

Heading towards an unsustainable world: some of the implications of not achieving the SDGs

Walter Leal Filho¹ · Franziska Wolf¹ · Amanda Lange Salvia¹ · Ali Beynaghi² · Kalterina Shulla³ · Marina Kovaleva¹ · Claudio R. P. Vasconcelos^{4,5}

Received: 22 July 2020 / Accepted: 19 August 2020
© The Author(s) 2020 

Abstract

The Sustainable Development Goals (SDGs) were conceived at the United Nations Conference on Sustainable Development, held in Rio de Janeiro in 2012 (Rio + 20), and adopted by the United Nations General Assembly in September 2015. They are part of a larger framework, namely the UN 2030 Agenda for Sustainable Development. Since then, many countries round the world have been engaging in respect of their implementation. The slow progress seen in the implementation of the SDGs, is in contrast with the many negative implications of not implementing them. This paper outlines the relevance of the SDGs, the barriers currently seen in respect of their implementation and outlines what is at stake, if they are not duly implemented. To accomplish this, a thorough literature review of contributions published in the field of SDGs in English between the years 2012–2020 was performed.

1 Introduction: the importance of the Sustainable Development Goals

During the past centuries, almost all the systems have been developed through natural processes. However, with the technological advancements today, development is moving faster than our expectations. Therefore, having no plan for well-being and environment can cause serious problems to the future societies. As a result of the fast-moving unbalanced economic growth, the world's systems may lose their ability to adjust with the people's well-being which also significantly affect the environment. In this era, having a systematic action plan can definitely help to focus on a common perspective.

To this end, on 25 September 2015, countries in UN adopted a set of 17 Sustainable Development Goals (SDGs), representing a new coherent way of thinking about ecological, social, and economic issues that are inter-related [1]. Considering as the “transformative agenda” [2], the SDGs address all the critical and major global challenges that threaten the future, including those related to poverty, inequality, climate change, environmental degradation, peace and justice, necessarily entails an integrated approach.

Different studies have analyzed challenges and opportunities of the SDGs [3, 4]. Some scholars and practitioners have referred to the fact that these goals are not easy to achieve due to the diversity of the elements involved [5]. Moreover, the importance of including interdependencies between the goals [6, 7], taking a nexus approach [8–10], and strengthening

✉ Marina Kovaleva, Marina.Kovaleva@haw-hamburg.de; Walter Leal Filho, esssr@ls.haw-hamburg.de; Franziska Wolf, Franziska.Wolf@haw-hamburg.de; Amanda Lange Salvia, amandasalvia@gmail.com; Ali Beynaghi, a.beynaghi@gmail.com; Kalterina Shulla, kalterina@yahoo.co.uk; Claudio R. P. Vasconcelos, claudioruy@yahoo.com | ¹European School of Sustainability Science and Research, Hamburg University of Applied Sciences, Ulmenliet 20, 21033 Hamburg, Germany. ²Office of Sustainability, Amirkabir University of Technology (Tehran Polytechnic), Tehran, Iran. ³ZEF, Center for Development Research, University of Bonn, Germany, Genscherallee 3, 53113 Bonn, Germany. ⁴Laboratory of Sustainability Engineering and Consumption, Federal University of Paraíba, João Pessoa, PB, Brazil. ⁵Algoritmi Research Centre, School of Engineering, University of Minho, 4800-058 Guimarães, Portugal.



governance and institutions [11] have been highlighted in some studies in order to achieve these goals. Nevertheless, the significance of the SDGs can be viewed from different perspectives. For instance:

- *Addressing essential human needs.* As the world population grows fast, there is an essential need for the basics of life such as drinking water, food, and shelter. To achieve this, appropriate establishment of plans as well as creating infrastructures are able to guarantee the sustainability of these basic needs for long term periods [10].
- *Managing climate change.* Strategies for sustainable development and climate change have shown many common fundamentals, suggesting that sustainable development is a key to capacities for mitigation and adaptation [12]. It is believed that addressing them jointly can synergistically help the future generations. This is one of the main purposes of the SDGs to reduce the excessive use of harmful fossil-based sources. To take the example of China, air pollution from over-reliance on coal-based electricity generation and other fossil fuels contributes to the deaths of more than 1.2 million per year [13]. Therefore, such a path is not merely unsustainable; it is a prescription for disaster. Hence, the 2030 Agenda and its 17 SDGs highlight that a sustainable transformation to renewable energies is sorely needed [14, 15].
- *Financial stability.* Financing has always played a key role in the realization of other targets and goals. Sustainable development practices can potentially have a decisive influence on the stability of the financial system to create more financially sustainable economies across the globe. The critical role of energy has been highlighted in this road by the former United Nations Secretary-General Ban Ki-moon: “energy is the golden thread that connects economic growth, social equity, and environmental sustainability” [16]. As a result of the low carbon policy, developing countries can leverage renewable forms of energy to compete with the developed countries and to power up their economies. It is believed that by achieving the SDGs in this sector, many sustainable jobs will be created, affecting the stability of the economy [17].
- *Sustaining biodiversity.* The current state of overconsumption practices all around the world has negatively affected biodiversity. The natural ecosystem is designed in a subsequent manner that species depend on one another in a circular way. The SDGs and affords to achieving them encourage us to back to the nature. This will result a balance in the biodiversity of different species [18–20].

Finally, it should be noted that to achieve the SDGs, based on the multidisciplinary nature of sustainability: (1) Innovative transition pathways are required to allow countries to move forward, and (2) a collaborative work should be done in a global scale. Focusing on universality of the 2030 agenda, although countries develop their own pathways to national targets, it is not limited to the borders and cultures. The ultimate goal of all these affords is saving the whole planet for the future generations. Hereafter, the paper discusses barriers to the implementation of the SDGs, followed by the used methodology, and results and discussion, presenting some of the consequences of not reaching the SDG with an emphasis on a worst-case scenario.

2 Barriers to the implementation of the UN Sustainable Development Goals

Although the SDGs, also known as “global goals” are supported by several countries, many challenges current hinder their implementation. Some of them are as follows:

1. **Vague goals:** Several of the goals are not well explained allowing for own interpretation and thus weak implementation. Therefore, it is imperative that the SDGs have indicators and benchmarks as well as formal agreements with governments for implementation [21].
2. **Collective action:** It is difficult to ensure that several parties work together to achieve the set goals. Several coordination issues exist preventing the efficient implementation of goals [22].
3. **Trade-offs:** The 17 SDGs were developed to ensure economic and environmental sustainability however, conflicts between each goal may exist. This causes the need for trade-offs to be identified i.e. sacrificing parts of one goal to benefit another goal when it is impossible to achieve both. Until all trade-offs and conflicts are identified it will be difficult to implement goals [23].
4. **Accountability:** A major challenge in application of goals is ensuring accountability for commitments made to the SDGs. This will ensure that targets and goals will be met within the prescribed period of time by the committed parties. A lack of accountability will reduce the chances of proper implementation [24, 25].

5. **Financial constraints:** In order to achieve goals set, a large amount of financial investment is required. Several countries lack the capital needed to fund the programmes involved in reaching the SDGs. This is more evident in third world countries as opposed to developed countries [26].
6. **Capacity building:** This requires parties involved in the development programmes to acquire all the skills, tools and education needed to carry out tasks to achieve goals. This is often not possible due to various reasons including location, finance, and trained personnel [26].
7. **Technology and data:** The success of any project requires the large-scale collection of data and monitoring of trends. This process is dependent on having the necessary updated technology which is not always available. This is more so apparent in developing countries making it more difficult to implement SDGs. Furthermore, some countries lack the infrastructure that is necessary for implementation [27].
8. **Culture:** Some cultures prohibit people from being open to new ideas and development. This seen significantly with indigenous groups which hampers the implementation of strategies [28].

The timeframe for the SDGs implementation has entered the “Decade of Action” 2020–2030. The UN High Level Political Forum (HLPF) in September 2019 on the “SDG Summit”, stressed that necessity for action on three areas “*global*” “*local*”, and “*people*” [29].

Table 1, connects the above mentioned SDGs challenges with these areas of actions, and explains some of the governance aspects for each of the challenges.

The challenges for SDGs are also interdependent. Resolving some issues would result in improving other conditions. For instance, “*Collective action*”, requires guidance and global coordination, which would emphasize inclusive decision making, involvement of diverse actors, and contributions from all sources. On the other hand, enhancing collective action can influence “*Accountability*”, probably by defining clearer roles and responsibilities for the national/local governments, which still remain the main responsible actors. Collective action is also important for “*technology and data*” that would feed to the SDGs framework, through an integrated global approach. Better coordination of financial resources in international level can also resolve some “*financial constraints*”. Exchanges between countries and actors can facilitate “*Capacity building*”.

Additionally, “*Trade-offs*” can depend on the counties priorities, and the interests of the donors for specific SDGs. Silos approach from some governments can negatively influence the implementation of the 2030 Agenda as a whole. Uneven implementation of the Goals is also related to unbalance development between countries and their political

Table 1 Connections between SDG challenges and governance

Global action areas (2020–2030)	SDGs challenges	Governance aspects
Global action	Collective action	International cooperation, political leadership and guidance at international level, political stability
	Accountability	Clear responsibilities to national governments and multi-national organizations
	Financial constrains	Global resources for SDGs, economic equity, private sector finances for SDGs
	Capacity building	Exchange between countries, smart solutions, knowledge transfer
	Technology and data	Integrated global monitoring framework, open data
Local action	Accountability	Clear responsibilities within the public sector entities, scalability to multi-stakeholders and to multi-levels of governance
	Collective action	Organized platforms or cooperation mechanisms that engage a wide range of actors, in national and local level
	Capacity building	Initiatives and resources for capacity building
	Trade-offs	No silos approach and balanced commitment to all SDGs
	Vagueness of goals	Aligning SDGs with national/local agendas and budgets, synergize Targets and Indicators with local national benchmarks
People action	Collective action	Reaching to all layers of society, involving diverse communities in SDGs processes (youth, civil society, media, the private sector, unions, academia etc.)
	Culture	Raise awareness and advocacy about the benefits of SDGs, for different groups of society and individuals
	Financial constrains	Financial resources for communities and individuals to facilitate their commitment to SDGs

environment. The ambiguity or “Vagueness” of the Goals can hamper “data and technology” as an obstacle for the SDGs reporting and monitoring framework. Thus risking an unmeasured performance even when there are contributions toward the SDGs. Another important element is the synchronization of different agendas, so the SDGs to become a common language. In this aspect “Culture” and bringing SDGs to the basis would require awareness rising, financial resources and coordination.

3 Methodology

Based on the need to foster a better understanding of the consequences of not implementing the SDGs, this work had three main objectives. Firstly, it intended to outline the relevance of the SDGs in achieving global sustainability. Secondly, it aimed to present the main barriers faced in the implementation of the SDGs. Finally, it intended to outline the implications of failing in implementing the 2030 Agenda.

To accomplish those objectives an extended literature review was performed, which is defined by Aboudaoude, Feghali, and Kfourri [30, p. 27], as “a critical look and in depth interpretation and assessment of previous research relevant to the topic or problem being studied”. The literature review was applied to select a comprehensive set of contributions that adequately represent the body of references published within the field of SDGs addressed to its relevance, the state-of-art of its implementation, in terms local and global, as well as, the major challenges reported that hinder its proper implementation and also studies that described the consequences experienced in regions which have had a poor performance in implementation of SDGs.

Several library databases were used in the process of searching and collecting references for this review, including ScienceDirect, Taylor & Francis, Springer, Sage, EBSCO, ProQuest, Wiley, and Emerald.

The following three criteria were employed to select the articles used in this study:

1. Period: studies published between 2012 to 2020;
2. Language: in English;
3. Themes: related to the integration of SDGs and theoretical framework; cases of implementation and performance of SDG in specific regions; major sustainability problems regarding to the low implementation of whole SDGs or a specific objective; advantages and transitions paths related to higher-level implementation of SDG; and, global reporting and monitoring results of SDG implementation.

While contributing to the knowledge on the evolution of SDS implementation over time, the study presented in this article nonetheless is subject to the following limitations: the first is related to the fact that this article only considers references published in English, disregarding cases and reports published in other language than English; the second, considering that the literature on SDGs is exhaustive and full coverage of all the articles is not achievable, there was a need to prioritize the scope considered most globally relevant, and may have disregarded others more specific aspects considered pertinent for a given region.

4 Results and discussion

Table 2 presents an overview of some of the consequences of not implementing the SDGs. Due to their importance, the analysis entails all SDGs and does not prioritise any specific one. It can be seen that the consequences of a non-implementation are significant, and may endanger the lives of many people.

The implications of the non-achievement of the SDGs are significant. For instance, success in achieving poverty reduction is of crucial importance for every country around the world. Even in case of optimistic scenarios, African countries such as Nigeria Benin, Burundi Central African Republic, Malawi, Mali, Mozambique, Somalia, South Sudan, and Zambia are expected to have poverty levels increased by a further 20% by 2030 [71, 72], characterising what is “extreme poverty”. These countries are also likely to be affected by various climate hazards and disasters [72]. Annually, the global economy losses in excess of USD 520 billion means that 26 million additional people are pushed into poverty [73].

Provision of food security is also heavily impacted by climate variability and extreme weather events, threatening the well-being of the poor [74], especially in countries where food needs are not met due to limited resources. In 2017, nearly 821 million people were affected by chronic food deprivation or undernourishment [74].

Table 2 Some of the consequences of not reaching the SDGs. Source: prepared by the authors

SDGs	Implications of not achieving them
 <p>1 NO POVERTY</p>	<p>More than half of the world's population would still have no access to social protection and hundreds of millions would be living in extreme poverty, mostly in Africa [31]</p> <p>If other SDGs would also not be met, conflicts and climate change would worsen the situation. Children would keep being disproportionately affected and it would distress their whole lives [32]</p> <p>If climate action is not taken, extreme weather events would certainly endanger the poverty situation [33]</p>
 <p>2 ZERO HUNGER</p>	<p>Following the tendency currently observed, more people would be undernourished and malnutrition and overweight would still be a serious problem (especially for children) [34]</p> <p>Extreme weather events and conflicts would further threaten food availability [35, 36], affecting also food price. Additionally, food production systems and resilient agricultural practices might not have been implemented, worsening land and soil quality [37] and failing to care for ecosystems</p>
 <p>3 GOOD HEALTH AND WELL-BEING</p>	<p>Local or even global health crisis could be a reality if this goal is not achieved. Spread of epidemics would cause impacts in social life but also in economic issues and supply of medicines, food and water, among other basic needs, demanding a framework of actions for response [38]. The number of deaths and illnesses from the most varied types of risk [39] would demand major investments in treatment interventions</p>
 <p>4 QUALITY EDUCATION</p>	<p>Not realising this goal would imply in approximately 50% of children in the world without minimum proficiency standards in mathematics and reading and out of school [34], making it more difficult to escape poverty and participate in a tangled global economy (jeopardising also economic growth)</p> <p>Despite the advances in early childhood education, low-income countries would still lack behind and suffer the consequences (primarily related to difficulties for learning at later years) [40]. Lack of investments on lifelong learning and illiterate adults would compromise future opportunities and awareness of the need for behaviour change to more sustainable lifestyles [41]</p>
 <p>5 GENDER EQUALITY</p>	<p>Not achieving gender equality would have two main types of consequences: one related to economic issues and other even more worrying, concerning social and physical violence. The former includes unpaid work, denied decision-making positions to women and disproportional salary, among others [42, 43]; the latter refers to millions suffering from forced marriage or physical/sexual violence [44]</p>
 <p>6 CLEAN WATER AND SANITATION</p>	<p>Hundreds of millions would still remain without basic drinking water services and practising open defecation [34]. Clean water and proper sanitation would be unattainable for billions</p> <p>Due to the consequences of not reaching other SDGs as well (including increased infrastructure demand and climate consequences) people could be displaced and experience water stress. This situation would certainly affect education and health [45, 46], among other sustainability goals</p>
 <p>7 AFFORDABLE AND CLEAN ENERGY</p>	<p>By not increasing considerably the share of renewable energy in the global energy mix, the consequences would be mainly related to climate (e.g. substantial carbon emissions and reduced air quality) [47] in addition to probable conflicts for the consumption of fossil fuels. This might happen especially due to the inefficacy in electrifying the transportation sector [48]. Additionally, billions would still be using polluting cooking systems [34]</p> <p>Despite the positive trend of improvements in energy efficiency, not meeting this target would also prevent the reduction of greenhouse gas emissions [49]. Consequently, increase in temperature and negative effects on climate would be observed</p>
 <p>8 DECENT WORK AND ECONOMIC GROWTH</p>	<p>The current concern of lack of job opportunities, especially for young people [50], and the spread of informal employment would continue to be a preoccupation if this goal is not met. This one might be the SDG with the highest level of disparities among world regions [34]. Unemployment and lack of engagement in education or training could impact other goals [51], worsening poverty and inequality, for example</p>
 <p>9 INDUSTRY, INNOVATION AND INFRASTRUCTURE</p>	<p>The lack of development of manufacturing sectors, especially in developing countries, would endanger productivity and competition [52]. Smaller industries and business would probably not have enough resources to invest in innovation and efficiency</p> <p>This inevitably affects employment and reduction of carbon emissions. Moreover, considering that infrastructure was not deployed to be resilient [53], cities would be at risk to suffer from infrastructure loss or damage</p>

Table 2 (continued)

SDGs	Implications of not achieving them
	Inequality within and among countries would imply in prosperity not being shared equally between different population groups [54]. It would negatively affect employment, life quality and probably health as well. If inequality persists in the future, the world would experience more events of migration [55], which expose migrants to several risks and danger in the journey across borders
	The urbanisation represents a challenge to the targets of SDG 11 [56] and if not met it would imply in cities with living conditions that favour carbon emissions and exacerbated use of resources. It pressures waste and water management systems and infrastructure Millions would keep lacking proper waste collection and provision of basic needs (such as sanitation) and living in bad conditions [57]. Harmful air quality, not enough provision of public transportation, and bad network among streets and open public spaces [34] would lead to public dissatisfaction and could cause city crisis
	Not seeing a decoupling of economic growth and natural resources use would imply in bigger global material footprint [58] putting much pressure on the environment. Inappropriate waste management and lack of investments in production and supply chains (i.e. to avoid food waste) would considerably affect availability of resources and pollution of air, water and soil. Detrimental production patterns will also impact greenhouse gas emissions [59]
	Failing in limiting global warming, the concentration of carbon in the atmosphere and the global temperature would entail catastrophic consequences to social systems, to the economy and to the environment, especially due to extreme weather events. Several studies point out these consequences [60, 61], which include sea-level rise and heat waves More resources would be needed to work on mitigation, especially if not invested previously on resilience and adaptation [62, 63]
	Marine life would be endangered due to ocean acidity (that can rise to 100–150% by 2100) [34] and marine pollution. It would also affect the ocean's role to moderate climate change (attributable to the capacity to absorb carbon dioxide) causing more impacts on water, including sea-level rise By not encouraging sustainable use of oceans and preserving coastal and marine areas, part of marine biodiversity would be in severe risk of extinction [64, 65]
	Not protecting biodiversity and territorial ecosystems would lead species to extinction (or risk of being extinct) [66]. Erosion, deforestation and land degradation would affect millions of people, especially due to loss of essential services of well-being and land productivity [67]. Preservation of biodiversity and different ecosystems is fundamental to climate regulation, so this could be an irreparable loss and worsen extreme weather events
	Not achieving peaceful, just and inclusive societies would prevent millions to experience their security, rights and opportunities [34]. The most serious consequences would be related to risk of murder, sexual exploitation, and forced labour. Conflicts among different territories would also compromise life quality and endanger many lives [68]
	Not realizing this goal might be one of the primary reasons not to achieve the others. Not enough investment and resources would have been mobilised to implement global partnership for the goals [69, 70]. For being the SDG with the highest number of global targets, it complies several approaches for a more sustainable world, including finance, technology, capacity-building, trade and systemic issues, and all of these should have progressed together to achieve the goals

The global health system is also threatened by spread of infectious diseases. According to latest estimates, total annual losses from a pandemic are about 0.6% of global GDP [75]. The latest EU scenarios project that real GDP growth might fall to 0% or even be considerably negative as a result of the COVID-19 crisis [76]. It is projected that global GDP will decrease by 2.8% in 2020 in comparison to 1.1% in 2009 [77].

Economic development depends also on education that provides children and youth with knowledge and skills necessary for their future. Unfortunately, the quality of children's education not always reach a necessary level. In low-income countries only 20% of all 3- to 6-year-olds have access to preprimary education, globally this value reaches 50% [78]. Despite the increase of the literacy level among youth, there are still 56 and 44 million illiterate women and men

between age 5–24 years [79]. Education is facing continuous insufficient funding. In 2012, the share of preprimary education in the education budgets of North America and Western Europe accounted to 8.8%, whereas Sub-Saharan Africa allocated only 0.3% for the same purpose [78]. During the last decade, financing of adult learning and education (ALE) has continued to decrease. Worldwide, 14% of the countries allocate less than 1% to ALE and 19% less than 0.5% [80].

4.1 Non-implementation of the SDGs: a worst-case scenario

The 2019 SDG index offers evidence that not even the most progressed countries topping the index, i.e. the EU's Nordic countries Sweden, Norway and Finland, managed to enter a transformative path that would lead to truly achieving all the seventeen Sustainable Development Goals by 2030 [81]. Moyer and Bohl [82] warn that many human development related SDG indicators may not be achieved neither by 2030 nor 2050 on the current development trajectory. As global phenomena like climate change, the continued loss of biodiversity and rising inequality are expected to increasingly impact global human development, a new debate that is emerging slowly in the sustainability field centers around the worst-case scenario: What are likely consequences if the implementation of the SDGs falls short, what may happen if the underlying 169 targets are not reached in 2030 by the global community?

Introduced in 2015, the UN Statistical Commission created the Inter-agency and Expert Group on SDG Indicators (IAEG-SDGs) which is continuously working towards improving the global indicator framework. Until today, measuring SDG performance seems a never-ending story, due to the continued need to develop of appropriate methodologies and standards as well as making required country-level data available that allow reliable truly global SDG monitoring and forecasting [83]. As the SDGs are interlinked with each other (see [84]), Donoghue and Khan [85] highlight the critical need to understand synergies and tradeoffs and act accordingly, bearing in mind that decisions taken in one area may negatively endanger progress in others. Sachs et al. [81] point towards substantial negative ecologic and socio-economic spillover effects generated by high-income nations on low-and middle-income nations, e.g. nurturing poor labor standards or promoting deforestation.

The dynamics and complexity of global development are a substantial challenge to forecasting SDGs achievements. Moyer and Bohl [82] argue that achievement of the SDGs should be analyzed at the country, not regional level to capture progresses made. Several approaches can be found in the literature, e.g. using composite SDG indexes (e.g. [81]) that assess and monitor the current state of SDG achievement at the country level and extrapolate results to show trends. Utilizing baseline scenarios such as the Shared Socio-Economic Pathways (SSPs) found in climate science, i.e. cross-cutting projections of a global future (see IPCC), or back-casting or target-seeking scenarios, i.e. exploring how trajectories towards distinctive goals may look like (see, e.g. [86]), in connection with integrated assessment models that allow assessment at the country level, are another way for generating SDG projections [87].

Referring to biodiversity conservation, Kok et al.'s [86] assessment of an 'option space' provided by three distinctive pathways (see [88, 89]) for agriculture and forestry, the sectors reported to be responsible for up to 60% of the total reduction in global terrestrial biodiversity, suggested that human development may thrive best if the world pursues a global technology pathway whereas a pathway linked to reduced consumption might be less favorable [82]. However, current forecasts on individual SDG achievement or interacting SDG variables only provide downscaled country-level insights, i.e. possibly diluting developmental differences and resulting in a blurred picture [82, 87].

Despite existing methodological challenges, SDG monitoring and forecasting is progressing and has produced first results that point into similar directions (e.g. [81, 87]). For example, differentiating according to world regions, a current study assumes a 'middle-of-the-road scenario' (= SSP2) and analyzing progress of a sub-set of six human development SDGs (i.e. 1, 2, 3, 4, 6 and 7), Moyer and Hedden [87] projected that only 53% of the target indicators assessed may be achieved by 2030. Moreover, 28 particularly vulnerable countries may not achieve any progress in any of the nine human development related target indicators, suggesting an urgent need for initiating action to foster sustainable development within those nations as to leave no one behind.

The dull perspectives suggested by Moyer and Hedden [87] can be underpinned by current monitoring and trends for the respective regions: Presently, Sub-Saharan African countries, show poor performance on socio-economic goals and provide even basic access to services and infrastructure (SDGs 1–9). Negative or even reversed trends are suggested for urban pollution related to sustainable cities (SDG 11), and SDG 15 related to biodiversity loss and deforestation [81]. For the Asia–Pacific region, a recent UN report observed stagnation or even opposite development for more than half the SDGs in the region, especially SDGs 6, 8 and 12. In other areas progress has been achieved, e.g. SDG 1 (poverty), 4 (quality education) and 7 (sustainable energy), but pace appears too slow to meet the 2030 targets [90]. Whereas the situation in East and South Asia may be considered similar relating to SDG 1, 4 and 7 (with exceptions), progress in eight SDGs is

slow in most of those nations (SDG 2, 3, 5, 12–15, 16). However, achieving the SDG targets in a region comprising nations of varying sizes and economic development is a complex endeavor. Despite the eradication of poverty seems viable, the targets of SDG13 and 15 will likely not be met in most of East and South Asia on the current trajectory [81, 91]. Progress in most of the SDGs, especially SDG2 (Hunger), SDG 3 (good health and well-being) and SDG 16 (Peace, Justice and Strong Institutions), in the Middle East and North African region is severely impacted where conflicts and wars exist. Achieving SDG2 appears to be a major challenge for all countries in the region [81]. Latin America and the Caribbean lack behind in SDG 12–15 as their economic development negatively affects their environments, and the regions show little progress if at all in SDG 16 due to deadly crime and corruption. Income and wealth inequalities (SDG 10) persist, and access and quality issues relating to health and education impede progress towards SDG 3 and 4 targets [81]. OECD countries' efforts in terms of climate change mitigation and biodiversity protection need to be accelerated. A lack of agricultural transformation and shifting in diets remains problematic, also inequalities, the poverty of the elderly population and a persistent gender gap relating to pay and unpaid work prevail [81].

This list of consequences is by no means exhaustive, but serves the purpose of illustrating the many implication of lack of concerted action in their implementation. Future research could embrace a qualitative approach, based for instance on a delphi technique, to examine and unveil visions and scenarios from a set selected experts. Other studies may also highlight the implications for diverse types of stakeholders (e.g. policy makers, NGOs, industry, etc.).

5 Conclusions

This study has revealed a number of trends. As a start, it can be seen that the list of obstacles to implement the SDGs is long, with many serious problems to be tackled, which at the moment hinder their implementation. But it has also shown that, left unattended, the negative outcomes of not implementing the SDGs may lead to an overall depletion of environmental conditions, an exacerbation of problems such as poverty and hunger.

In addition, economic growth and well-being can also be negatively influenced if a low emphasis to the SDGs is provided. Managing the complexity of SDG implementation is not simple. As they are structured, their implementation depends on partnerships and engagements of local communities and a wide range of stakeholders and require proper sustainability leadership. Moreover, complex issues related to social justice, gender equality and peace are likely to remain unsolved, and many problems will prevail, if the SDGs are not duly implemented.

As this work has shown, the disadvantages of not pursuing the SDGs suggest that much could be gained if they are pursued—and hopefully achieved—so that they are worthy the effort. The implications of this study are twofold. First of all, it sends a clear message about the need to take the SDGs seriously, and pay better attention to the many factors which affect their implementation. Secondly, the original analysis of the implications of not achieving the SDGs, as provided here, should be seen as a warning sign.

In terms of implications for further research, this paper outlines the need for a greater emphasis on a critical analyses and empirical assessments of the degree to which the 17 SDGs are being implemented. It may also pave the way for further studies which may investigate the consequences to specific sectors (e.g. agriculture) and population groups (e.g. farmers, herders, fishing communities) whose livelihoods heavily depend on nature, natural resources and ecosystem services.

A failure to achieve the SDGs is likely to negatively affect billions of people round the world, with substantial damages to livelihoods, an exacerbation of poverty and the spread of diseases. These, in turn, will particularly affect people in developing countries, which are especially vulnerable.

Authors' contributions WLF: the idea for the article, critical revision of the work. FW: the literature search and data analysis, Sects. 1, 4. ALS: the literature search and data analysis, Sect. 4. AB: the literature search, section on the importance of SDGs. KS: data analysis, section on barriers to the SDGs implementation. MK: the literature search, Sect. 4. CRPV: Sect. 3.

Funding Open access funding provided by Projekt DEAL.

Competing interests The authors declare that they have no competing interests.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source,

provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

1. United Nations. Transforming our World: The 2030 agenda for sustainable development. New York. 2015. <https://sustainabledevelopment.un.org/post2015/transformingourworld>.
2. United Nations. A world that counts mobilising the data revolution for sustainable development, Independent Expert Advisory Group on a Data Revolution for Sustainable Development. 2014.
3. Singh Z. Sustainable development goals: challenges and opportunities. *Indian J Public Health*. 2016;60(4):247.
4. Swain RB. A critical analysis of the sustainable development goals. In: Leal Filho W, editor. *Handbook of sustainability science and research*. Springer: Cham; 2018. p. 341–55.
5. Horton R. Offline: why the sustainable development goals will fail. *The Lancet*. 2014;383(9936):2196.
6. Griggs DJ, Nilsson M, Stevanca A, McCollum D. A guide to SDG interactions: from science to implementation. Paris: International Council for Science; 2017.
7. Nash KL, Blythe JL, Cvitanovic C, Fulton EA, Halpern BS, Milner-Gulland EJ, Addison PFE, Pecl GT, Watson RA, Blanchard JL. To achieve a sustainable blue future, progress assessments must include interdependencies between the sustainable development goals. *One Earth*. 2020;2(2):161–73.
8. Le Blanc D. Towards integration at last? The sustainable development goals as a network of targets. *Sustain Dev*. 2015;23(3):176–87.
9. Bleischwitz R, Spataru C, VanDeveer SD, Obersteiner M, van der Voet E, Johnson C, Andrews-Speed P, Boersma T, Hoff H, van Vuuren DP. Resource nexus perspectives towards the United Nations Sustainable Development Goals. *Nat Sustain*. 2018;1:737–43.
10. Liu J, Hull V, Godfray H, Tilman D, Gleick P, Hoff H, Pahl-Wostl C, Xu Z, Chung MG, Sun J, Li S. Nexus approaches to global sustainable development. *Nat Sustain*. 2018;1(9):466–76.
11. Sachs JD. From millennium development goals to sustainable development goals. *The Lancet*. 2012;379(9832):2206–11.
12. Rodriguez RS, Ürge-Vorsatz D, Barau AS. Sustainable Development Goals and climate change adaptation in cities. *Nat Clim Change*. 2018;8(3):181–3.
13. Rohde RA, Muller RA. Air pollution in China: mapping of concentrations and sources. *PLoS ONE*. 2015;10(8):e0135749.
14. McCollum DL, Echeverri LG, Busch S, Pachauri S, Parkinson S, Rogelj J, Krey V, Minx JC, Nilsson M, Stevanca AS, Riahi K. Connecting the sustainable development goals by their energy inter-linkages. *Environ Res Lett*. 2018;13(3):033006.
15. Nerini FF, Tomei J, To LS, Bisaga I, Parikh P, Black M, Borrión A, Spataru C, Castan-Broto V, Anandarajah G, Milligan B, Mulugetta Y. Mapping synergies and trade-offs between energy and the Sustainable Development Goals. *Nat Energy*. 2018;3(1):10–5.
16. Detchon R, van Leeuwen R. Policy: bring sustainable energy to the developing world. *Nat News*. 2014;508(7496):309.
17. Laestadius S. Transition paths: assessing conditions and alternatives. In: Fagerberg JS, Laestadius S, Martin BR, editors. *The triple challenge for europe economic development, climate change and governance*. Oxford: University Press; 2015.
18. Opoku A. Biodiversity and the built environment: implications for the Sustainable Development Goals (SDGs). *Resour Conserv Recycl*. 2019;141:1–7.
19. Rosa IMD, Pereira HM, Ferrier S, Alkemade R, Acosta LA, Akcakaya HR, den Belder E, Fazel AM, Fujimori S, Harfoot M, Harhash KA, Harrison PA, Hauck J, Hendriks RJJ, Hernandez G, Jetz W, Karlsson-Vinkhuyzen SI, Kim HJ, King N, Kok MTJ, Kolomytsev GO, Lazarova T, Leadley P, Lundquist CJ, Marquez JG, Meyer C, Navarro LM, Nesshoever C, Ngo HT, Ninan KN, Palomo MG, Pereira L, Peterson GD, Pichs R, Popp A, Purvis A, Ravera F, Rondinini C, Sathyapalan J, Schipper AM, Seppelt R, Settle J, Sitas N, van Vuuren D. Multiscale scenarios for nature futures. *Nat Ecol Evol*. 2017;1(10):1416–9.
20. Schultz M, Tyrrell TD, Ebenhard T. The 2030 agenda and ecosystems—a discussion paper on the links between the Aichi Biodiversity Targets and the Sustainable Development Goals. Stockholm: SwedBio at Stockholm Resilience Centre; 2016.
21. Biermann F, Kanie N, Kim RE. Global governance by goal-setting: the novel approach of the UN Sustainable Development Goals. *Curr Opin Environ Sustain*. 2017;26:26–31.
22. Henry AD, Vollan B. Networks and the challenge of sustainable development. *Ann Rev Environ Resour*. 2014;39:583–610.
23. McNeill D, Nesheim I, Brouwer F. Land use policies for sustainable development: exploring integrated assessment approaches, vol. 22. Cheltenham: Edward Elgar Publishing; 2012.
24. Janus H, Keijzer N. Post 2015: setting up a coherent accountability framework. German Development Institute Briefing Paper. 2014;13
25. Ocampo JA, Gómez-Arteaga N. Accountability in international governance and the 2030 development agenda. *Glob Policy*. 2016;7(3):305–14.
26. Jaiyesimi R. The challenge of implementing the sustainable development goals in Africa: the way forward. *Afr J Reprod Health*. 2016;20(3):13–8.
27. Easterly W. How the millennium development goals are unfair to Africa. *World Dev*. 2012;37(1):26–35.
28. Ashencaen Crabtree S, Parker J, Man Z, Garcia Segura A, Sylvester O. Sustainability, development and devastation: new encounters in indigenous dialogues. Discover Society. 2019.
29. United Nations Secretary-General. Remarks to High-Level Political Forum on Sustainable Development. 2019. <https://www.un.org/sg/en/content/sg/speeches/2019-09-24/remarks-high-level-political-sustainable-development-forum>. Accessed 14 Apr 2020.
30. Aboudaoude MK, Feghali K, Kfourri C. Planning the research. In: Gómez JM, Mouselli S, editors. *Modernizing the Academic teaching and research environment: methodologies and cases in business research*. Berlin: Springer International Publishing; 2018. p. 25–46.
31. World Bank. Year in review: 2018 in 14 charts. 2018. <https://www.worldbank.org/en/news/feature/2018/12/21/year-in-review-2018-in-14-charts>. Accessed 14 Feb 2020.

32. Wong MM, Ma JL, Chan LC. The impact of poverty on children in out-of-home care services in a Chinese context and the application of multiple family group therapy to enrich their family lives. *Child Youth Serv Rev.* 2019;97:76–84.
33. Leal Filho W, Balogun AL, Olayide OE, Azeiteiro UM, Ayal DY, Muñoz PDC, Nagy G, Bynoe P, Oguge O, Toamukum NY, Saroar M, Li C. Assessing the impacts of climate change in cities and their adaptive capacity: towards transformative approaches to climate change adaptation and poverty reduction in urban areas in a set of developing countries. *Sci Total Environ.* 2019;692:1175–90.
34. United Nations. Tier classification for global SDG indicators. 13 February 2019. 2019. https://unstats.un.org/sdgs/files/Tier%20Classification%20of%20SDG%20Indicators_13%20February%202019_web.pdf. Accessed 22 Feb 2020.
35. Martin-Shields CP, Stojetz W. Food security and conflict: empirical challenges and future opportunities for research and policy making on food security and conflict. *World Dev.* 2019;119:150–64.
36. Seaman JA, Sawdon GE, Acidri J, Petty C. The Household Economy Approach. Managing the impact of climate change on poverty and food security in developing countries. *Clim Risk Manag.* 2014;4:59–68.
37. Lombardi GV, Atzori R, Acciaioli A, Giannetti B, Parrini S, Liu G. Agricultural landscape modification and land food footprint from 1970 to 2010: a case study of Sardinia, Italy. *J Clean Prod.* 2019;239:118097.
38. Raviglione M, Maher D. Ending infectious diseases in the era of the sustainable development goals. *Porto Biomed J.* 2017;2(5):140–2.
39. De Sarkar S. Health risks in the way of sustainable development. In: Leal Filho W, Wall T, Azul AM, Brandli L, Gökcin Özüyar P, editors. *Good health and well-being., Encyclopedia of the UN sustainable development goals.* Cham: Springer; 2020.
40. Okeng'o MJ, Neuman L. Early childhood policies in low-and middle-income countries. *Early Years.* 2019;39(3):223–8.
41. Webb S, Holford J, Hodge S, Milana M, Waller R. Conceptualising lifelong learning for sustainable development and education 2030. *Int J Lifelong Educ.* 2019;38(3):237–40.
42. Hideg I, Wilson AE. History backfires: reminders of past injustices against women undermine support for workplace policies promoting women. *Organ Behav Hum Decis Process.* 2020;156:176–89.
43. Verniers C, Vala J. Justifying gender discrimination in the workplace: the mediating role of motherhood myths. *PLoS ONE.* 2018;13(7):e0201150.
44. Klasen S. From 'MeToo' to Boko Haram: a survey of levels and trends of gender inequality in the world. *World Dev.* 2020;128:104862.
45. Cairncross S. The public health benefits of urban sanitation in low and middle income countries. *Util Policy.* 2018;51:82–8.
46. Ortiz-Correa JS, Resende Filho M, Dinar A. Impact of access to water and sanitation services on educational attainment. *Water Resour Econ.* 2016;14:31–43.
47. Gielen D, Boshell F, Saygin D, Bazilian MD, Wagner N, Gorini R. The role of renewable energy in the global energy transformation. *Energy Strategy Rev.* 2019;24:38–50.
48. Pereirinha PG, González M, Carrilero I, Anseán D, Alonso J, Viera JC. Main trends and challenges in road transportation electrification. *Transport Res Procedia.* 2018;33:235–42.
49. Bothun G. Greenhouse gases: properties and evolution. In: Leal Filho W, Azul AM, Brandli L, Lange Salvia A, Wall T, editors. *Affordable and clean energy., Encyclopedia of the UN sustainable development goals.* Cham: Springer; 2020.
50. Picatoste X, Rodríguez-Crespo E. Decreasing youth unemployment as a way to achieve sustainable development. In: Leal Filho W, Azul AM, Brandli L, Lange Salvia A, Wall T, editors. *Decent work and economic growth., Encyclopedia of the UN sustainable development goals.* Cham: Springer; 2020.
51. Mawn L, Oliver EJ, Akhter N, Bambra CL, Torgerson C, Bridle C, Stain HJ. Are we failing young people not in employment, education or training (NEETs)? A systematic review and meta-analysis of re-engagement interventions. *Syst Rev.* 2017;6(1):16.
52. Haraguchi N, Cheng CFC, Smeets E. The importance of manufacturing in economic development: has this changed? *World Dev.* 2017;93:293–315.
53. Gallego-Lopez C, Essex J. Designing for infrastructure resilience. Evidence on demand, UK; 2016.
54. Narayan A, Saavedra-Chanduvi J, Tiwari S. Shared prosperity: links to growth, inequality and inequality of opportunity. Washington: The World Bank; 2013.
55. Hackl A. Mobility equity in a globalized world: reducing inequalities in the sustainable development agenda. *World Dev.* 2018;112:150–62.
56. Khanna NP. Urbanization and urban growth: sustainable cities for safeguarding our future. In: Leal Filho W, Azul AM, Brandli L, Gökcin Özüyar P, Wall T, editors. *Sustainable cities and communities., Encyclopedia of the UN sustainable development goals.* Cham: Springer; 2019.
57. Reyes Plata JA, Galindo Pérez MC. Access to basic services: from public benefit practice to a sustainable development approach. In: Leal Filho W, Azul AM, Brandli L, Gökcin Özüyar P, Wall T, editors. *Sustainable cities and communities., Encyclopedia of the UN sustainable development goals.* Cham: Springer; 2019.
58. Wiedmann TO, Schandl H, Lenzen M, Moran D, Suh S, West J, Kanemoto K. The material footprint of nations. *Proc Natl Acad Sci.* 2015;112(20):6271–6.
59. Bengtsson M, Alfredsson E, Cohen M, Lorek S, Schroeder P. Transforming systems of consumption and production for achieving the sustainable development goals: moving beyond efficiency. *Sustain Sci.* 2018;13(6):1533–47.
60. Bosello F, De Cian E. Climate change, sea level rise, and coastal disasters. A review of modeling practices. *Energy Econ.* 2014;46:593–605.
61. Ramis C, Amengual A. Climate change effects on European heat waves and human health, vol. 2., *Encyclopedia of the Anthropocene* Amsterdam: Elsevier; 2018. p. 209–16.
62. Grafakos S, Trigg K, Landauer M, Chelleri L, Dhakal S. Analytical framework to evaluate the level of integration of climate adaptation and mitigation in cities. *Clim Change.* 2019;154(1–2):87–106.
63. Wong-Parodi G, Fischhoff B, Strauss B. Resilience vs. adaptation: framing and action. *Clim Risk Manag.* 2015;10:1–7.
64. Fattorini S. Climate change and extinction events. In: Reference module in earth systems and environmental sciences. 2020. <https://doi.org/10.1016/B978-0-12-409548-9.12116-5>
65. Jenkins CN, van Houtan KS. Global and regional priorities for marine biodiversity protection. *Biol Conserv.* 2016;204:333–9.
66. Shahbol N, Hannah L, Lovejoy TE. Climate change and biodiversity: conservation, vol. 3., *Encyclopedia of the Anthropocene* Amsterdam: Elsevier; 2018. p. 441–51.

67. Borges PAV, Gabriel R, Fattorini S. Biodiversity erosion: causes and consequences. In: Leal Filho W, Azul AM, Brandli L, Lange Salvia A, Wall T, editors. *Life on land*, Encyclopedia of the UN sustainable development goals. Cham: Springer; 2019.
68. Ramcharan B, Ramcharan R. Sustainable development, peaceful, just and equitable societies. In: *Conflict prevention in the UN's agenda 2030*. Cham: Springer; 2020.
69. Grau Ruiz MA. Financing for SDGs: toward a responsible public-private tax approach. In: Leal Filho W, Azul AM, Brandli L, Lange Salvia A, Wall T, editors. *Partnerships for the goals*, Encyclopedia of the UN sustainable development goals. Cham: Springer; 2019.
70. Pomare C. Accountability frameworks for partnership toward sustainability. In: Leal Filho W, Azul AM, Brandli L, Lange Salvia A, Wall T, editors. *Partnerships for the goals*, Encyclopedia of the UN sustainable development goals. Cham: Springer; 2019.
71. Manuel M, Desai H, Samman E, Evans M. Financing the end of extreme poverty. London: Overseas Development Institute; 2018.
72. Gertz G, Kharas H. Leave no country behind: ending poverty in the toughest places. *Global Economy and Development Working Paper 110*. Washington DC: Brookings Institution; 2018.
73. World Bank. Results Brief—Climate Insurance. 2017. <https://www.worldbank.org/en/results/2017/12/01/climate-insurance>. Accessed 14 Apr 2020.
74. FAO, IFAD, UNICEF, WFP, WHO. The state of food security and nutrition in the world 2018. Building climate resilience for food security and nutrition. Rome: FAO; 2018.
75. Fan VY, Jamison DT, Summersc LH. Pandemic risk: how large are the expected losses? *Bull World Health Organ*. 2018;96(2):129–34.
76. European Commission. Communication from the Commission to the European Parliament, the European Council, the Council, the European Central Bank, the European Investment Bank and the Eurogroup Coordinated economic response to the COVID-19 Outbreak COM(2020) 112 final; 2020.
77. Oxford Economics. World economic prospects. Executive summary; 2020.
78. World Bank. The changing nature of work. *World Development Report*; 2019.
79. UNICEF. Literacy. 2019. <https://data.unicef.org/topic/education/literacy/>. Accessed 14 Apr 2020.
80. UIL (UNESCO Institute for Lifelong Learning). 4th Global report on adult learning and education. 2019.
81. Sachs J, Schmidt-Traub G, Kroll C, Lafortune G, Fuller G. Bertelsmann Stiftung and sustainable development solutions network (SDSN). *Sustainable Development Report*. New York; 2019. <https://sdgindex.org/>. Accessed 22 Feb 2020.
82. Moyer JD, Bohl DK. Alternative pathways to human development: assessing trade-offs and synergies in achieving the Sustainable Development Goals. *Futures*. 2019;105:199–210.
83. UNSTATS. E-handbook on SDG indicators. 2020. <https://unstats.un.org/wiki/display/SDGeHandbook/Home>. Accessed 22 Feb 2020.
84. Nilsson M, Chisholm E, Griggs D, Howden-Chapman P, McCollum D, Messlerli P, Neumann B, Stevance AS, Visbeck M, Stafford-Smith M. Mapping interactions between the sustainable development goals: lessons learned and ways forward. *Integrated Knowledge Generation for Transformations towards Sustainability from Local to Global Scales*. Sustainability Science. 2018. <https://doi.org/10.1007/s11625-018-0604-z>.
85. Donoghue D, Khan A. Achieving the SDGs and 'leaving no one behind'. Maximising synergies and mitigating trade-offs. Working Paper 560. Overseas Development Institute, London, UK. 2019.
86. Kok MTJ, Alkemade R, Bakkenes M, van Eerdt M, Janse J, Mandryk M, Kram T, Lazarova T, Meijer J, van Oorschot M, Westhoek H, van der Zagt R, van der Berg M, van der Esch S, Prins AG, van Vuuren DP. Pathways for agriculture and forestry to contribute to terrestrial biodiversity conservation: a global scenario-study. *Biol Conserv*. 2018;221:137–50.
87. Moyer JD, Hedden S. Are we on the right path to achieve the sustainable development goals? *World Dev*. 2020;127:104749.
88. van Vuuren D, Kok M, van der Esch S, Jeuken M, Lucas P, Prins AG, Alkemade R, van den Berg M, Biermann F, van der Grijp N, Hilderink H, Kram T, Melamed C, Pattberg P, Scott A, Stehfest E, de Vries B, te Velde DW, Wiggins S. Roads from Rio + 20. Pathways to achieve global sustainability goals by 2050. The Hague, PBL Netherlands Environmental Assessment Agency. 2012.
89. van Vuuren DP, Kok M, Lucas PL, Prins AG, Alkemade R, van der Berg M, Bouwman L, van der Esch S, Jeuken M, Kram T, Stehfest E. Pathways to achieve a set of ambitious global sustainability objectives by 2050: explorations using the IMAGE integrated assessment model. *Technol Forecast Soc Change*. 2015;98:303–23.
90. ESCAP. Asia and the Pacific SDG Progress Report 2019. United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), Bangkok, Thailand. 2019; <https://www.unescap.org/publications/asia-and-pacific-sdg-progress-report-2019>. Accessed 22 Feb 2020.
91. Asadullah MN, Savoia A, Sen KT. Will South Asia achieve the Sustainable Development Goals by 2030? Learning from the MDGs experience. ESID Working Paper No. 126. Manchester, UK: The University of Manchester. 2019. http://www.effective-states.org/wp-content/uploads/working_papers/final-pdfs/esid_wp_126_asadullah_savoia_sen.pdf. Accessed 01 Mar 2020.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.