recent times, the need for establishing concrete and explicit links between GE and SDGs has been underlined by PAGE (2017),

whose *Green Economy Progress Index* is made of indicators unambiguously correlated to most of the 17 SDGs.

The interconnection between GE and NRs is as much evident. According to UNEP (2012), resource efficiency represents one of the cross-cutting thematic priorities that GE indicators should always cover. For EEA, resource efficiency was seen from the beginning as a “necessary criterion” for GE (EEA, 2011). More recently, in its 7th Environment Action Programme, EEA consider “to turn the Union into a resource-efficient, green and competitive low-carbon economy” as one of its three priority objectives (EEA, 2016). In a similar way, the TEEB sees “measures for eco-efficiency and wider resource efficiency” and “decoupling the economy from resource use and its negative impacts” as two of the six fundamental building blocks in the transition to a GE (ten Brink et al., 2012). OECD also explicitly refers to resources when defining Green Growth and sees “resource efficiency” as one its four key objectives (OECD, 2011). For the World Bank, Green Growth is also “one that is efficient in its use of natural resources, clean in that it minimizes pollution and environmental impacts and resilient in that it accounts for natural hazards” (World Bank, 2012).

### 2.2. Sample description

The research team defined the sample in two subsequent phases. The first one, primarily heuristic, aimed at opening up the spectrum of potentially pertinent measurement frameworks. The second phase attempted to close down the set of conceivable inputs by concretely determining those to be included in the final sample.

A literature review was carried out on scientific papers as well as diverse documents from grey literature in relation to GE. Measurement frameworks were methodically collected and screened through a set of basic criteria (Table A1, in Appendix A). During this first phase, the research team also informally consulted several members from international institutions working on GE indicators.

Once all potential measurement frameworks had been identified (“snowball sampling” technique), the focus was placed on the concrete delimitation of sample’s boundaries. Potential frameworks were included or excluded into the final sample according to the following criteria:

- (i) The scope was voluntarily placed on institutional sources (i.e. reports; policy briefs; working papers; technical notes; etc.). In that sense, the GE concept originally emerged from the scientific field of *Environmental Economics* (Pearce et al., 1989). However, since the 2008 global financial crisis, it has been primarily articulated and principally fostered by international organizations such as UNEP, World Bank, EEA and OECD (Borel-Saladin and Turok, 2013; Ferguson, 2015; Anderson et al., 2016; Loiseau et al., 2016; Georgeson et al., 2017). The concept is particularly well established in the international political sphere where it has drawn strong attention and mobilized significant financial means. The later progressively implied great impetus to concomitant initiatives aimed at measuring, monitoring and benchmarking transition towards GE.
- (ii) The research team only considered multidimensional frameworks that address GE in general and do not exclusively focus on particular sectors, environmental issues or economic activities. Frameworks having such a specific focus were excluded from the final sample.
- (iii) Only those frameworks adding significant novelty to the field of GE indicators were taken into account. The research team estimated the originality of each potential framework according to not only the indicators concretely selected, but also the overall framing and the particular focus chosen. Therefore, applications at national level of previous measurement frameworks suggested by international institutions were not considered (even if they slightly adapt the original framework to the particular context of the country at

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