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Leal Filho, W, Azeiteiro, U, Alves, F, Pace, P, Mifsud, M, Brandli, L, Caeiro, SS and Disterheft, A (2018) Reinvigorating the sustainable development research agenda: the role of the sustainable development goals (SDG). *International Journal of Sustainable Development and World Ecology*, 25 (2). pp. 131-142. ISSN 1350-4509

DOI: <https://doi.org/10.1080/13504509.2017.1342103>

Publisher: Taylor & Francis

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1 **Reinvigorating the sustainable development research agenda: role of sustainable development goals**

2 *International Journal of Sustainable Development & World Ecology, Volume 25, 2018 - Issue 2,*
3 *<https://www.tandfonline.com/doi/abs/10.1080/13504509.2017.1342103?journalCode=tsdw20>*

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25

26 **Abstract**

27 The United Nations Sustainable Development Goals (UN SDGs) contain a set of 17 measures to foster
28 sustainable development across many areas. It offers a good opportunity to reinvigorate sustainable
29 development research for two main reasons. Firstly, it comprises many areas of SD research, which have
30 become mainstream thanks to the UN SDGs. Secondly, the fact that the UN and its member countries have
31 committed to attaining SDGs by 2030 has added a sense of urgency to the need to perform quality research
32 on SD on the one hand, and reiterates the need to use the results of this research on the other.

33 Even though the basic concept of sustainability goes back many centuries, it has only recently appeared on
34 the international political agenda. This is partly due to an awakening of the fact that the human ecological
35 pressure on the planet is still much larger than what nature can renew or compensate for. Based on this state
36 of affairs, this paper presents an outline of the process leading to the agreement on the UN SDGs, and looks
37 at some of the ecological aspects as a result of continued pressure of human activities on natural resources.
38 Furthermore, a set of research needs is proposed –also based holistically on updated research trends –
39 discussing the degree of urgency of some measures and explaining why the UN SDGs need to be accorded
40 greater priority in international sustainable development research efforts.

41 **Keywords:** Sustainable Development Goals, Implementation, UN 2030 Agenda, Research

42

43 1. Introduction

44 Built around the concept of sustainable development, sustainability research, linked to sustainability
45 science, continues to be a field of research that has developed in the last decades and gained importance in
46 international literature and politics (Kates et al., 2011). With the aim of tackling the global challenges of
47 dealing with the complex societal problems at the interaction between nature and society (Schaefer et al.,
48 2010), sustainability research involves inter-, multi- and trans-disciplinary research to jointly find solutions
49 and design strategies that can contribute to creating good lives for the community today and in the future,
50 too.

51 Considering the complex problems that sustainability science and sustainability-related research tackle and
52 strive to offer solutions, this type of research has as its main challenge to integrate knowledge and methods
53 from different disciplines, which require a stakeholder-oriented approach and methodological innovation
54 (Schoolman et al., 2011). It is acknowledged that the most urgent problems that sustainability science need
55 to solve should be defined by society, not by scientists, thus engagement of the stakeholders in such process
56 is a condition for success, but also a major challenge (Jäger, 2009). In this context, there is clearly a need
57 for new knowledge to find novel ways to secure the future (Mooney et al. 2009) and to better understand
58 coupled human-natural systems, thus sustainability research should have a transformational and solution-
59 oriented research agenda.

60 As a matter of global concern, sustainable development needs to be addressed to international and
61 transnational cooperation and research. In this respect, several new global and regional initiatives have
62 emerged over the past years (e.g. Future Earth, Initiative for Science and Technology for Sustainability
63 ISTS, SDG Academy, International Council for Science ICSU, National Research Council - Board on
64 Sustainable Development, Sustainable Development Solutions Network SDS), gathering professionals
65 from different disciplines. Some works have focused on implementing sustainability at the country level
66 (e.g. Sardain, Tang, Potvin 2016).

67 The new United Nations Sustainable Development Goals that aim to end poverty, protect the planet, and
68 ensure prosperity for all, require transformative and solution-oriented research to offer the knowledge
69 needed to support transformations towards sustainable development (ICSU, 2015). In this respect, Future
70 Earth has been designed as a global research platform, aiming to provide the knowledge needed to support
71 transformation geared towards sustainability and to contribute to achieve goals on global sustainable
72 development. The Future Earth Strategic Research Agenda for the forthcoming years proposes three major
73 research themes — Dynamic Planet, Global Sustainable Development and Transformations towards
74 Sustainability – and proposes a key approach for achieving them, in order to co-design and co-produce
75 solutions-oriented science, knowledge and innovation (Future Earth, 2014).

76 Suni et al. (2016) argue that Future Earth has potential to develop long-term relationships between academia
77 and society, bring attention to capacity-building needs, and break old disciplinary research structures by
78 promoting a new research culture where stakeholders and scientists find each other based on relevant
79 research questions.

80 Due to increasing efforts to achieve evidence-based policymaking, the role of science and research has
81 become crucial for decisions at all political levels. Sustainability is of increasing importance for policies,
82 communities, business and countries around the globe, being an important concept and a cross-cutting issue
83 for many disciplines, namely for the economy (Kordestani, Peighambari, and Foster, 2015), education (Leal
84 Filho, Manolas and Pace, 2015; Lozano et al., 2011; Lozano et al., 2013) or governance. (Husted and Sousa
85 Filho, 2016; Patterson et al., 2016). The UN report on sustainability for all not only reiterates the need to
86 mainstream sustainability across goals in areas such as economic growth, energy production, agriculture,
87 and urban environment, but also to enhance scientific research and encourage innovation, particular in
88 developing countries (UN, 2015). Europe has made significant progress in mainstreaming sustainable
89 development issues through its strategies and operational programmes, research geared towards sustainable
90 development being recognised as important in the 2030 Agenda for Sustainable Development¹. The
91 sustainable development concept has been introduced into scientific fields such as innovation science,
92 economics, environmental science, assessment science, governance and emerging fields like transition
93 science (Hametner et al., 2010).

94 Although sustainability research has made significant progress in many areas and strives to integrate
95 knowledge from the environmental, social, and economic sciences, it still needs to make further steps
96 towards interdisciplinarity (Elling and Jelsøe, 2010), as well as addressing the social, economic and
97 environmental dimensions of sustainable development in an equitable manner (UNSG SAB, 2014). It
98 appears that environmental sciences are significantly less interdisciplinary with respect to knowledge
99 integration across pillars as compared to the economic and social sciences (Schoolman et al., 2011). **Also,**
100 **sustainability research in the developing world lags behind the research performed in developed countries,**
101 **creating knowledge gaps that require attention (Mukhopadhyay et al., 2014).** Progress on policy research
102 has not always translated into substantial concrete actions, the investment in research and development
103 (R&D) has increased only slightly².

104 Despite the increasing number of professionals involved in sustainability, there is still a lack of trained
105 specialists in higher education institutions to properly develop this research field.

106 In addition, a further issue is the existence of improper collaboration, networking and coordination among
107 different educational institutions (Jäger, 2009).

108 In summary, considering the complex development problems the world is currently facing, many studies
109 perceive that it is vital to pursue **sustainability research**.

110 The latest “Living Planet Report 2014” shows that mankind’s demand on the planet is more than 50 per
111 cent greater than what nature can renew, jeopardising the well-being of humans as well other animals, and
112 it would take 1.5 Earths to produce the resources necessary to support humanity’s current Ecological
113 Footprint (WWF, 2014). Consequently, the ecological dimension of the sustainable development research
114 agenda should be a priority, although always seen in a holistic and integrated way. More recently, the
115 document “The Future We Want” – one of the main outputs from the World Conference on Sustainable
116 Development held in Rio de Janeiro in 2012 (Leal Filho, Manolas and Pace, 2015) – outlines some of the

¹ https://ec.europa.eu/europeaid/policies/european-development-policy/2030-agenda-sustainable-development_en

² http://www.sd-network.eu/quarterly%20reports/report%20files/pdf/2010-June-Research_and_development_for_sustainable_development.pdf

117 actions needed, whereas the UN Sustainable Development Goals move a step further and outline concrete
118 targets for the next 14 years, in order to make life on Earth more sustainable.

119 This paper aims to outline the process leading to the agreement on the UN SDGs, whose complexity entails
120 action on many dimensions. An understanding of such connections is seen to be crucial, as the SDGs point
121 to the interconnectedness between humanity and nature. Following the concept of ‘planetary boundaries’
122 (Rockström et al., 2009), societies depend on ecosystems for their survival. Within this line of thought, a
123 set of research needs is proposed, discussing the degree of urgency of some measures and explaining why
124 the UN SDGs need to be accorded greater priority in international research about an integrated approach to
125 socio-ecological systems and sustainability.

126

127 **Methods**

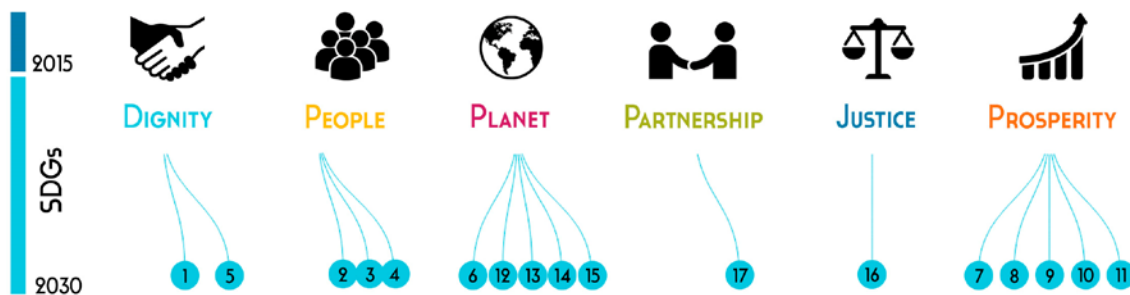
128 In a first step, a content analysis (Bryman, 2012) was conducted on the UN SDGs and corresponding targets,
129 in order to analyse the connections between the SDGs and to identify the key areas for the research needed.

130 In a second stage, and based on the first step, an online focus group was set up with eight experts coming
131 from different countries (Europe and South America) and expertise spanning social science to ecology (the
132 authors of this paper), all with in-depth experience in working in and conducting sustainable science
133 research. The aim of the focus group was to reinvigorate the research agenda, highlighting the role of socio-
134 ecological dimensions connected holistically with the SDG. Proposals of main areas, methods, models or
135 criteria were debated, in order to then triangulate a set of research needs that were consolidated and
136 discussed based upon up-to-date literature.

137

138 **2. The dimensions of the United Nations Sustainable Development Goals (UN SDGs)**

139 The seventeen goals are intended to provide a framework for policymaking in member states over a period
140 of 15 years. The SDGs were officially adopted at the UN summit in New York in September and become
141 applicable as from January 2016. The deadline for the SDGs is 2030. There are seventeen sustainable
142 development goals (SDGs) which can be grouped into six thematic areas: Dignity, People, Planet,
143 Partnership, Justice and Prosperity (Figure 1).



144

145 Figure 1: Thematic areas and sustainable development goals

146

147

148 What are the connections between ecology and SDGs, and where and how are links made between ecology
149 and society? How are the various (e.g. social, economic, ecological) dimensions covered in UN 2030
150 Agenda SDGs, and what are the research needs?

151 Looking firstly at targets that foster, in particular, the ecological dimension, SDG14 (*Conserve and*
152 *sustainably use the oceans, seas and marine resources for sustainable development*) and SDG15 (*Protect,*
153 *restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat*
154 *desertification and halt and reverse land degradation, and halt biodiversity loss*) can be highlighted. They
155 clearly address healthy oceans and sustainable fisheries and conservation and restoration of biodiversity
156 and ecosystem services. These SDGs are in line with international directives for OSPAR - Marine Policy -
157 Environment - European Commission, FAO Fisheries and Aquaculture, UN-OCEANS, UNESCO
158 Intergovernmental Oceanographic Commission, UNDP Water and Ocean governance and the United
159 Nations Decade on Biodiversity, among others. As identified in previous works, (e.g. Österblom et al.,
160 2017; Bennett, 2017; Creighton et al., 2016), a legal framework is needed in order to progress further in
161 these areas further, combined with the required financial resources in addition to research capacities and
162 science expertise.

163 Food **security and improved nutrition, and promote sustainable agriculture (SDG2), availability and**
164 **sustainable management of water and sanitation for all (SDG6), energy (SDG7), environmentally sound**
165 **technologies (SDG9), cities (SDG11), sustainable consumption and production (SDG12) and climate**
166 **change (SDG 13)** also explicitly address ecological dimensions geared towards sustainable development.
167 Here, there are several needs for research, ranging sustainable agriculture, water and sanitation, sustainable
168 energy, resilient infrastructure, cleaner technologies/cleaner production to sustainable consumption and
169 production. The academic community, R&D institutions, non-academic (in an inter-sectoral synergy with
170 SMEs) and stakeholders have priority areas to invest (e.g. research on resource efficiency and investing in
171 energy and resource efficiency), conceptualise and structure better governance models for implementation.

172 **Climate change is addressed explicitly in SDG13 (Take urgent action to combat climate change and its**
173 **impacts)** and is transversal to other SDGs (e.g. SDGs 1, 2, 11). Climate change is a global change and also
174 a global priority, and has been recognised as both one of the biggest threats and the biggest opportunities
175 for global health in the 21st century (Verner et al., 2016). Here, the research needs are multiple and
176 multidimensional (e.g. climate variability and uncertainties, agriculture in a changing climate, effects of
177 climate change on marine ecosystems, impact of climate change on the coastal zone, vulnerability and
178 adaptation of ecosystems to global climate change and cryosphere climate research, among others).
179 Research is needed in all climate change dimensions (e.g. energy and climate change, cities and climate
180 change, climate change impacts for food security, assessing the resilient provision of ecosystem services
181 by social-ecological systems and climate services for sustainable development). Intersectoral,
182 multidisciplinary and transdisciplinary approaches are crucial in addressing this thematic, and we must be
183 able to collaborate (international collaboration) and use available funding for research, action and
184 implementing solutions (novel innovation leading to effectiveness).

185 In addition to the ones described above and from the seventeen SDGs list and targets, an exercise was
186 conducted to highlight the ecological dimension of the SDGs (see Table 1). Excerpts were taken from the
187 targets proving the ecological dimension (the third column contains excerpts taken from the targets – UN,
188 2016). The socio-ecological dimensions of the SDGs are depicted in Appendix 1.

189
190 Some observations can be drawn from Appendix 1 as follows:

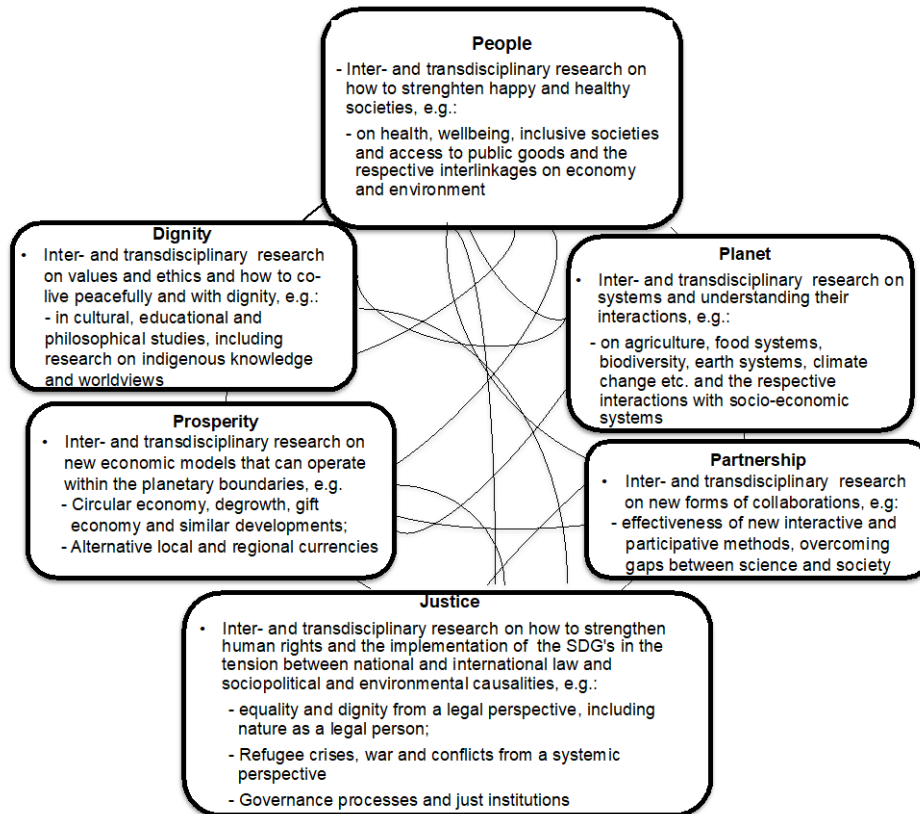
191 While nine SDGs focus explicitly on the ecological dimensions, SDGs 1-5 and 11 and their targets (poverty
192 eradication, hunger and sustainable food production, health, education, gender, equality, cities and peace)
193 focus on social objectives, and SDGs 8-9 and their targets (sustainable economic growth, full and
194 productive employment, environmentally sound technologies) focus on economics. However, these goals
195 impact the ecological dimensions by preventing environmental degradation, pollution and promoting
196 recovery, as research across various disciplines has shown the relationship between environmental quality
197 and social inequality (Adger, 2000, Cushing et al., 2015). It can therefore be said that SDGs make strong
198 connections between ecology and society in practically all goals: equality, justice and peace are the pillars
199 for a harmonious existence of all species on this planet. Wars, injustice and inequality not only violate
200 mankind's and nature's rights, but also have an adverse impact on the ecological dimension as natural
201 resources and land are destroyed. Furthermore, and possibly of greater concern, they destroy the necessary
202 structures needed to tackle a prosperous future with joint forces. The multifaceted problems included in the
203 SDGs and the individual targets necessitate interdisciplinary research and intersectoral collaboration, in
204 order to be achieved.

205 **3. Reinvigorating the Sustainable Development Research Agenda**

206 Based on a holistic perception, and the SDG's main areas and links with the ecological dimension and
207 limits of the Earth, a set of research needs was drawn up to reinvigorate the research agenda (see Fig. 2),
208 grouped under the six thematic areas of the SDGs. It should be reiterated that the decision by the General
209 Assembly of the United Nations in September 2015 to approve and pursue the SDGs is a rather recent
210 development. This state of affairs attests the need for more research into them. At the same time, it reiterates
211 the unique window of opportunity to use this new momentum, in order to intensify a more general debate
212 on sustainable development research around the world.

213 One of the needs is to reinvigorate and develop more research in the field of values, ethics, peace and
214 happiness and its contribution and link with sustainable practices and policies (see figure 1 – Dignity and
215 People). Ramos (2009) emphasised that sustainable development should be built upon non-traditional
216 aspects of sustainability such as goal and target/limit uncertainties, ethics, cultural dimensions, aesthetics
217 and general non-material values (e.g. solidarity, compassion, mutual help). Recent research also shows that
218 human progress, welfare and well-being are closely related to sustainable development, in particular
219 environmental capital (renewable and non-renewable resources) (Frugoli et al., 2015, Giannetti et al., 2015).
220 The use of biophysical indicators (like Human Wellbeing Index and Ecosystem Wellbeing Index) can more
221 effectively estimate the availability of environmental resources and be used to help societies to live within
222 planetary boundaries in the short and long term (Frugoli et al., 2015). The measurement of natural capital
223 usage and depreciation is a major problem, and biophysical indicators are the only ones that can be
224 associated to a strong sustainability model, and must be included/confronted to any progress evaluation

225 (Giannetti et al., 2015). Values-based achievements can be made tangible, but the link between values,
 226 success and more sustainable practices is not clearly shown yet, what should be investigated in the future
 227 as defended by Podger et al. (2016).



228
 229 Figure 2: A set of interconnected/interlinked research needs to reinvigorate the research agenda for SDGs

230 As seen in Figure 1, the commonly held people-planet debate has been widened to encompass a set of key
 231 social aspects such as dignity, prosperity, and justice. Surrounding these is the issue of partnerships – not
 232 in a master-servant format where industrialised nations tell developing countries what to do – but in a true
 233 spirit of collaboration.

234 More research on new economic models that can operate within the planetary boundaries is also still needed
 235 (see Figure 1 - Prosperity). Indeed, it is already well established that economic growth is not sustainable
 236 and that human progress is possible without economic growth (Schneider et al., 2010, Jackson, 2009).
 237 Besides Schumacher's 1973 book “Small is Beautiful – A Study of Economics as if People mattered” which
 238 already predates a unified degrowth movement, there is still a large amount of research needed to put this
 239 concept into practice. Sustainable degrowth, meaning monetary growth ‘decoupled’ from growth, and can
 240 be seen as an equitable downscaling of production and consumption that increases human well- being and
 241 enhances ecological conditions at the local and global level, in the short and long term (Schneider et al.,
 242 2010, Jackson, 2009, Latouche, 2009). **The sustainable degrowth transformation should be distinguished**

243 from unsustainable degrowth (economic recession) and it is not a goal in itself (Schneider et al., 2010).
244 Whether it should be trying to degrow or to grow more slowly remains a very open question in the field.
245 Nevertheless, within the need of undoubtedly decreasing the economic growth, this new economics model
246 introduces alternatives to individual purchasing actions, where innovation is driven by collective action far
247 beyond the action of price signals. Progress is to be measured by new criteria, such as community building,
248 collective action, and construction of new infrastructures of provision, in which well-being is not wholly
249 tied to consumption (Ehrenfeld, 2010; Cohen et al., 2010). Degrowth may be simply understood as a process
250 where material and energy consumption are reduced, and where incentives are created to encourage more
251 local production, leading to more frugal lifestyles (Cosme et al., 2017). In addition, better strategies are
252 needed to decrease current economic growth patterns and to reframe the alternative to economic growth,
253 but in a more positive way related with alternatives such as “good life” or “stable prosperity” that can be
254 more useful to trigger deliberation about a different future involving people from all walks of life as
255 defended by Drews and Antal (2016). Also, according to those authors, degrowth sounds like going down
256 (hence bad), so negative snap judgments of degrowth can unconsciously lead to unfavourable and
257 subsequent information processing and evaluation, congruent with the initial negative feeling. According
258 to proponents of degrowth, and the need for actions geared towards sustainability, the problematic aspects
259 of the growth economy do not only stem from the adverse impacts on the environment, but also the need to
260 redistribute income and wealth both within and between countries and to promote the transition from a
261 materialistic to a convivial and participatory society (Cosme et al., 2017). Therefore, in-depth analysis must
262 consider the full range of ecological and social aspects of well-being and quality of life. For example,
263 ecofeminist economics are perceived as a contribution towards a more comprehensive understanding of the
264 growth economy. They are seen as an encouragement of developing fresh perspectives on alternatives to
265 capitalist growth and integrate ecology and, in a broader sense, the human–nature relationship, as crucial
266 for new approaches (Bauhardt, 2014). Another debate and challenge needed is how to put into practice the
267 reduction of economic growth in a developing countries context, like China for example (Xue et al., 2012).

268

269 Participatory systems’ thinking tools have much to offer in envisioning contractional, macro-pathways
270 towards the implementation of post-growth policies, with a systemic identification of risks, uncertainties
271 and leverage points of intervention (Videira et al., 2014). Consequently, new forms of collaboration (see
272 figure 1- Partnership) are also a necessary research line for in-depth exploration, in order to achieve the
273 SDGs and reduce the ecological pressure on nature’s limits.

274 Sustainability issues should be addressed upon possible synergies within, between, and among inter-linked
275 issues and dimensions and not compartmentalisation, thereby reducing or even avoiding conflicts
276 between/among issues, so practical research applied to organisations is still needed on this (see figure 1 –
277 Planet). Long-term changes towards sustainability should be taken into account, where the time dimension
278 plays a key role in human survival on Planet Earth (Lozano and Huisingh, 2011). The intertwined
279 causalities, e.g. between malnutrition, disease and the current industrial food production system require a
280 major food system reform (Hawkes et al., 2015) and demonstrate the need for systems’ approaches
281 supported by inter-and transdisciplinary sustainability research.

282 Justice and peace are closely interrelated, as stated in SDG 16. Research in this field therefore tackles
283 questions related to inclusive societies and needs to be strengthened by effective governance intervention

284 (see figure 1 - justice) (Joshi et al., 2015). Possibly one of the biggest challenges of the current times is to
285 address the refugees' crises from a sustainability perspective (Al-Husban et al, 2016) with further need to
286 investigate solutions beyond national and international barriers – also taking into account environmental
287 crises and anthropogenic pressures that are exacerbating the scenarios. Focussing on overcoming the
288 reasons to flee (sociopolitical, economical and environmental), research should strengthen human rights
289 and SDGs. El-Zein et al. (in press), ask e.g. about citizenship and whether a national state should also assure
290 SDGs to non-citizens, and what if this state is dealing with a war-torn society itself? More research is
291 needed to address such wicked problems.

292 Several scholars also call for an Earth jurisprudence, understanding crimes against nature as 'ecocide'
293 (similar to genocide) and as a crime against peace (Gauger et al., 2013; Higgins et al., 2013). Ensuring
294 justice and dignity to all requires establishing the necessary legal structures that should include nature as a
295 legal person and as a stakeholder.

296 Overall, this research agenda also calls for rethinking methodic research approaches and adapting current
297 models in use. The research itself can go beyond descriptive-analytical and become transformative (Wiek
298 and Lang, 2016), when academia as well as governmental, private and non-profit organisations are willing
299 embrace new frameworks that offer solution-oriented sustainability research, thereby helping to achieve
300 the implementation of the SDGs.

301 **4. Conclusions**

302 As this paper has attempted to demonstrate, Sustainable Development Goals offer a unique opportunity to
303 reinvigorate the international sustainability research agenda. This is greatly needed, since the principles and
304 practices of sustainable development are important not only from a policy perspective, but they are essential
305 to the well-being of communities, cities and region, as well as to business around the globe. Even though
306 research has advanced and more knowledge is available, it has not stopped humanity from exceeding natural
307 resources and limits..

308 This paper aimed to look at the implementation of the SDGs and to delineate a set of research needs,
309 discussing the degree of urgency of some measures and paths to explore and explain why the UN SDGs
310 need to be accorded greater priority in international sustainable development research efforts. In this
311 context, an emphasis to the following, essential aspects is needed:

312 - to increase the inter-disciplinary and trans-disciplinary character of sustainability research for being more
313 solution-oriented to society's needs.

314 - to further develop local level research on sustainability, in order to properly understand and manage
315 the impacts of local decisions on a wider scale.

316 - to bring sustainability research closer to society, which should become more vocal in defining the
317 sustainability research directions and agenda.

318 - to intensify communication of scientific results to the various stakeholders, and co-share
319 knowledge with them. This requires a change in how the sustainability researchers think, to offer better
320 value non-academic expertise.

321 - to foster governance and provide better means of linking science to policymaking. Ideally,
322 decisions should be based on good research that emphasise the trade-offs and multiple possibilities of
323 action.

324 Moreover, collaboration, networking and coordination among different educational institutes represent key
325 steps in advancing and reinvigorating sustainability research and in promoting innovation. Furthermore,
326 career incentives for sustainability scientists and stakeholders are needed, in order to allow them to be
327 actively involved since preliminary stages of research initiatives.

328

329 Sustainable development is a long-term process and entails elements such as the preservation of the physical
330 environment on the one hand, but also economic efficiency and social equity on the other. It seeks to
331 decouple what the socio-economic development countries of the world pursue, from the increased and
332 harmful consumption of natural resources, also taking account matters related to North-South disparities,
333 and seeking equity. By reinvigorating sustainable development research, a considerable step forward may
334 be taken to integrate it into existing political structures, and thus help deliver the goals of the SDGs.

335

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SDGs	Descriptive	Socio-Ecological Dimensions (Quoting the targets)
1	<i>End poverty in all its forms everywhere</i>	<ul style="list-style-type: none"> - The equal right to natural resources (quoting target 1.4); - Build the resilience and reduce exposure and vulnerability to climate-related extreme events is mentioned (quoting target 1.5);
2	<i>End hunger, achieve food security and improved nutrition, and promote sustainable agriculture</i>	<ul style="list-style-type: none"> - Food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality (quoting target 2.4); - Maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels (quoting target 2.5);
3	<i>Ensure healthy lives and promote wellbeing for all at all ages</i>	<ul style="list-style-type: none"> - Reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination (quoting target 3.9); - Early warning, risk reduction and management of national and global health risks (quoting target 3.d);
4	<i>Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all</i>	<ul style="list-style-type: none"> - Ensure that all learners acquire the knowledge and skills needed to promote sustainable development (quoting target 4.7);
5	<i>Achieve gender equality and empower all women and girls</i>	<ul style="list-style-type: none"> - Give women equal rights and access to ownership and control over land (...) inheritance and natural resources, in accordance with national laws (quoting target 5.a);
6	<i>Ensure availability and sustainable management of water and sanitation for all</i>	<ul style="list-style-type: none"> - Improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally (quoting target 6.3); - Implement integrated water resources management at all levels, including through transboundary cooperation as appropriate (quoting target 6.5); - Protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes (quoting target 6.6); - Expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies (quoting target 6.a); - Support and strengthen the participation of local communities in improving water and sanitation management (quoting target 6.b);
7	<i>Ensure access to affordable, reliable, sustainable and modern energy for all</i>	<ul style="list-style-type: none"> - Enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology (quoting target 7.a); - expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support (quoting target 7.b);
8	<i>Promote sustained, inclusive and sustainable economic growth, full and</i>	<ul style="list-style-type: none"> - Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-year framework

	<i>productive employment, and decent work for all</i>	of programmes on sustainable consumption and production, with developed countries taking the lead (quoting target 8.4);
9	<i>Build resilient infrastructure, promote inclusive and sustainable industrialisation, and foster innovation</i>	- Upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities (quoting target 9.4);
11	<i>Make cities and human settlements inclusive, safe, resilient and sustainable</i>	- Strengthen efforts to protect and safeguard the world's cultural and natural heritage (quoting target 11.4); - Reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management (quoting target 11.6); - Provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities (quoting target 11.7); - Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning (quoting target 11.a); - Substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels (quoting target 11.b); - Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials (quoting target 11.c);
12	<i>Ensure sustainable consumption and production patterns</i>	- Implement the 10-year framework of programmes on sustainable consumption and production, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries (quoting target 12.1); - Achieve the sustainable management and efficient use of natural resources (quoting target 12.2); - Halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses (quoting target 12.3); - Achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment (quoting target 12.4); - Substantially reduce waste generation through prevention, reduction, recycling and reuse (quoting target 12.5); - Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle (quoting target 12.6); - Ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature (quoting target 12.8);

		<ul style="list-style-type: none"> - Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production (quoting target 12.a); - Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products (quoting target 12.b); - Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities (quoting target 12.c);
13	<i>Take urgent action to combat climate change and its impacts (taking note of agreements made by the UNFCCC forum)</i>	<ul style="list-style-type: none"> - Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries (quoting target 13.1); - Integrate climate change measures into national policies, strategies and planning (quoting target 13.2); - Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning (quoting target 13.3); - Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly \$100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible (quoting target 13.a); - Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities (quoting target 13.b);
14	<i>Conserve and sustainably use the oceans, seas and marine resources for sustainable development</i>	<ul style="list-style-type: none"> - Prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution (quoting target 14.1); - Sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans (quoting target 14.2); - Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels (quoting target 14.3); - Effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics (quoting target 14.4); - Conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information (quoting target 14.5); - Prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and

		<p>unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation (quoting target 14.6);</p> <ul style="list-style-type: none"> - Increase the economic benefits to Small Island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism (quoting target 14.7); - Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries (quoting target 14.a); - Provide access for small-scale artisanal fishers to marine resources and markets (quoting target 14.b); - Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in UNCLOS, which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of The Future We Want (quoting target 14.c);
15	<p><i>Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation, and halt biodiversity loss</i></p>	<ul style="list-style-type: none"> - Ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements (quoting target 15.1); - Promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally (quoting target 15.2); - Combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world (quoting target 15.3); - Ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development (quoting target 15.4); - Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species (quoting target 15.5); - Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed (quoting target 15.6); - Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products (quoting target 15.7); - Introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species (quoting target 15.8); - Integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts (quoting target 15.9); - Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems (quoting target 15.a);

		<ul style="list-style-type: none"> - Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation (quoting target 15.b); - Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities (quoting target 15.c);
17	<i>Strengthen the means of implementation and revitalise the global partnership for sustainable development</i>	<ul style="list-style-type: none"> - Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed (quoting target 17.7); - Enhance the global partnership for sustainable development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the sustainable development goals in all countries, in particular developing countries (quoting target 17.16).

487 Source: UN (2016)

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