
Encyclopedia of the UN Sustainable Development Goals

Series Editor

Walter Leal Filho

The problems related to the process of industrialization such as biodiversity depletion, climate change, and a worsening of health and living conditions, especially but not only in developing countries, intensify. Therefore, there is also an increasing need to search for integrated solutions to make development more sustainable. The current model of economic growth used by many countries is heavily based on the exploitation of natural resources, which is not viable. Evidence shows that a more careful, that is, a more sustainable, approach to the use of our limited resources is needed.

The United Nations has acknowledged the problem, and among other measures, it produced a set of documents at the UN Conference on Sustainable Development (Rio+20), held in Rio de Janeiro, Brazil, in 2012. In 2015, the UN General Assembly approved the “2030 Agenda for Sustainable Development.” On January 1, 2016, the 17 Sustainable Development Goals (SDGs) of the Agenda officially came into force. These goals cover the three dimensions of sustainable development: economic growth, social inclusion, and environmental protection.

There are to date no comprehensive publications addressing the SDGs in an integrated way. Therefore, the Encyclopedia of the UN Sustainable Development Goals is being published. It encompasses 17 volumes, each devoted to one of the 17 SDGs.

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Industry, Innovation and Infrastructure

With 166 Figures and 100 Tables

 Springer

Series Preface

The United Nations General Assembly agreed and approved in September 2015 the document “2030 Agenda for Sustainable Development”, which contains a set of measures aiming to balance economic progress and protection of the environment, while at the same time remain aware of the need to address the many disparities still seen between industrialized and developing countries.

The Agenda document consists of 17 Sustainable Development Goals (SDGs). These Goals build on the successes of the Millennium Development Goals, while including new areas such as climate change, economic inequality, innovation, sustainable consumption, peace and justice, among other priorities. The goals are interconnected – often the key to success on one will involve tackling issues more commonly associated with another. The 17 SDGs are:

SDG 1, placing an emphasis on ending all forms of extreme poverty.

SDG 2, which aims to end hunger and achieve food security with improved nutrition

SDG 3, focusing on ensuring healthy lives and promoting well-being for all

SDG 4, touches on one of the most important areas, namely inclusive and quality education

SDG 5, focusing on gender equality

SDG 6, which emphasizes the need for clean water and sanitation

SDG 7, advocates the need for affordable and clean energy

SDG 8, sustaining inclusive and sustainable economic growth with productive and decent working conditions for all

SDG 9, which intends to foster industry, innovation, and infrastructure

SDG 10, being about reducing inequalities among countries

SDG 11, an attempt to ensure that human settlements and cities are inclusive, safe, resilient, and sustainable

SDG 12, with a focus on sustainable consumption and production patterns

SDG 13, with an emphasis on the need for climate action

SDG 14, raises the need to preserve life below water, especially rivers and oceans

SDG 15, draws attention about the need for a greater care about life on land

SDG 16, which advocates peace, justice, and strong institutions

SDG 17, a cross-SDGs effort to foster the partnership for the goals and their delivery

The SDGs and their specific objectives are very complex. The mandate of the Encyclopedia of the UN Sustainable Development Goals is, therefore, to clarify and explain a wide range of terms associated with each SDG. It does so by gathering and presenting inputs provided by experts from across all areas of knowledge and from round the world, who explain each term and their implications, drawing also from the latest literature.

With 17 volumes and involving in excess of 1,500 authors and contributors, the Encyclopedia of the UN Sustainable Development Goals is the largest editorial project on sustainable development ever undertaken. We hope that this publication will be helpful in fostering a broader understanding of the SDGs, and that this process may inspire and support a wide range of initiatives aimed at their implementation, thus realizing the “2030 Agenda for Sustainable Development”.

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Volume Preface

The basis of SDG9 is the need to facilitate the development of sustainable and resilient infrastructure, especially in developing countries, through increased financial, technological, and technical assistance to African countries, least developed countries (LDCs), landlocked developing countries, and small island developing states.

In addition, SDG9 intends to support local technology development, research, and innovation in developing countries, including the establishment of an enabling policy environment. This should contribute towards industrial diversification and value creation, especially – but not only – in the raw materials sector.

Operationally, SDG9 can be implemented by promoting broad-based and sustainable industrialization. The idea is that by 2030, there will be a substantial increase in the share of industry in employment and gross domestic product, according to national circumstances. It is also expected that double the share will be achieved in the least developed countries. One of the means of achieving it is via increased access to financial services, including affordable credit, for small industrial and other enterprises and their integration into value chains and markets.

With this volume, we attempt to emphasize and also showcase the advantages of implementing SDG9. The road towards its full implementation also includes the urgent need to modernize infrastructure and retrofit industries, so as to make them sustainable by 2030. The idea is that with more efficient use of resources and increased use of clean and environmentally sound technologies and industrial processes, all countries will be able to pursue sound economic development, according to their respective capacities. One of the means to implement SDG9 is to better use the scientific research and the technological capacities of industrial sectors in all countries – especially in developing countries – by promoting innovation. But in order to achieve this, it is important to increase the number of R&D personnel per million people and increase public and private spending on R&D by 2030.

Another sector which may also help foster the implementation of SDG9 is information and communication technology (ICT). Here, it is important to significantly expand access to ICT and provide universal and affordable access to the Internet, especially in the least developed countries, by 2020. This will help them take greater advantage of the many business opportunities seen in the industrial sector and foster innovation.

We hope the contributions in this volume will provide a timely support towards the implementation of SDG 9, and will help foster the ongoing global efforts towards developing high-quality, reliable, sustainable, and resilient infrastructure (including regional and cross-border ones) to support economic development and human well-being, with a focus on affordable and equitable access to industrial products and services for all.

April 2021

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About the Editors



Walter Leal Filho (B.Sc., Ph.D., D.Sc., D.Phil., D.L., D.Litt., D.Ed.) is Professor and Director of the European School of Sustainability Science and Research, whose Headquarters are at the Hamburg University of Applied Sciences in Germany. He also holds the Chair of Environment and Technology at Manchester Metropolitan University, UK. He is founding editor of the *International Journal of Sustainability in Higher Education* and heads the Inter-University Sustainable Development Research Programme (IUSDRP), the world's largest network of universities engaged on sustainable development research. He is also Editor-in-Chief of the World Sustainable Development series with Springer. Prof. Walter Leal serves on the editorial board of various journals. He has in excess of 400 publications to his credit, among which are groundbreaking books such as *Universities as Living Labs for Sustainable Development: Supporting the Implementation of the Sustainable Development Goals*, *Social Responsibility and Sustainability*, and *Handbook of Sustainability Science and Research*. He has nearly 30 years of field experience in project management and has a particular interest in the connections between sustainability, climate change adaptation, and human behavior.



Anabela Marisa Azul is a Researcher at the Center for Neuroscience and Cell Biology (CNC) and Institute for Interdisciplinary Research of the University of Coimbra (UC, Portugal). She holds a Ph.D. in Biological Sciences, with specialization in Ecology (2002, UC), and pursued her investigation on biology and ecology of fungi to pinpoint the role of mycorrhizal symbiosis for sustainability of Mediterranean forests under different land use scenarios, at the Centre for Functional Ecology (CFE-UC), where she became an Associate Researcher (from 2009 to 2014). At CFE-UC, Marisa Azul developed a holistic approach that combined innovation in food production with sustainable development and public scientific awareness to multiple actors. At CNC, from 2014 onward, she focuses her investigation on basic research and participatory research dynamics to pinpoint links between fungi-metabolism-health/disease-sustainability. She has coedited over 40 scientific publications and book chapters, coedited four books for children and two comics, and coproduced an animation.



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Amanda Lange Salvia has a degree in Environmental Engineering from the University of Passo Fundo, Brazil, and graduate studies focused on sustainable cities and universities. Her work focuses on the Sustainable Development Goals, the role of universities towards sustainability and the impacts of climate change. Amanda has experience with international studies assessing aspects related to the 2030 Agenda and sustainability in higher education. She is a reviewer for various

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Tony Wall is Founder and Head of the International Centre for Thriving, a global-scale collaboration between business, arts, health, and education to deliver sustainable transformation for the common good. He is passionate about *thriving* and has published 200+ works, including articles in quartile 1 journals such as *The International Journal of Human Resource Management* and *Vocations and Learning*, as well as global policy reports for the *European Mentoring & Coaching Council* in Brussels. Overall, his leadership and international impact in these areas have attracted numerous accolades including the prestigious Advance-HE National Teaching Fellowship and three Santander International Research Excellence Awards.

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