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# Charting human development in the Anthropocene

## Charting human development in the Anthropocene

We are entering a new geologic age: the Anthropocene. The age of humans.

For the first time in our history the most serious and immediate risks are human made and unfold at planetary scales, from climate change to the Covid-19 pandemic to rising inequalities.

How can human development help us navigate the complexities of the Anthropocene?

This chapter argues that we must reimagine the human development journey and leverage the human development approach to support transformational change.

*“The quandary of unsustainability may be our predicament, but the task of solving it is ours as well. The nature of the problem, its fuller appreciation and the ways and means of solving it all belong to us—humanity as a whole. If there is a subject on which collaboration and non-divisive commitments are needed, this surely is it. But in order to make this possible and effective, we need a vision of mankind not as patients whose interests have to be looked after, but as agents who can do effective things—both individually and jointly.”*<sup>1</sup>

Amartya Sen

*“Most ‘classic’ writings on sustainability present people as the problem, not as a collective source of strength. [...They] frame the discourse in terms of the Earth’s finite resources and rising population. [...] We have moved away from framing it exclusively around limits to growth and conserving natural resources. Instead, we emphasize the connections between communities, ecosystems and social justice.”*<sup>2</sup>

Harini Nagendra

The Covid-19 pandemic is a cautionary tale. For decades scientists have been predicting just such a pandemic, pointing to the rise of new diseases that jump from animals to humans<sup>3</sup>—and the virus that causes Covid-19 is likely one.<sup>4</sup> Indeed, the increasing transmission of disease from wildlife to humans reflects the pressures we are putting on the planet.<sup>5</sup>

It is a tale of the risks we confront as we go deeper into a new reality described as the Anthropocene, the age of humans, with the unprecedented planetary change in scope, scale and speed—as elaborated in chapter 2—driven by human activity posing risks to people and all forms of life.<sup>6</sup> But the risks do not affect everyone in the same way. Covid-19 was superimposed on a world with wide and growing inequalities in human development. And it is driving deeper wedges between those more able and those less able to cope. Meanwhile, the underlying drivers of shocks such as Covid-19 are rooted ultimately in unbalanced interactions between people and the planet. And these drivers feed off the imbalances in opportunities, wealth and power across people and countries.

Confronting this new reality of a self-reinforcing cycle of social imbalances and of planetary imbalances (the dangerous planetary change for people and all forms of life) calls for reimagining the human development journey (where do we want to go?).<sup>7</sup> It also calls for applying the human development approach to longstanding debates on sustainability (how do we want to get there?).

The human development journey—enlarging people’s abilities and opportunities to be and do what they have reason to value—must be considered in the context of an unprecedented moment in human

history and in the planet’s history. This chapter asserts the importance of reconfiguring the material and energy flows now structurally linked to how we organize economies and societies. It details the transformational changes that need to be brought from the periphery to the centre of the human development journey. That journey cannot be separated from the web of life we are embedded in.

“The Anthropocene: the age of humans. For the first time in our history the most serious and immediate, even existential, risks are human made and unfolding at planetary scale.

The human development approach sets out an evaluative framework for development outcomes based on expanding capabilities, thus increasing wellbeing freedoms, the valuable opportunities to choose from. This takes us beyond notions of sustainability based on needs fulfilment and away from focusing on instrumental objectives such as economic growth. This chapter argues that a human development approach invites us to look beyond sustaining needs to expanding capabilities. To see people as agents—who act and bring about change. And to evaluate people’s achievements in terms of their own values and goals. In that expansion and perspective lay both the goal of the human development journey and, instrumentally, the means to widen the scope of potential actions to change the drivers of pressures on the planet. In a broader set of motivations for human behaviour, market incentives as well as values, dignity and sense of worth are all important. Ultimately, people are agents of their individual and collective destiny, able to drive social change.

The Anthropocene: the age of humans. For the first time in our history the most serious and immediate, even existential, risks are human made and unfolding at planetary scale. The chapter argues that this new reality calls for reimagining the human development journey and leveraging the human development approach to support transformational social changes to ease pressures on the planet. The nature and process of change will be contested, resisted, promoted and driven by varied interests and values. This Report mobilizes human development analysis to marshal evidence and suggest options for individual and collective choices on how to redress both social and planetary imbalances. Thirty years ago the first Human Development Report placed people as the ultimate end of development. “People are the real wealth of nations,” read the first line. It is time to draw on that real wealth of nations to transform our world, as called for in the 2030 Agenda for Sustainable Development.

## Confronting a new reality: People versus trees?

*“Unlike other concepts that have highlighted the impact of human pressures on the environment, the Anthropocene describes a state change in the Earth system, viewed as an interdependent, co-evolving social-ecological system, as well as a new way of thinking about our recent and current epoch. Anthropocene thinking takes us away from reductionist linear cause-effect analysis of equity and sustainability, to underline the fully intertwined character of human and ecological systems, and the co-evolving fates of sustainability and equity.”<sup>8</sup>*

Melissa Leach, Belinda Reyers and others

“It is people, not trees, whose future choices have to be protected” affirmed the first Human Development Report, published in 1990.<sup>9</sup> By setting human flourishing as the ultimate end of development, it asserted that development is not about the accumulation of material or natural resources. It is about enlarging people’s ability to be and do what they have reason to value and expanding wellbeing freedoms. This fundamental premise of human development animates this Report. But the apposition of people and nature needs to be re-examined. Because leaving nature in the background—or, worse, presenting

choices as if they were between people and planet—will limit human flourishing for everyone. As the 1994 Human Development Report stated, “The strongest argument for protecting the environment is the ethical need to guarantee to future generations opportunities similar to the ones previous generation have enjoyed. This guarantee is the foundation of ‘sustainable development.’”<sup>10</sup> But these impacts are no longer solely for future generations: Planetary imbalances are already hurting people today, driving some of the inequalities in human development analysed in the 2019 Human Development Report.<sup>11</sup> And those inequalities and social imbalances, in turn, are reflected in even sharper relief in planetary imbalances.

Over the years Human Development Reports have highlighted the interactions between environmental degradation and human development.<sup>12</sup> They have identified affluence in developed countries as a key environmental stressor. Two Reports have been devoted to water and climate change, and two have considered sustainability and resilience. The environment and the challenges of sustainability and climate have been forcefully advocated by social and political movements that have pushed these issues to the top of the development agenda. Natural hazards and environmental disasters have contributed to public awareness, and scientific evidence and understanding of key biophysical, economic and social impacts have accumulated (spotlight 1.1). The 2030 Agenda for Sustainable Development is a clear political statement of the universal consensus that has emerged as a result.

“This Report mobilizes human development analysis to marshal evidence and suggest options for individual and collective choices on how to redress both social and planetary imbalances.

Our dependence on nature is not in question. Amartya Sen put it bluntly: “It is not so much that humanity is trying to sustain the natural world, but rather that humanity is trying to sustain itself. It is us that will have to ‘go’ unless we can put the world around us in reasonable order. The precariousness of nature is *our* peril, *our* fragility.”<sup>13</sup> But there are two new elements to consider.

First, the notion of the Anthropocene has forced a reframing of thinking—from standalone environmental and sustainability issues, such as climate change, to the recognition of a set of interdependent challenges resulting from underlying processes of planetary change driven by human pressures.<sup>14</sup> Indeed, the climate is changing in dangerous ways,<sup>15</sup> and urgent action is needed to curb the greenhouse gas emissions causing global warming.<sup>16</sup> Concentrations of carbon dioxide—a long-lived greenhouse gas—are high and increasing because the planetary processes that have maintained concentrations within a relatively narrow range (the carbon biogeochemical cycle) are being overwhelmed by rapid and large increases in anthropogenic emissions.<sup>17</sup> But other key biogeochemical cycles are being dramatically altered as well. Take nitrogen, essential for life and the most common yield-limiting nutrient in agriculture.<sup>18</sup> The use of synthetic fertilizers (which increased eightfold between 1960 and 2000) and the combustion of fossil fuels have produced the largest disturbance to the nitrogen biogeochemical cycle since it emerged 2.5 billion years ago.<sup>19</sup>

Most people now live longer and healthier lives than their predecessors, but the opposite is true for the vast majority of the rest of life on Earth.<sup>20</sup> Humans evolved over 300,000 years<sup>21</sup> amid a richness and diversity of life unprecedented in the planet's history, as measured by the absolute number of species.<sup>22</sup> That richness of life is now being destroyed at an alarming rate due to direct and indirect human action, with a quarter of species facing extinction, many within decades.<sup>23</sup> Biodiversity enhances nature's contributions to people.<sup>24</sup> In addition, language and culture have coevolved with biological diversity, so biological impoverishment parallels the loss of cultural and linguistic diversity.<sup>25</sup>

This Report's point of departure is that there is no clear pathway to avoid the dangerous planetary change of the Anthropocene. It is, as Julia Adeney Thomas argues, a predicament that needs to be navigated.<sup>26</sup> Or as Sharachandra Lele put it, we need to move beyond a "narrowed framing of the problem: one value (sustaining future generations), one problem (climate change), one goal (reduce carbon emissions) and one solution (renewables)."<sup>27</sup> And that calls for a full understanding of the pressures we are putting on the planet and of our interdependence with nature.<sup>28</sup>

“As long as planetary imbalances persist, they engender risks that can materialize in shocks to human development, just as the Covid-19 pandemic has done. Superimposed on existing asymmetries of power and opportunity, they perpetuate and can even increase inequalities in human development.

Second, the notion of the Anthropocene emerges thanks to remarkable advances in Earth system and sustainability sciences.<sup>29</sup> In addition to documenting and explaining the impacts of human activities, these new fields are stimulating interdisciplinary work, encompassing natural and social sciences and the humanities, providing insights into how to mitigate those impacts while improving people's lives. The physical realities of the unprecedented pressure humans are putting on the planet have reawakened interest in understanding our dependence on nature now as well as in the past and what is likely to unfold in the future. Value systems go beyond conventionally looking at nature and the planet for only their instrumental value (service provision) or intrinsic value (inherent worth) to incorporate relational values (“associated with relationships, both interpersonal and as articulated by policies and social norms”).<sup>30</sup> Bagele Chilisa has highlighted how knowledge systems rooted in African philosophies, worldviews and history have been marginalized in development discourse but hold the potential to enrich sustainability science.<sup>31</sup> And the interdependence of biological and cultural diversity has led to biocultural diversity (discussed later in the chapter) as a source of knowledge for scientists, local communities, civil society and policymakers interested in local and global sustainability.<sup>32</sup>

A key insight emerging from this vast and rapidly growing body of work is that social and natural systems are best seen not only as interacting and interdependent but also as embedded in each other. “Moving beyond the notion of sustainable development as separable human development targets constrained by environmental or natural resource limits, to an inseparable socio-ecological systems perspective on sustainable development, offers a fresh perspective on sustainable development. It further offers a novel and expanded opportunity space from which to address the challenges of the Anthropocene.”<sup>33</sup>

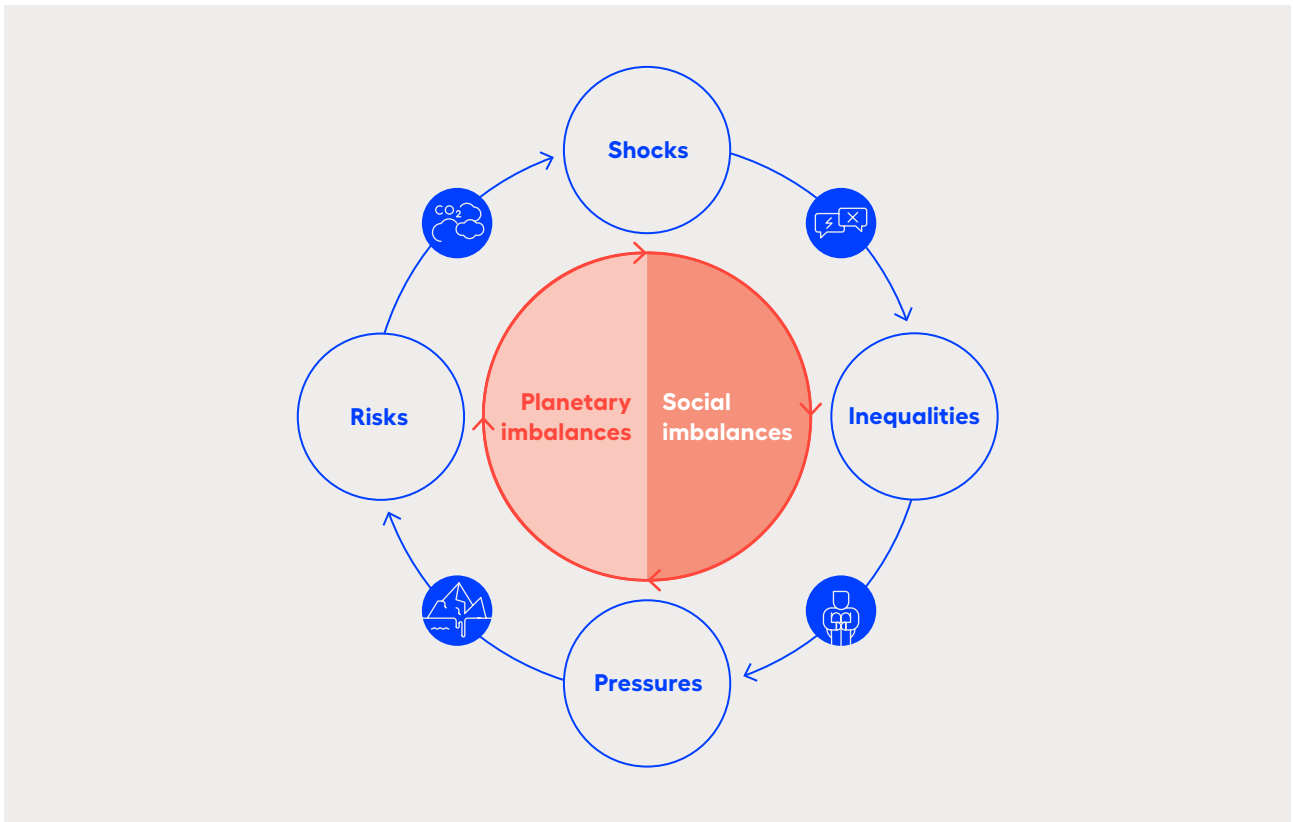
An important implication is that as much as human activity is harming nature, it remains within our reach to be a positive regenerative force on the planet—looking at nature less as a constraint or something to be preserved in pristine form<sup>34</sup> and more as an asset with the potential to provide sources and resilience, and more choices, to navigate the Anthropocene.<sup>35</sup> More important, the emerging insights also point the way forward on what to do and how, in a way that avoids what Ruth DeFries and Harini Nagendra called the two traps of “falsely assuming a tame solution and inaction from overwhelming complexity.”<sup>36</sup>

Considering the complex and interdependent relationship between people and planet, between socio-economic and natural systems, points to the links between dangerous planetary and social imbalances, which interact and often reinforce each other. As long as planetary imbalances persist, they engender risks that can materialize in shocks to human development, just as the Covid-19 pandemic has done (figure 1.1). Superimposed on existing asymmetries of power and opportunity, they perpetuate and can

even increase inequalities in human development. The pandemic is adjudged to have reversed development progress by decades. It has hit more harshly, more quickly and more deeply those already vulnerable, marginalized or with few resources and capabilities, increasing inequalities in human development.<sup>37</sup> That, in turn, has fed social imbalances.

Social dynamics result in actions that can either intensify or ease the pressures on the planet. Social imbalances feed inequalities in human development—which ultimately are gaps in empowerment—constraining the space for deliberative reasoning and collective action.<sup>38</sup> We all care about those close to us, but a key to solidarity and cooperation is how to extend pro-social behaviour beyond close-knit networks. That is determined in part by the position of those worse off and minorities in social structures and economic systems, along with the institutional arrangements that determine the extent of their political inclusion.<sup>39</sup> Instead, those who are more powerful (and for the most part benefit from the status quo) shape the framing of available information,

**Figure 1.1** Planetary and social imbalances reinforce each other



Source: Human Development Report Office.

including scientific evidence,<sup>40</sup> and leverage their resources and influence to preserve their power—often in ways that oppose transformation.<sup>41</sup> All of this perpetuates the pressures on the planet that further drive planetary imbalances. This, in turn, engenders risks, and the cycle starts afresh. Reframing the human development journey in the Anthropocene has the potential to break this cycle.

What does this mean for human development? First, it presents a challenge as to how to imagine and pursue human development. Addressing social imbalances, the hemisphere on the right in figure 1.1, has always been at the core of the human development journey. But until now the other hemisphere, planetary imbalances, has not been systematically brought into the human development journey. How to do it, and how that changes the journey, are addressed in the next section of this chapter.

Second, the human development approach has not yet been fully leveraged to inform how to address the challenges in the hemisphere on the left in figure 1.1. It can offer fresh perspectives on making expanded capabilities and human agency central to easing pressures on the planet, as addressed in the last section of this chapter.<sup>42</sup>

Human agency is thus at the core of the processes of change and transformation required to enhance equity in human development while easing pressures on the planet. This implies reassessing capabilities with a new sense of possibility and responsibility to respect the planet, to reach those who have the fewest opportunities and to eliminate the persistent patterns of inequality, discrimination and exclusion (including racism and patriarchy) that tear societies apart.<sup>43</sup>

## Reimagining the human development journey: Bringing the planet back in

Decoupling economic growth from emissions and material use is key to easing pressures on the planet while improving living standards. The debate on the extent to which this is sufficient and feasible provides a natural starting point to explore whether decoupling helps rearticulate the human development journey in the Anthropocene.

The relative decoupling between GDP growth and both material use and carbon dioxide emissions is common (the economic growth rate is higher than

the growth rate of material use or emissions). But absolute decoupling (economic growth alongside absolute reductions in material use or emissions) is partial, temporary and rare.<sup>44</sup> Interpretations of what the empirical findings imply vary. It is widely agreed that decoupling is vital and needs to be pursued.<sup>45</sup> Most agree also that future decoupling based on extrapolating current trends would be insufficient to meet goals such as those agreed to in the Paris Agreement<sup>46</sup> or the suite of international goals related to biodiversity loss.<sup>47</sup> But ultimately, it will be up to choices. A recent model suggested that a policy package on climate change mitigation would allow the world to reach net-zero emissions in 2050 at moderate transitional growth and employment costs, resulting in global net output gains of up to 13 percent of GDP by 2100 and with income transfers compensating the poor for the costs of the energy transition.<sup>48</sup>

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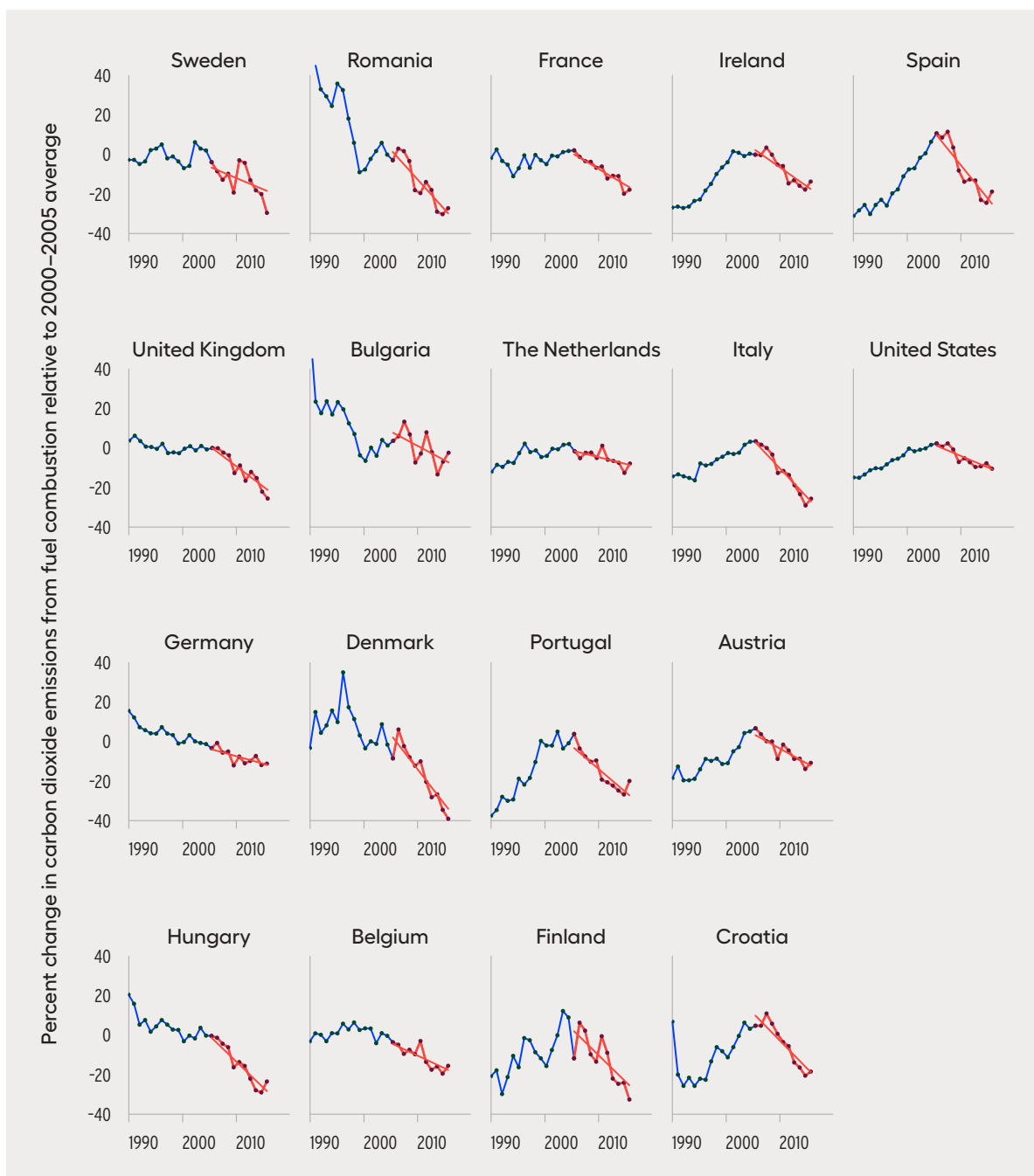
### Decoupling what?

The dominant view on decoupling is that green growth or green economy approaches hold promise by shifting towards more resource-efficient and less emission-intensive production and consumption, allowing for relative or absolute decoupling.<sup>49</sup>

A recent study identified 18 developed countries whose carbon dioxide emissions declined in absolute terms between 2005 and 2015, both for territorial emissions (those due to production within the country) and for consumption-based emissions (those that account for the effects of trade in shifting high-emission production activities to other countries and then importing goods produced elsewhere; figure 1.2).<sup>50</sup> Although slow growth contributed by reducing energy demand, absolute decoupling happened mainly as a result of targeted policies to promote renewable sources of energy and energy efficiency.<sup>51</sup> Another study looked at energy use and GDP in the aftermath of the 2008 global financial crisis, finding that although the countries worst affected economically had the largest reductions in energy use, those that rebounded more strongly had the highest energy efficiency gains.<sup>52</sup> Both studies cover a short period and limited set of countries, but they provide evidence for green growth patterns of development underpinned



**Figure 1.2 Carbon dioxide emissions from fossil fuel combustion have fallen in several countries**



Source: Le Quéré and others 2019.

by more resource- and emission-efficient economies driven by policy interventions.<sup>53</sup>

It has been argued that efficiency gains based on known and safe technologies have proved insufficient (based on past trends and model-based projections) and that an overall downscaling in aggregate economic activity is also required.<sup>54</sup> This could be achieved through the degrowth of production and

consumption in high-consuming countries and a shift away from growth-focused development in the Global South.<sup>55</sup> This conclusion is based primarily on scenarios of low energy demand<sup>56</sup> but is also informed by the broader research and advocacy on degrowth.<sup>57</sup>

The debate continues in part because economic models have limitations in incorporating key biophysical functions, and biophysical models remain limited



in exploring the ranges of flexibility that can emerge as a result of changing economic and social behaviour, making clear that conclusions are difficult to reach.<sup>58</sup>

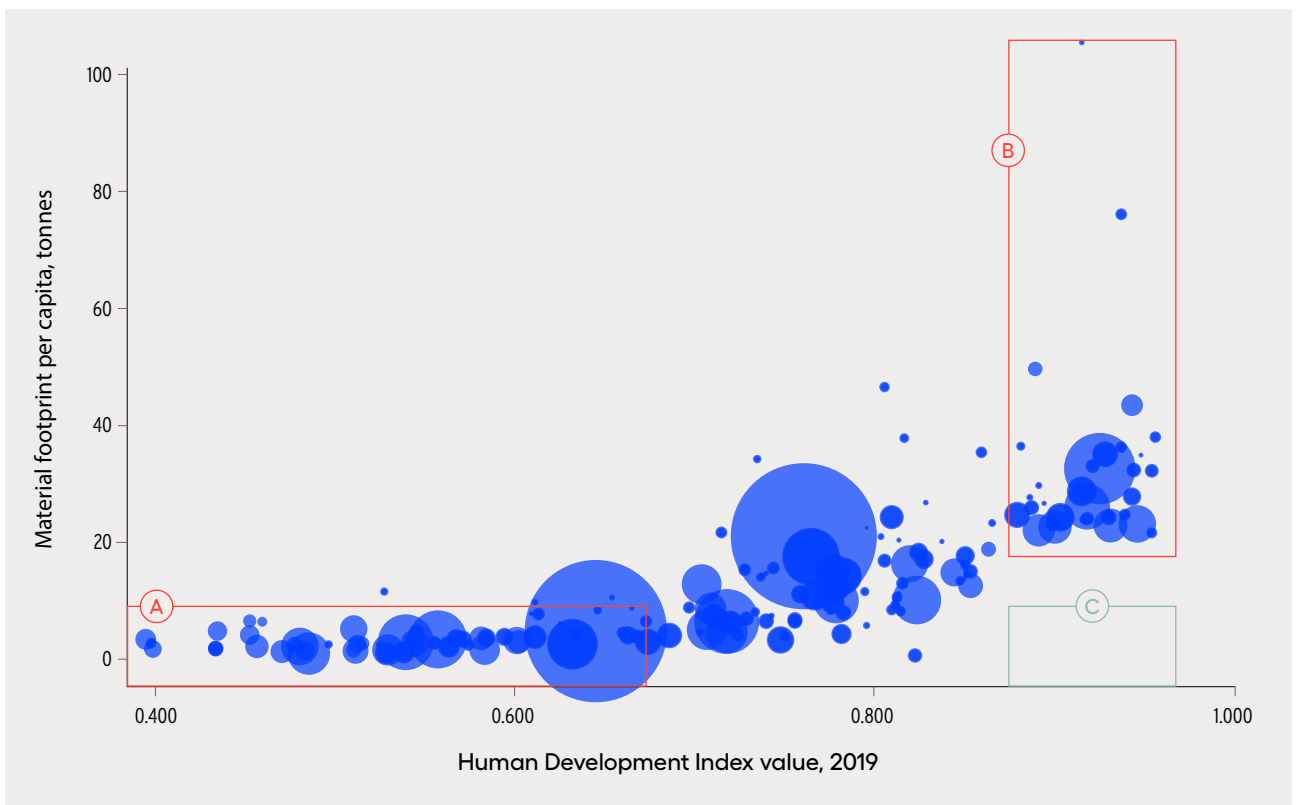
Can the decoupling framing help reimagine the human development journey? One way would be to replace economic growth with advances in human development. This shift has always been at the heart of the human development approach, and indeed the Human Development Index (HDI) can be, and has been, used instead of GDP.<sup>59</sup> Recent work that shifts the lens from decoupling growth and resource use to decoupling the determinants of wellbeing can illuminate pathways to improve people’s lives in a less resource-intensive way.<sup>60</sup> Yet, these perspectives still underemphasize the role of human agency—the ability of individuals and communities to take the driver’s seat in addressing challenges and seizing opportunities—that is central to the concept of human development.

Roughly speaking, human development comprises capabilities that relate to wellbeing and agency. Improvements in human development as measured

by the HDI (which accounts only partially for agency) were fuelled by using resources that generated today’s ecological crises (countries in rectangle B of figure 1.3). So a reimagined human development journey cannot occur along the same path for low human development countries (in rectangle A), and high human development countries cannot remain where they are. As elaborated later in chapter 2, inequalities in achievements in wellbeing mirror injustices in resource use. A reimagined human development journey thus calls on all countries to improve wellbeing equitably while easing pressures on the planet (moving to the empty rectangle C).

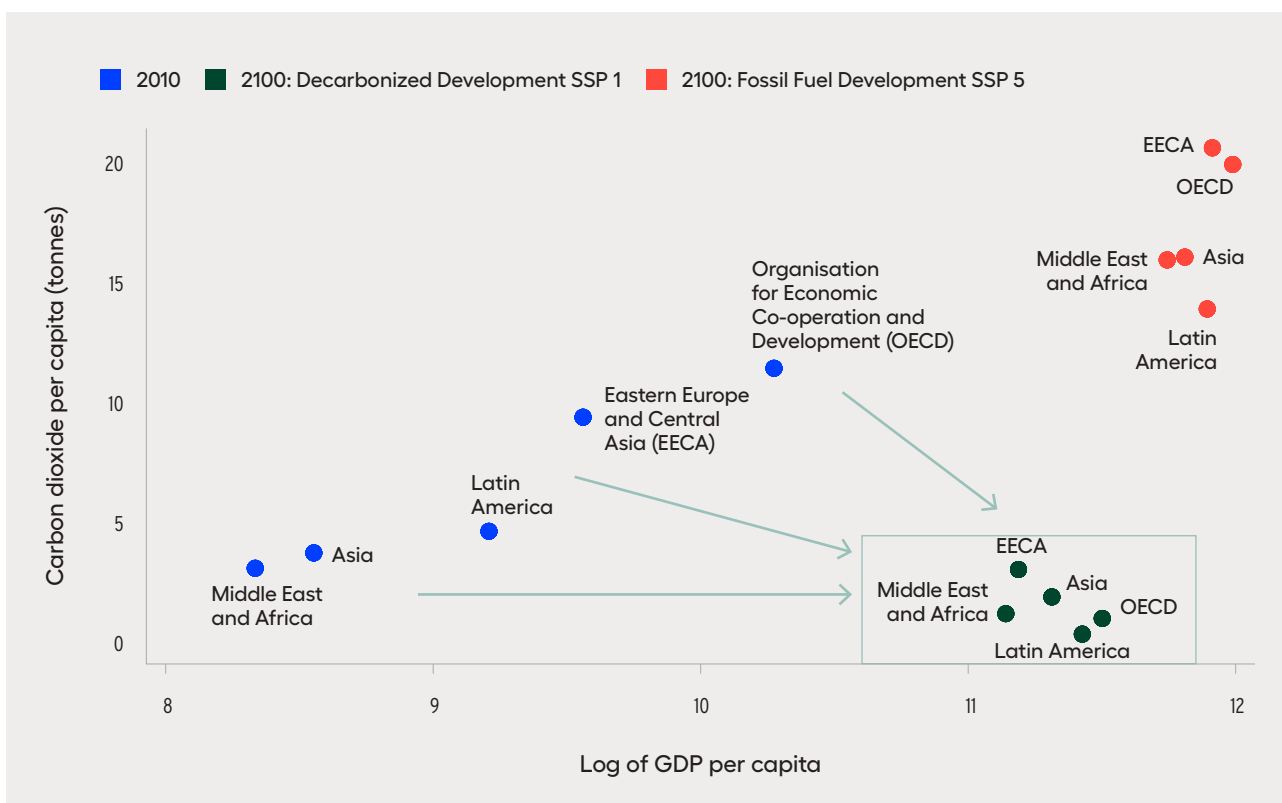
Taking that journey is a matter of choice. Simulations using shared socioeconomic pathways (SSP) scenarios to assess the impact of social and economic choices on greenhouse gas emissions and climate change illustrate the alternatives (figure 1.4).<sup>61</sup> SSP 5, the business-as-usual scenario, would move five world regions to high income status, but global warming would reach 3–5 degrees Celsius above preindustrial levels. SSP 1, the scenario in which social and

**Figure 1.3** Where human development paths landed: High human development goes with high resource use



**Note:** Includes only countries with more than 1 million inhabitants. Bubble size is proportional to population.  
**Source:** Human Development Report Office based on data from the United Nations Environment Programme.

**Figure 1.4** Under the sustainability scenario, countries converge by 2100—with lower carbon dioxide emissions per capita and higher human development



Source: Human Development Report Office based on data from the Shared Socioeconomic Pathways Database.

economic choices keep global warming within 2 degrees Celsius above preindustrial levels, would bring all five regions to the aspirational space of high standards of living and reduce pressures on the planet.

Exercising the choices that will take us away from the current development pathways and towards the reimagined human development journey depends on human agency, or the potential to empower people to make different choices, individually and collectively. To do so, we have to explore how societies, economies and the biosphere interact to understand the conditioning imposed by biophysical factors on what can be achieved in meeting people’s aspirations: not a few people’s, but all people’s.

### Mapping human societies’ embeddedness in the biosphere: Energy and material flows

Life has created many of the features of the planet as we know them today: the gas composition of the

atmosphere, the amount of sunlight reflected and absorbed by Earth, the chemical composition of the oceans. Timothy Lenton describes the role of life as a creator of these features over the planet’s history, showing how planetary processes are deeply intertwined with the biosphere (spotlight 1.2). So it cannot be stressed enough that we cannot treat climate change as separate from the biosphere. The oceans absorb about 25 percent of annual carbon emissions and more than 90 percent of the additional heat generated from those emissions. Forests, wetlands and grasslands also draw down carbon dioxide, sequestering close to 30 percent of anthropogenic carbon dioxide emissions. The total carbon stored in terrestrial ecosystems in 2017 was almost 60 times larger than the global emissions of anthropogenic greenhouse gases (carbon dioxide equivalent). Soil carbon (including permafrost) is about 4.5 times larger than the atmospheric pool and about 5 times larger than the carbon in living plants and animals. The ocean holds a much larger carbon pool, about 38,000 gigatonnes.<sup>62</sup>

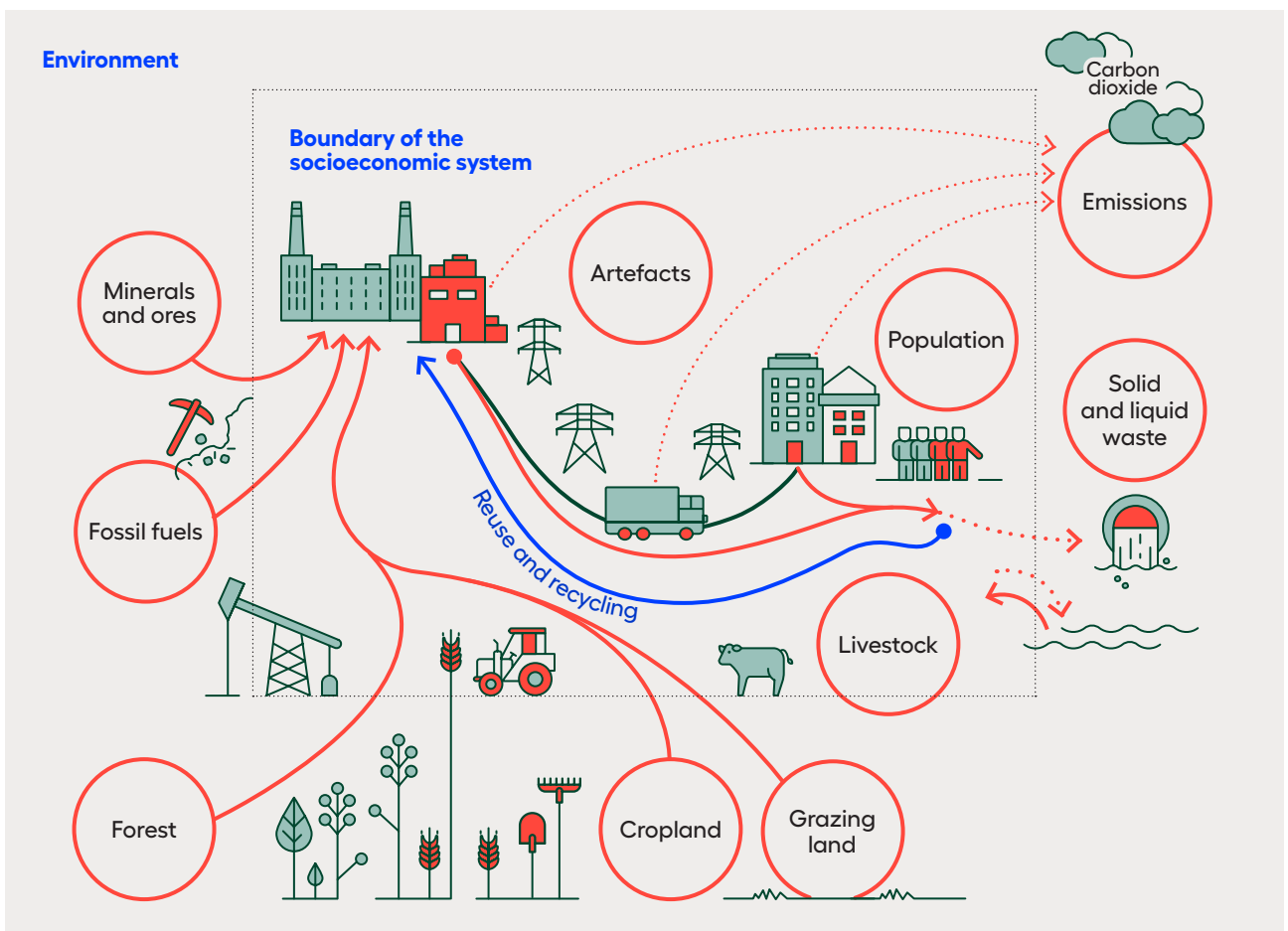
Human societies are embedded in the biosphere and depend on it. But by extracting from it for economic activities that shape consumption and production patterns, they have also been depleting it. Much of this happens in the background and seems invisible to social and individual choices, similar to forgetting our dependence on the air we breathe. To make the interactions between social and ecological systems more visible, it is useful to look at material and energy flows in our societies and their impact on planetary processes.

Every form of life takes up, transforms and expends energy and materials for its maintenance, growth and reproduction.<sup>63</sup> On land and in the seas, plants capture energy directly from sunlight, which combined with their use of materials<sup>64</sup> enable not only their growth and maintenance but also what is available to be consumed in succession by all other forms of

life—generating waste products in the process. For the most part life consumes what is required for its biological existence, but human societies capture more energy and more material (figure 1.5) than they need to simply survive<sup>65</sup> on a scale that goes well beyond that of other species.<sup>66</sup>

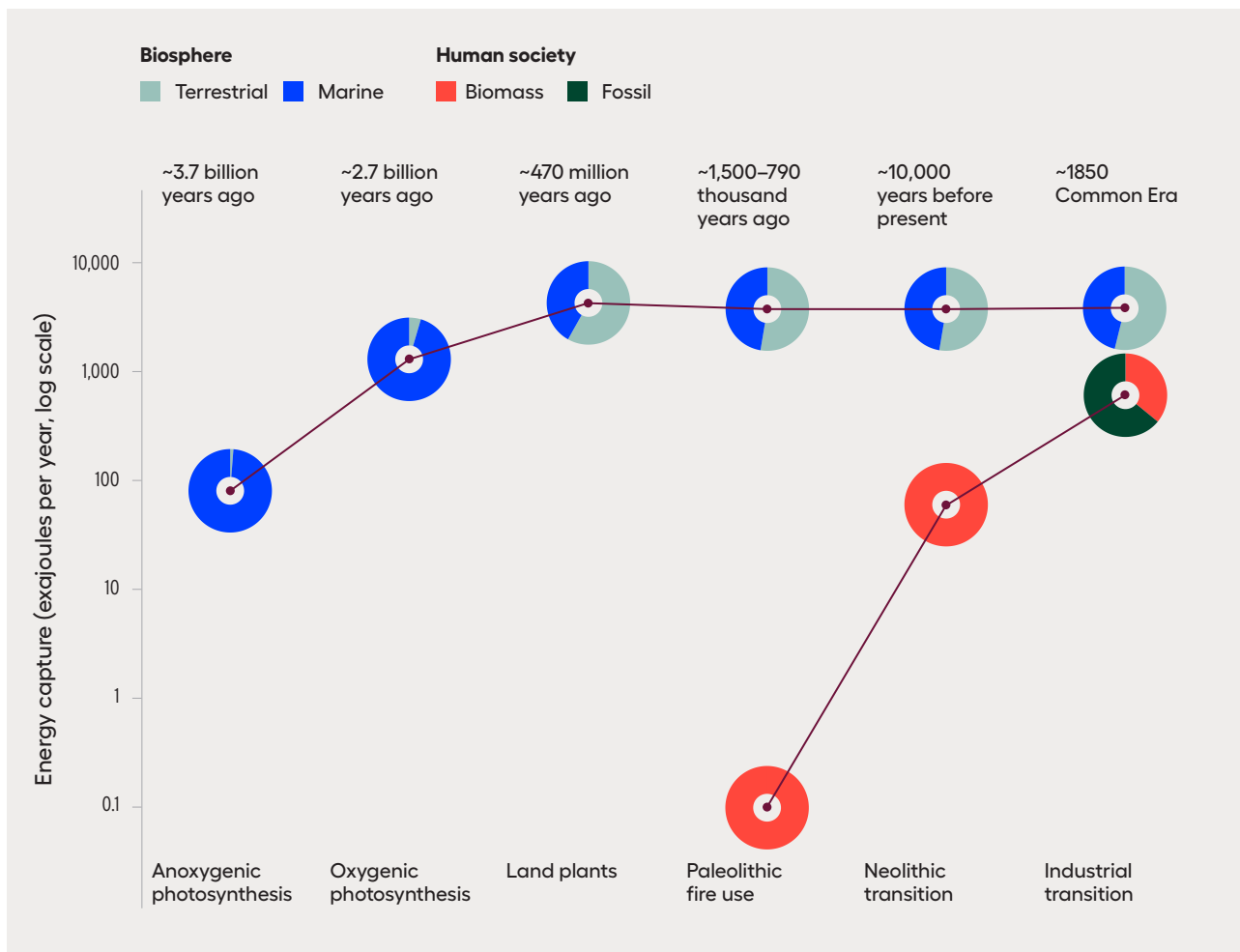
For the planet the continuing flow of light from the sun ensures an essentially limitless flow of energy.<sup>67</sup> Looking at the evolution of the energy captured by the biosphere and by societies over major transitions, as well as the implications for material cycles, places the current moment in the context of both Earth history and human history (figure 1.6).<sup>68</sup> It highlights that the Anthropocene is unprecedented and shows how social dynamics drive planetary imbalances.<sup>69</sup> Major transitions correspond to increases in energy capture and changes in material cycles that surpassed the limiting conditions<sup>70</sup> prevailing before the transition. But these

**Figure 1.5 Human societies are imbedded in the biosphere: Energy and biophysical resources are used to build stocks and provide benefits for humans while generating waste and emissions**



Source: Haberl and others 2019.

**Figure 1.6** Energy captured in the biosphere and human society



**Note:** Dates indicate the approximate beginning of each transition, with energy estimates for when energy regimes have matured.  
**Source:** Lenton, Pichler and Weisz 2016.

transitions also destabilized the prevailing geochemical cycles. Timothy Lenton provides an account of the major transitions in Earth history, such as the transition from photosynthesis that does not use oxygen (anoxygenic) to the one that does (oxygenic, which took more than a billion years to evolve; spotlight 1.2). This transition increased the energy captured by the biosphere by an order of magnitude.<sup>71</sup>

Transitions in human history have been driven by technological and institutional innovations, resulting in new forms of social and economic organization that have progressively expanded energy and material use.<sup>72</sup> The intentional use of fire first allowed people to generate energy outside the human body<sup>73</sup> but increased energy input above human physiological needs only by a factor of 2–4 (see figure 1.6).<sup>74</sup> The transition to agriculture represented a fundamentally new stage that

raised human energy capture by three orders of magnitude (in around 1850, when it was the dominant mode of subsistence and the global population was around 1.3 billion).<sup>75</sup> The higher flows of energy and population linked to farming boosted societies' material inputs and waste products and led to substantial local (and possibly global) ecological impacts due in part to the large-scale changes in forest cover often associated with fire regimes that spread and managed fire.<sup>76</sup>

Agriculture emerged independently at different times in different parts of the world but generated energy surpluses. These heightened the social complexity in cities, the specialization and division of labour, exchange and trade, and the innovations such as writing that enabled further social stratification and provided for the expression and transmission of knowledge.<sup>77</sup> Still, the reliance on biomass from

agriculture (requiring as much as 90 percent of the population to work in farming) linked the availability of energy surpluses to the land's productivity and expansion of its use, while transportation was limited by the need to balance the feed demands of animals with the distance they could travel.<sup>78</sup> These limiting conditions created quickly unfolding local negative feedbacks from resource use or destruction, holding down sustained material growth per person. Energy and material conditions imposed limiting constraints, but social change processes determined the actual production and demand for resources of different societies, which varied over time and across regions and were often shaped by inequalities in wealth distribution.<sup>79</sup>

As some societies increased economic demands and evolved social structures to sustain those demands, the limiting conditions could be overcome by using fossil fuels for energy and through industrialization. This decoupled energy use from land and human labour. As a result, global human energy capture rose 10-fold between 1850 and 2000, as the population grew by a factor of 4.6 and GDP per person by a factor of 8.3.<sup>80</sup> The total global energy flux through human societies is already one-third above the total that flows through all nonhuman and nonplant biomass. Along with energy, there have been unprecedented changes in global material cycles. Minerals have replaced biomass as the dominant material, and carbon dioxide emissions—which account for about 80 percent of the total annual flow of materials in industrial societies by weight—are the dominant waste product. Carbon dioxide emissions are overwhelming the carbon geochemical cycle and driving climate change, and the cycles for nitrogen and phosphorus have also been massively disrupted.

All this was underpinned by social and economic changes that drove, and were enabled by, technological and institutional innovations no less dramatic than those during the agricultural transition. But there is a key difference. The historical origins and initial diffusion of industrialization were concentrated geographically, leading to the Great Divergence between early industrializing countries and the rest of the world.<sup>81</sup> This divergence was exacerbated in some cases by colonialism and the intercontinental slave trade,<sup>82</sup> whose impacts persist to this day.<sup>83</sup> About two-thirds of the global population is

undergoing the move from a predominantly agrarian society to an industrial one.<sup>84</sup>

But we are now confronting limiting conditions, determined by biophysical processes, to maintaining a resilient Earth system in a state conducive to human wellbeing. Overcoming those limiting conditions implies shifting away from fossil fuels<sup>85</sup> and closing material cycles.<sup>86</sup> Also essential is reducing pressure on the biosphere by protecting biodiversity and restoring landscapes and seascapes.<sup>87</sup>

Given the centrality of fossil fuels in industrial societies, it is crucial to keep policy and public attention on reducing carbon dioxide emissions. But this alone is insufficient to improve cycling for nitrogen, phosphorus and other materials, especially minerals. In fact, many energy-intensive processes—such as producing fertilizer, whose use contributes overwhelmingly to disruptions in the nitrogen and phosphorus cycles—could be made easier with greater availability of clean energy sources. Moreover, a transition to clean energy will likely boost demand for materials, especially minerals. Based on the International Energy Agency's scenarios through 2050 of shifts away from fossil fuels, targeting 15 electricity generation and 5 transport technologies would increase global total material requirements by up to 900 percent for electricity and 700 percent for transport, largely associated with greater use of copper, silver, nickel, lithium, cobalt and steel.<sup>88</sup> And the production processes could induce considerable greenhouse gas emissions.<sup>89</sup> Moreover, renewable energy technologies can come with other problems: They can be land use intensive<sup>90</sup> or require minerals from mines,<sup>91</sup> threatening biodiversity.<sup>92</sup>

That makes it essential to complement the focus on reducing carbon dioxide emissions with an explicit consideration of material flows. But there is a more fundamental point. Often the technological innovations that help address limiting constraints—overcoming the limitation of nitrogen in agriculture through fertilizers, the use of chlorofluorocarbons in refrigeration, fossil fuels to overcome the limiting energy constraints of agricultural societies—bring unintended consequences. As chapter 3 argues, this implies that in addition to expanding the use of known and proven technologies, it is crucial to continue to invest in science. The carbon stored in land, water and forests requires better management and stewardship by local communities and governments.

The demand of industrial societies for materials and fossil fuel energy is structurally determined, so focusing only on technological solutions can generate new problems.<sup>93</sup> Although end-of-pipe (meaning, at the end of production or consumption processes) approaches to treating waste and pollution (a focus of much environmental policy and advocacy) are important, they are not necessarily addressing the structurally determined uses of energy and demand for materials that generate planetary pressures.<sup>94</sup> Behavioural changes in production and consumption will also be crucial. But the structurally determined elements of industrial societies will not change unless the underlying mechanisms for capturing energy and using materials do—and this would likely imply another major transition.

A reimagined human development journey thus calls for a deeper connection between human development achievements and maintaining a resilient Earth system in a state conducive to human well-being. And the imperative of a major transition provides a sense of direction for the transformational change to ease planetary pressures.<sup>95</sup> One where the pursuit of improvements in wellbeing goes along with mobilizing human agency to implement that transition, where people are seen not only as users of resources, as rapacious of the environment, but also as able to reason individually and collectively to establish regenerative relationships with the biosphere. Human societies have had, and continue to have, visions of a good life, relational values with respect to nature (as discussed below), that go beyond seeing people as responding only to economic incentives or having a utilitarian perspective on the biosphere.

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### Learning from human and biological diversity

Biodiversity loss often parallels loss of cultural and language diversity, impoverishing societies culturally.<sup>96</sup> For instance, there is wide-ranging evidence that land-use intensification decouples productive landscapes from the natural processes in order to sustain production outcomes.<sup>97</sup> Gains in resource efficiency and production often affect the cultural diversity that underpins collective wellbeing (figure 1.7).<sup>98</sup> Biocultural approaches that emphasize the intertwining of human societies and ecological systems<sup>99</sup> and describe deeply interconnected ecological and social

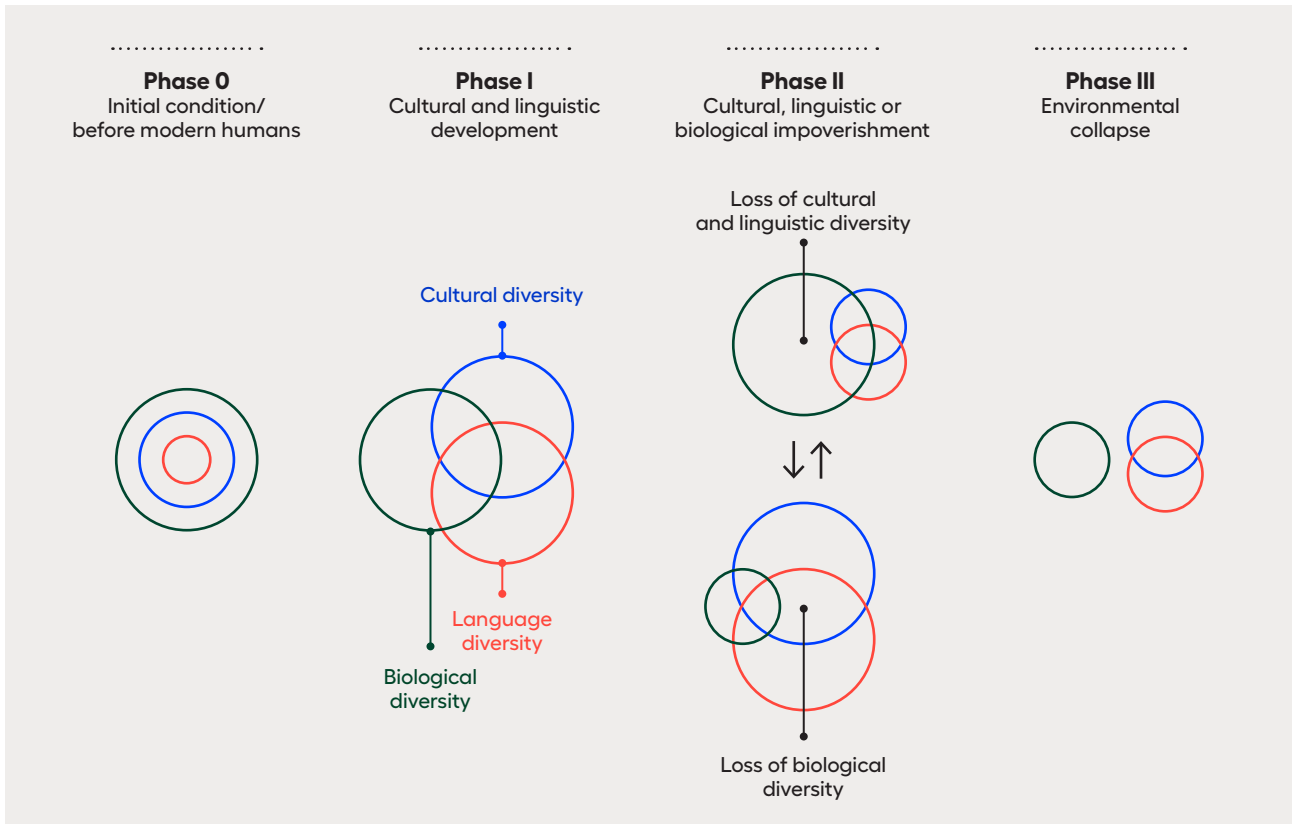
dynamics where human livelihoods, landscapes and ecosystems have coevolved over long periods help explain this codependence. They move from a unidirectional utilitarian concept of nature towards acknowledging a plurality of worldviews and human-nature interactions.<sup>100</sup> Biocultural diversity is the “diversity of life in all its manifestations—biological, cultural, and linguistic—which are interrelated within a complex socio-ecological adaptive system.”<sup>101</sup>

“The question is whether it is possible to marshal the social, political and economic changes towards a transition where societies can capture more energy from the sun, close material cycles and safeguard the biosphere. What would a human development journey look like as that transition unfolds? It requires a fundamental change in the role of humans on the planet.

These perspectives exemplify how the biosphere supports human development in nonmaterial ways—through learning and inspiration, physical and psychological experiences, and identities and sense of place.<sup>102</sup> People, through their experiences, derive meaning, a sense of belonging, identity and attachment to both place and the rhythms of nature.<sup>103</sup> Changes to the biosphere can affect a place’s character and humans’ relationship with it, since changes to the structure and function of an ecosystem can also affect the symbolic meaning and belonging created by the relationship with that place.<sup>104</sup> These kinds of change can lead to psychological and emotional distress,<sup>105</sup> including grief and anguish associated with loss of place, biodiversity and nature.<sup>106</sup> Sense of place connected to the biosphere affects how individuals and communities adapt to new conditions, determines whether relocation strategies are used or successful and influences shifts in livelihood strategies.<sup>107</sup> A strong attachment to particular meanings of a place and a feeling of belonging in nature inspire empathy<sup>108</sup> and motivate action and stewardship of ecosystems.<sup>109</sup>

Indigenous peoples’ ways of knowing and being, and their governance systems, have supported biocultural diversity.<sup>110</sup> The decline in what the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services defines as nature has been lower in areas managed by indigenous peoples than in other lands, often as a result of practices that actively maintain or

**Figure 1.7 Diversity in life, culture and language coevolve**



**Note:** The ancestral condition of humans is one in which culture and language reflect the local environment (phase 0). The evolution of culture and language partially detaches them from biological diversity, but it does not necessarily impoverish any of the three components (phase I). But losses in culture and language can occur when, for instance, more homogenous cultural populations overwhelm local diversity, from which loss in the diversity of life may follow (phase II). When the detachment becomes complete, all three dimensions lose in diversity (phase III).

**Source:** Frainer and others 2020.

enhance diversity.<sup>111</sup> Many of the world's healthiest ecosystems, especially those outside formally protected areas, involve lands of indigenous peoples and local communities.<sup>112</sup> And the customary lands of indigenous peoples and local communities encompass at least a quarter of the global land area, an important direct contribution to the global preservation of biocultural diversity,<sup>113</sup> even if indigenous peoples often resist nonindigenous peoples' unsustainable and unjust patterns of exploitation of the biosphere.<sup>114</sup> The cooperative management of centuries-old rice terraces in Bali extends beyond villages to entire watersheds. Decisions by local farmers evolved towards optimal harvests and preserved watersheds.<sup>115</sup>

Areas often perceived as wilderness or untouched are frequently the result of a long-term relationship between indigenous peoples and their territories.<sup>116</sup> But rather than extrapolating to a global scale what can be seen as isolated practices by indigenous

peoples with little general relevance,<sup>117</sup> it is important to emphasize that indigenous peoples' knowledge systems reflect sophisticated governance practices that advance human wellbeing while maintaining biocultural diversity.<sup>118</sup> They open our eyes to the risks of reproducing the same socially, politically, culturally and economically engrained ways that have put pressures on the biosphere.<sup>119</sup> They give us an opportunity to better weave knowledge systems together (box 1.1)<sup>120</sup> and to broaden our understanding of the interdependence of the human development journey in the Anthropocene with the biosphere.

### Envisioning the human development journey in the Anthropocene

The reality of the limiting constraints facing industrial societies is increasingly apparent, as chapter 2



### Box 1.1 Indigenous and local knowledge systems and practices generate synergies between biodiversity and human wellbeing

Indigenous and local knowledge is a key link for building synergies between the wellbeing of local people and the conservation of ecosystems. To realize this potential for sustainable human development, indigenous and local knowledge needs to be embedded in and actively connected to ecosystem governance that recognizes their rights. The diverse social, cultural and environmental knowledge of indigenous peoples and local communities contributes to safeguarding ecosystem services and securing the multidimensional wellbeing of people across large parts of the globe.<sup>1</sup> The scope and content of indigenous and local knowledge bring insights of great relevance for ecosystem governance, as in controlling deforestation, reducing carbon dioxide emissions, understanding climate change and sustaining and restoring resilient landscapes.<sup>2</sup> For example, at least 36 percent of the world's intact forest landscapes are within indigenous peoples' lands.<sup>3</sup>

Despite the role of indigenous and local knowledge in conservation, indigenous and local governance systems are threatened and in decline—along with indigenous peoples' wellbeing.<sup>4</sup> Recognizing land tenure, access and resource rights; applying free, prior and informed consent; and improving collaboration and comanagement arrangements with indigenous peoples and local communities are critical. Indigenous peoples and local communities, and their knowledge systems and practices, have a major role in global biodiversity governance and conservation, from knowledge generation and assessment to policy formulation and decisionmaking and to implementation in practice.<sup>5</sup>

To realize this potential, new collaborative ways of mobilizing knowledge and learning across diverse systems can contribute innovations and new solutions to sustainable human development.<sup>6</sup> Involving multiple actors and knowledge can strengthen usefulness and legitimacy in decisionmaking and implementation.<sup>7</sup> Approaches and programmes that bridge diverse constituencies in resource governance along these lines are emerging in many parts of the world today.<sup>8</sup>

#### Notes

1. Díaz and others 2019b. 2. Hill and others 2020. 3. Fa and others 2020. 4. Díaz and others 2019b. 5. Hill and others 2020. 6. Mistry and Berardi 2016; Sterling and others 2017; Tengö and others 2014. 7. Danielsen and others 2005; Gavin and others 2018; Sterling and others 2017. 8. Malmer and others 2020.

Source: Galaz, Collste and Moore 2020.

makes clear, and will condition the human development journey in the Anthropocene. The question is not whether that reality will continue to disrupt social and economic processes and drive further wedges in inequalities in human development. The question is whether it is possible to marshal the social, political and economic changes towards a transition where societies can capture more energy from the sun, close material cycles and safeguard the biosphere.

What would a human development journey look like as that transition unfolds? It requires a “fundamental change in the role of humans in the planet.”<sup>121</sup> It takes us beyond ensuring the carrying capacity of an individual ecosystem or resource<sup>122</sup> to understanding the system dynamics for societies to expand human capabilities while supporting the planet's ability to provide for that expansion over time.<sup>123</sup>

The aspiration of a transition to a just and sustainable human environment has been discussed

since at least the mid-1980s.<sup>124</sup> There has been much recent interest in the concept of just transitions (box 1.2). But we are now confronting a new reality. The Covid-19 pandemic seems to be one more example of the shocks we may be confronting, and there is a step-change in the nature of the risks we create because we are affecting the very planetary processes that enabled wellbeing to prosper in the first place. Global production systems, such as the food system, are growing increasingly homogeneous and concentrated, geared to yield high and predictable supplies of biomass in the short run, but are also entrenching long-term and pervasive risks.<sup>125</sup> For most of our existence the major risks were natural hazards—but they are now anthropocentric, and we are poorly prepared to cope (spotlight 1.3). The human development journey in the Anthropocene has to be fully aware of these risks and find ways to address them.

## Box 1.2 A just transition

The idea of transforming our economies and societies must have equity or justice at its centre. The transition from the current unsustainable patterns of production and consumption to a more sustainable system is bound to have winners and losers. But what is just depends on one's perspective. Advocates of climate justice take a human rights approach to sharing the costs and benefits of adjusting to climate change. By contrast, energy justice usually focuses on access to energy as a human right. And environmental justice emphasizes the agency of people and seeks to involve them in environmental decisionmaking.<sup>1</sup>

All three approaches touch on the political economy of a transition to more sustainable economies and societies. Any just transition will be a delicate balancing act.<sup>2</sup> The concept of a just transition is not merely a technical process of moving from a fossil fuel-based to a low-carbon system—it is a political process. The status quo is not only disrupting planetary processes but also perpetuating inequalities.<sup>3</sup> With this in mind, green innovation alone would not suffice to make the transition happen in the first place or to ensure that it is just. A just transition would require creating political coalitions among social and environmental movements, minority groups, labour unions, people employed in the energy sectors and engaged local communities.<sup>4</sup>

In a way the idea of a just transition gets to the core of sustainability. Rather than a fixed state we are aiming to reach, sustainability can be seen as a process of debate and inclusive deliberation. This view of sustainability as a process of exploring social, technological and environmental pathways recognizes that different stakeholders view sustainability in different ways and have diverging narratives about what is or is not sustainable. This implies the need to identify, in each case, the actors, their framing of the situation and their emphasis. This socially complex view of sustainability also implies that governments are not the only policy agents and that there is an important role for citizen engagement and mobilization, protest and coalition building.<sup>5</sup>

### Notes

1. Heffron and McCauley 2018.
2. Consider phasing out fossil fuel use. On the one hand, attention must be paid to people living in energy poverty—those who presently do not have access to energy. On the other hand, many people's livelihoods currently depend on the fossil fuel economy, and they are thus vulnerable to any transition away from it. Furthermore, both current and future generations are at risk given the social and ecological instabilities of the Anthropocene (Newell and Mulvaney 2013).
3. Healy and Barry 2017.
4. Healy and Barry 2017.
5. Leach, Sterling and Scoones 2010.

“The heightened risks combined with the narrow window of time to act instil a sense of urgency that is already well recognized for climate and biodiversity loss but is needed for a broader set of Anthropocene risks.

And we are unprepared for this. Take climate change. Both scientific and economic models, it is argued, have underestimated economic and social risks.<sup>126</sup> The call to shift the focus to lives and livelihoods and better incorporate risks<sup>127</sup> that we confront in the Anthropocene goes beyond climate change—and is consistent with how the interaction between social and planetary imbalances lies at the origin of these risks (see figure 1.1). Furthermore, not only are human-driven risks unprecedented and global in scale, but “social and technological trends and decisions occurring over the next decade or two could significantly

influence the trajectory of the Earth system for tens to hundreds of thousands of years. And they could potentially lead to conditions that resemble planetary states that were last seen millions of years ago, conditions inhospitable to current human societies and to many other contemporary species.”<sup>128</sup> The heightened risks combined with the narrow window of time to act instil a sense of urgency that is already well recognized for climate<sup>129</sup> and biodiversity loss<sup>130</sup> but is needed for a broader set of Anthropocene risks.<sup>131</sup>

Confronting these risks implies that enhancing resilience is central to the human development journey in the Anthropocene,<sup>132</sup> acknowledging that “[...] nonlinear, phased progress challenges the perception of linear incremental progressions from poverty to well-being, deforestation to reforestation, or fossil fuels to renewables. This insight highlights instead thresholds of change, where progress can involve the

often invisible preparation for change, the navigation of change once past a threshold or tipping point, and finally a focus on building the resilience of the transformed system.<sup>133</sup>

The human development journey in the Anthropocene will benefit from the strong evidence of the transformational change at local scales that is being increasingly scaled up to national levels through policies and finance mechanisms.<sup>134</sup> This suggests that the process of change is adaptive, with social changes evolving through a combination of gradual changes and larger regime shifts, as many aspects of socioecological systems change together.<sup>135</sup> And this process is inherently political, with multiple interests pulling in different directions.<sup>136</sup>

Technological advances and renewable energy pricing now competitive with fossil fuels mean that the energy transformation is increasingly feasible, even if the effectiveness of some of the proposed technologies is contested (as chapter 3 discusses). A combination of renewable energy, greater efficiency and reduced energy demand would make such a transformation feasible<sup>137</sup>—even if it remains challenging to decarbonize some economic sectors,<sup>138</sup> including food systems.<sup>139</sup> In fact, a recent study suggested that even if fossil fuel emissions were immediately stopped, current emission trends in global food systems would likely preclude meeting the Paris Agreement goals.<sup>140</sup>

Closing material cycles—extracting less and recycling more—is less certain technically but is receiving increasing public and policy attention. The challenge stems in part from the fact that about half of materials extracted globally are used to build or renew in-use stocks (such as infrastructure), making them impossible to recycle in the short run. Material stocks increased 23-fold from 1900 to 2010 and would increase another 4-fold (to more than 150 times the 1900 stock) if there were global convergence to the level of stocks of developed countries.<sup>141</sup> And around 44 percent of processed materials (those not used to build stocks) are used to provide energy, making them unavailable for recycling as well.<sup>142</sup> Further, some materials remain essential for specific functions: No exemplary substitutes are available for all major uses of 62 metals.<sup>143</sup>

Despite being a major challenge,<sup>144</sup> closing material cycles shows the need for, and potential of, major product redesign. In fact, much evidence suggests

that the opportunities are commensurate with the challenges, given that only 6 percent of globally extracted materials are recycled,<sup>145</sup> with clear opportunities for more efficient use and recycling in domains ranging from agriculture to green chemistry.<sup>146</sup> Analytical approaches such as the material stock-flow-service—focusing on the services that enhance wellbeing and then tracing back the flow of materials required and the minimum stocks needed—can also help identify opportunities to generate human benefits with less material use.<sup>147</sup>

Despite these challenges, the human development journey in the Anthropocene should be guided by exploration beyond the structural constraints of industrial societies—or it will be blind to what might be feasible. Living through the Industrial Revolution in England, Adam Smith, David Ricardo and others thought that diminishing marginal yields in agriculture would eventually bring industrialization to a halt.<sup>148</sup> They all saw the world through the lens of agricultural societies. Feasibility may be impossible to prove, but it is not disproved by using industrial societies as a frame of reference. It will be important to keep the future accessible and navigable<sup>149</sup> on the human development journey in the Anthropocene (box 1.3). And, as important, to recognize that new and unimagined institutions will support human aspirations for evolving conceptions of a good life.<sup>150</sup>

The human development journey in the Anthropocene will also hinge on broader social and economic transformations and their interactions with technologies, as during the agricultural and industrial transitions. Here, the insights from biocultural diversity approaches will be key to informing the transformations needed. Some elements of these changes may already be under way, such as the growing importance of intangible capital in many of today's economies<sup>151</sup> and the increasing economic value of digital goods and services (software, social networks, media, entertainment), even though it is unclear whether digitalization will substantially reduce demand for materials and energy.<sup>152</sup> Though the global population is growing, growth rates are falling (figure 1.8), with recent drops in fertility rates suggesting that the total population may even start falling in this century.<sup>153</sup> More and more people live in cities, so urban uses of energy and materials are particularly important,<sup>154</sup> as are the processes of economic and social change in cities.<sup>155</sup>

### Box 1.3 Choosing inclusive futures for human development in the Anthropocene

*By Andrea S. Downing, Stockholm Resilience Centre at Stockholm University and Global Economic Dynamics and the Biosphere programme at the Royal Swedish Academy of Sciences; Manqi Chang, Department of Aquatic Ecology at the Netherlands Institute of Ecology; David Collste, Stockholm Resilience Centre at Stockholm University; Sarah Cornell, Stockholm Resilience Centre at Stockholm University; Jan. J. Kuiper, Stockholm Resilience Centre at Stockholm University; Wolf M. Mooij, Department of Aquatic Ecology at the Netherlands Institute of Ecology and Department of Aquatic Ecology and Water Quality Management at Wageningen University; Uno Svedin, Stockholm Resilience Centre at Stockholm University; and Dianneke van Wijk, Department of Aquatic Ecology at the Netherlands Institute of Ecology*

Presenting a choice between focusing on environmental conservation and focusing on poverty alleviation and human development is a false dichotomy. These two goals are indivisible: Either one chooses neither—for instance, by maintaining business-as-usual practices of consumption and production—or one chooses both.<sup>1</sup> This dependence is simple—long-term fair and just human development depends on relative stability in Earth system dynamics, which in turn can be ensured only through sustainable use of the environment—that is, maintaining rates of human resource extraction below rates of resource production, and rates of waste emissions below the environment’s ability to absorb and transform the waste.<sup>2</sup> Overextraction and overemission compromise the biosphere’s ability to produce the resources and sustain the services that societies need to thrive and survive.

Choices are nonetheless important, and the types of choices available differ according to scales and perspectives. At a generic, global level the Intergovernmental Panel on Climate Change community has been developing different representative concentration pathways and shared socioeconomic pathways that humanity might broadly take and have analysed the outcomes of those pathways in terms of climate change and biodiversity loss.<sup>3</sup> The pathways, ranging from no to high mitigation, are mutually exclusive and all lead to further deterioration of the natural world and frame sustainability as the outcome of policies that constrain present activities. The pathways—and their outcomes—are firmly anchored in the present and designed around alterations of current systems.

However, this is not only an exercise in fixing current unsustainable processes and controlling damage from the impacts of past overexploitations and injustices. It also requires active thought and planning of what sustainable futures can look like—irrespective of perceived constraints or norms that shape today’s societies—and reflecting on how actions taken today build towards such futures or make them impossible. Clear goals of sustainable and just futures can help shape present action.<sup>4</sup> Furthermore, starting with a perspective on the desirable futures one aims for gears towards more transformative pathways of change,<sup>5</sup> acknowledging that gradual change is insufficient to ensure a safe and just world for all of humanity<sup>6</sup> or to achieve the Sustainable Development Goals.<sup>7</sup> Transformations would be the means to redesign systems to have justice and sustainability at their core rather than to gradually adjust systems to be less bad.

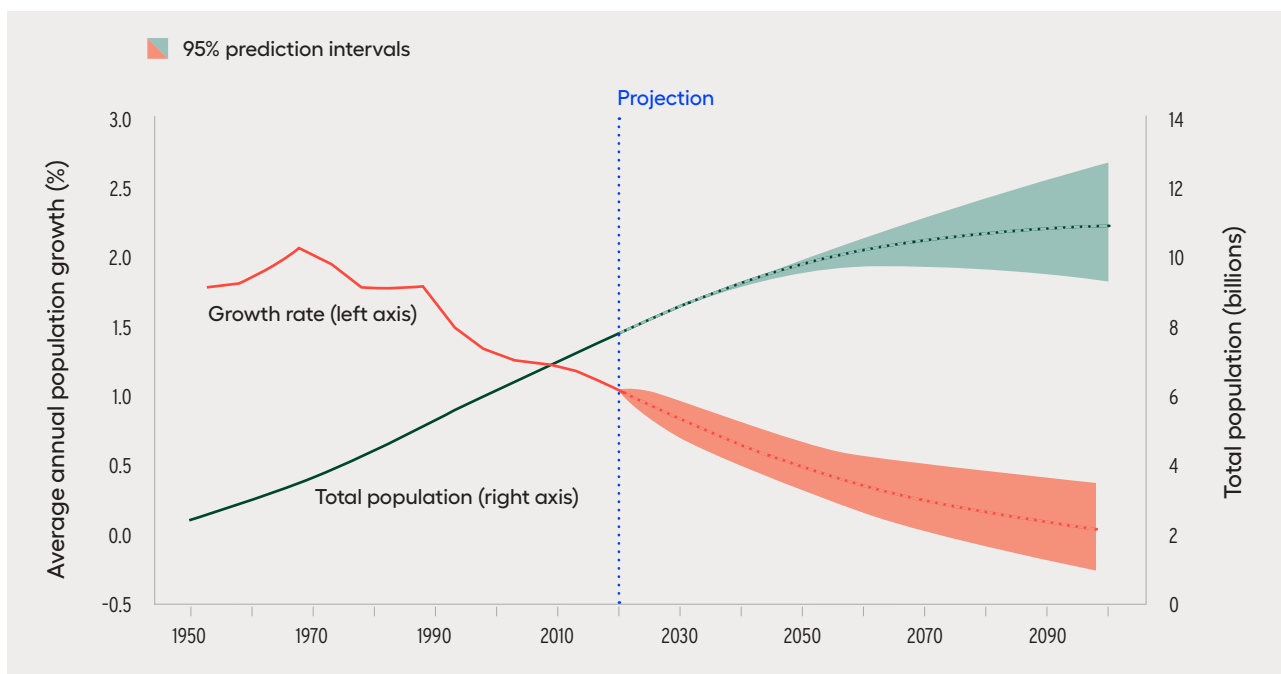
Though envisioning and choosing sustainable and just futures must be done across the world—indeed, all countries are developing countries in the context of the 2030 Agenda for Sustainable Development<sup>8</sup>—these are not global tasks. Indeed, the diversity of biogeophysical, socioeconomic and ethical contexts—and their possible combinations—clearly indicates that there is no silver bullet, no single realization of a sustainable future or transformation to guide all of humanity. Instead, each vision needs to suit the appropriate scales of biogeophysical dynamics, socioeconomic processes and ethical considerations.<sup>9</sup> This implies that a diversity of sustainable futures—and transformative pathways towards them—must coexist. From this perspective achieving the Sustainable Development Goals would be the outcome of realizing a diversity of desired sustainable development futures. Each pathway, transformation and realization of sustainable development must have at its core the inclusivity of other and different pathways and processes of sustainable human development.

Importantly, many of the processes and systems of today need to change: processes that overexploit and overemit, processes that benefit only the few, and the root causes and driving forces of these processes—such as consumerism, business models of unlimited economic growth and the displacement of impacts and dependencies across geographies and generations. Choosing away from an unsustainable present implies losses for those who disproportionately benefit or aim to benefit from business as usual. These can be seen as constraints—as in the framing of representative concentration pathways and shared socioeconomic pathways—but these unsustainable processes today all come at the cost of sustainable and just futures for all of humanity. Transformations are likely best navigated with an understanding of the unsustainable processes that must be lost and the sustainable and just processes that can be gained by using visions of inclusive, just and sustainable futures as compasses.

#### Notes

**1.** Downing and others 2020. **2.** Downing and others 2020; Rockström and others 2009a. **3.** Riahi and others 2017. **4.** Rodriguez-Gonzalez, Rico-Martinez and Rico-Ramirez 2020. **5.** Sharpe and others 2016. **6.** Holling, Clark and Munn 1986; Leach and others 2012. **7.** Hajer and others 2015; Randers and others 2019. **8.** United Nations 2015b. **9.** Häyhä and others 2016; Van Der Leeuw 2020.

**Figure 1.8** Global population is growing, but growth rates are falling



Source: UNDESA 2019b.

Studies suggest that cities do not necessarily “slow down” uniformly as the population grows, which is the typical pattern for colonies of hundreds of millions of organisms, such as termites, where the larger the colony, the slower the use of energy and materials relative to size.<sup>156</sup> Some aspects of city life do slow down as population grows, given that there are economies of scale (as with infrastructure networks), while increases in houses or jobs (associated with human needs) track population. But income, wages and rates of invention increase far faster than population.<sup>157</sup>

Urbanization’s effects on pressures on the planet are currently mixed.<sup>158</sup> But as more people gather, particularly the more educated and interconnected they are, they generate a larger pool of potential ideas.<sup>159</sup> In fact, as cities grow, the complexity of social life increases, yielding even more innovations that can overcome constraints to further population growth in the same city.<sup>160</sup> This offers a glimpse of the opportunities that may emerge as more people become more educated and more connected, especially as digital technologies expand.<sup>161</sup> Seizing these opportunities calls for more than envisioning the human development journey in the Anthropocene. As argued next, it calls for leveraging the human development approach by seeing people as agents, not merely as patients.

## Leveraging the human development approach for transformation: Beyond needs, beyond sustaining

The human development approach emphasizes expanding human freedoms and highlights inequalities in capabilities. Leveraging the human development approach takes us beyond notions of sustainability premised on meeting needs and striving for sufficiency and floors of subsistence alone—and towards empowering people to make choices that reduce planetary pressures and advance justice (addressing both planetary and social imbalances).

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### Meeting the needs of the present and the future: Is that all?

The Brundtland approach to defining sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”<sup>162</sup> was a watershed moment.<sup>163</sup> It brought together the ethical imperative of fulfilling the basic subsistence requirements of people today—putting poverty eradication squarely at the centre of the concept—with an

obligation to our descendants rooted in intergenerational justice. It put people at the core, instead of defining what needed to be sustained for consumption or production. And rather than asking for the preservation of a pristine state of nature, it emphasized the ability of each generation to use resources, allowing for some fungibility across resources.<sup>164</sup>

The two key ideas of the concept—sustain and needs—have been interpreted and reinterpreted in many ways. Sustain, when translated into notions that consumption is the thing to be made sustainable, puts the focus on disparities in consumption between developed and developing countries, informing approaches to deal with these asymmetries such as degrowth, discussed above. Robert Solow argued that a generalized capacity to produce wellbeing (or productive capacity) was the thing to be sustained into the indefinite future, allowing for the next generation to be left with what it takes to meet a standard of living at least as good as today's and to do so for the next generations similarly.<sup>165</sup>

There are also different interpretations of which needs should be sustained. Needs can be defined as encompassing not only the minimum required to survive but also a wider set of requirements.<sup>166</sup> However, moving the focus towards a wider conceptualization of needs—or completely away from needs to living standards or productive capacity—may diminish the ethical power of a formulation that emphasizes the minimum required to eliminate poverty in today's generation and every generation going forward.<sup>167</sup>

A focus on needs may lead to prioritizing social or economic floors, providing a minimum foundation to be shared by everyone, but it does not fully account for inequalities, and it downplays the potential of people as agents. For instance, the inspired and influential framework proposed by Kate Raworth sets a floor of essential human and social needs as a circle inside the planetary boundaries framework described in chapter 2.<sup>168</sup> The resulting “doughnut” defines an operating space that is not only safe, from the Earth system sciences perspective, but also socially just. People can strive in this safe and just operating space through a multitude of potential pathways.<sup>169</sup> But when interpreted as focused on enabling people to attain a minimum level of wellbeing, it puts less emphasis on inequalities.<sup>170</sup> Even when inequalities are

considered in related frameworks, the emphasis is often on income inequality.<sup>171</sup>

But as the 2019 Human Development Report argued, it is important to go beyond inequalities in income and consider a broader set of inequalities in human development. The 2019 Report also argued that while setting a floor of minimum achievements is essential, it is not enough to address persistent, and in some cases increasing, inequalities.<sup>172</sup> As shown next, impressive achievements in reducing planetary pressures that are blind to distributional consequences are likely to leave existing inequalities in place, compounding the drivers of social imbalances.<sup>173</sup>

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### Reducing planetary pressures with persisting inequalities

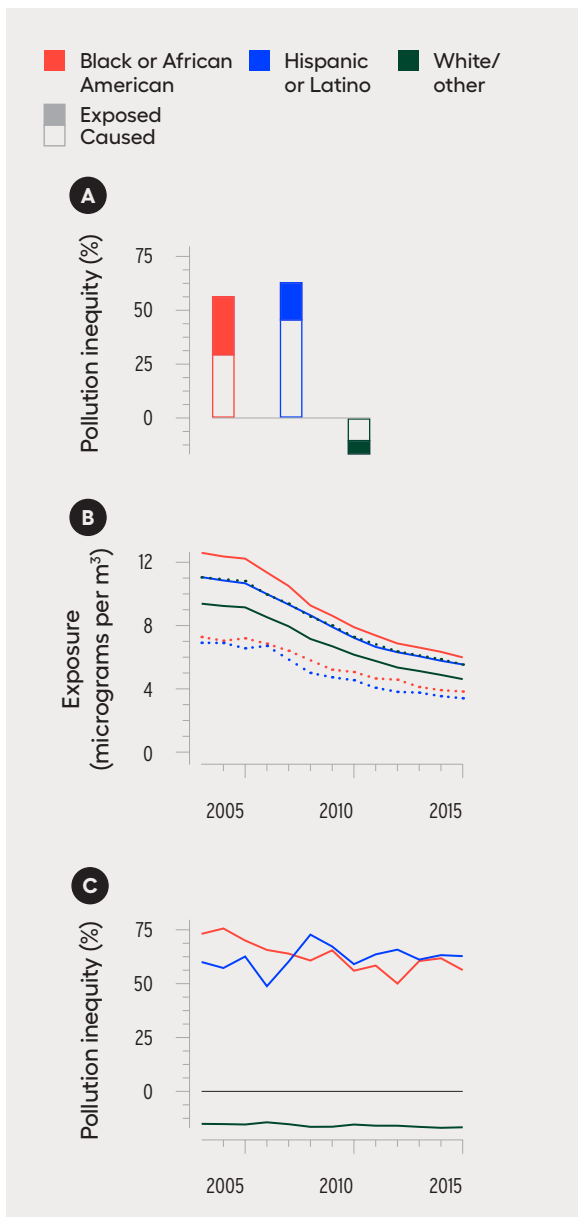
As chapter 2 shows, environmental degradation and the negative effects of that degradation reflect, and often amplify, underlying inequalities that in turn are often underpinned by asymmetries in power. Asymmetries in power across economic sectors can also account for some of the heterogeneity in response to environmental challenges.

To take an example, racial and ethnic disparities in pollution exposure have long been documented in several countries. In the United States they were at the origin of the environmental justice movement and persist today. Non-Hispanic Whites experience about 17 percent less exposure to air pollution relative to their consumption, while Blacks and African Americans bear a pollution burden of 56 percent excess exposure relative to their consumption and Hispanics and Latinos, 63 percent.<sup>174</sup> The study also revealed the risks of looking at environmental action without considering equity implications. Although exposure to aggregate fine particulate matter (PM<sub>2.5</sub>) air pollution fell by 50 percent between 2002 and 2015, inequality in pollution exposure remained the same (figure 1.9).<sup>175</sup>

There are also large inequalities in the production side of the economy. Gross external damage<sup>176</sup> due to premature mortality caused by industrial emissions of pollutants, consistent with the reduction in pollution documented above, fell by about 20 percent between 2008 and 2014.<sup>177</sup> But the decline was driven by cleaning up electricity generation and utilities (figure 1.10), as a result of policy, economic and technological changes unique to the sector that may not be



**Figure 1.9 Lower total pollution but persistent inequities in pollution exposure**

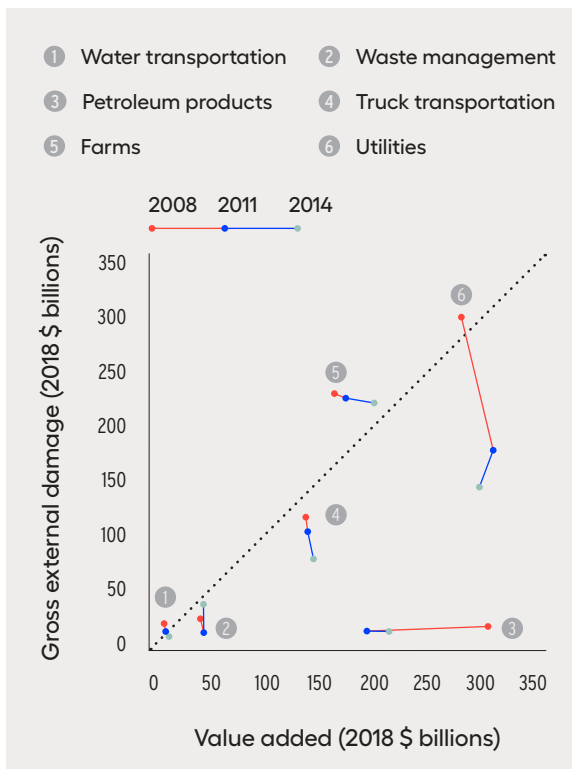


**Note:** (A) Contributions of differences in consumption (exposed and caused) to pollution inequity; (B) exposure of each racial/ethnic group to particle mass with aerodynamic diameter less than 2.5 microns (PM2.5) caused by the total combined personal consumption of all groups (solid lines) and total population exposure to PM2.5 caused by each group's population-adjusted consumption (dashed lines); (C) pollution inequity.  
**Source:** Tessum and others 2019.

relevant to others.<sup>178</sup> By 2014, four sectors alone accounted for 75 percent of gross external damage but less than 20 percent of GDP; farms were the largest sector contributing to industrial pollution.<sup>179</sup>

In sum, aggregate reductions in pollution may leave existing inequities in pollution exposure

**Figure 1.10 Reduced economic damages from industrial pollution were driven by utilities without losing economic value added**



**Source:** Tschofen, Azevedo and Muller 2019.

intact. And there are asymmetries across sectors in how much they drive reductions in pollution (in the United States utilities reduced pollution sharply, while farms and oil did not). These inequalities and asymmetries result from the interplay of economic, technological and political factors. So considering inequalities in exposure and in actions to reduce environmental damages shows the importance of going beyond social floors for minimum needs—and how marginalization and exclusion that feed into the social imbalances are often a blind spot when meeting needs is what is intended to be sustained.

### Expanding human freedoms to address social and planetary imbalances

Where to go beyond needs? What can we expand, beyond focusing on sustaining? How to account for persistent inequalities that feeds social imbalances? The human development approach offers a path to address these questions.



Human development takes us beyond notions of sustainability based on needs fulfilment and away from notions based on instrumental objectives such as consumption or economic activity (measured by growth in GDP, for instance).<sup>180</sup> By going beyond fulfilling basic needs, it also implies that the objective is to enable our children and their descendants to flourish, allowing for broader and evolving aspirations.

The approach is also fundamentally empowering in the realm of individual and social choice because it allows for the evolution of values (redefining parameters of worth and dignity) and of social norms that drive people's behaviour as much as, and sometimes more than, getting the prices right. People's commitments to certain values (honour, justice) can be absolute and inviolable.<sup>181</sup>

These values can encompass more than anthropocentric perspectives. Eileen Crist argued that a "human-centric worldview is blinding humanity to the consequences of our actions."<sup>182</sup> And Martha Nussbaum, an influential voice in the capabilities community, even argued for dropping "human" from the title of the *Journal of Human Development and Capabilities* to make it more inclusive of ethical views on the environment and the rights of nonhuman animals. This should be the case, she argued, even when they do not have a direct bearing on human capabilities because "the future of the planet and its sentient beings is one of the largest ethical issues facing humanity going forward."<sup>183</sup> These normative ethical concerns have acquired a heightened importance in the discussion surrounding the Anthropocene.<sup>184</sup>

Putting human freedoms at the core not only provides for a broader ethical and evaluative framing for sustainability but also, instrumentally, points the way towards changing the behaviours that are leading to unprecedented pressures on the planet. Surely the goal here is not to sustain these human freedoms, but rather to expand them as much as possible. For in that expansion lies the means to change both values and social norms, the possibility of widening the realm of action for change—whether through changes in individual behaviour or more consequentially through the expression of values and preferences in the political process or civil society advocacy and mobilization. Governments and policymakers are the central actors, but people's own will to shape their life can come together in organized ways through

social movements. As Frances Stewart said, "Policy change is the outcome of a political struggle in which different groups (and individuals) provide support for particular changes. In this struggle, uncoordinated individuals are generally powerless. They are also powerless to improve the conditions they face in the market. Yet by getting together to support particular changes, individuals can acquire considerable power collectively."<sup>185</sup> It is in this sense that a human development approach not only allows but actually calls for going beyond sustaining towards "the goal of preparing a future that is not just as good as, but that is better than the present."<sup>186</sup>

“Putting human freedoms at the core not only provides for a broader ethical and evaluative framing for sustainability but also, instrumentally, points the way towards changing the behaviours that are leading to unprecedented pressures on the planet.

Thus, it is important to develop a deeper awareness of our interdependence with the planet—one that is already held and sustained in part by values and social norms by communities around the world, as noted in the discussion on biocultural diversity, and it is also starting to percolate through the discourse on capabilities (box 1.4). These values and norms can find expression in individual and social choices—mediated through political and social processes that give further agency to people. Here, once again, redressing inequalities in human development is paramount, to avoid the capture of political processes by narrow interests that want to preserve the status quo—a process described in the 2019 Human Development Report.<sup>187</sup>

That change can happen does not mean that it will. It is conceivable, certainly based on past trends and current behaviour, that expanding human freedoms could result in a continuation of unsustainable patterns of consumption and production. But Amartya Sen has argued forcefully, using the decline in fertility rates, that empowering people and giving them enhanced agency not only avoid infringements of individual choice but can also effectively address the challenges of social choice.<sup>188</sup> Expanding human development—more education of women and girls, more economic empowerment of women, more

## Box 1.4 Capabilities in a rapidly changing living planet

The task of identifying forward-looking capabilities is not trivial because there is a plurality of views.<sup>1</sup> A useful departure point is to draw on the differentiation among intrinsic, relational and instrumental values for nature,<sup>2</sup> which already reflect a plurality of voices.<sup>3</sup>

- **Intrinsic and relational.** Interaction with nature can be considered an essential capability based on normative principles. As argued above, nature and societies are interdependent, embedded in one another. Martha Nussbaum adopted the view of including nature as one of 10 central capabilities: “being able to live with concern for and in relation with animals, plants and the world of nature.”<sup>4</sup>
- **Instrumental.** The interaction with the Earth system is a key factor defining other capabilities based on its instrumental role.<sup>5</sup> The erosion of biosphere integrity affects the ability to transform resources into functionings. For instance, more frequent and more intense extreme weather events as a result of climate change are likely to affect people’s ability to inhabit certain places, cultivate certain products or sustain certain livelihoods. Air pollution affects health. When the instrumental role of a resource is omnipresent in the way of life, the resource may almost become a proxy of an essential capability. How we interact with nature conditions capabilities and functionings because its further erosion affects people’s lives.
- **A new scientific consensus.** Scientists from a range of disciplines are showing with more precision the ways in which nature and people are interdependent, as discussed in chapter 2.<sup>6</sup> This emphasizes that humans and social actions are embedded in the biosphere<sup>7</sup> and that integration is key in dealing with complexity.
- **The political consensus.** Environmental sustainability appears at the same level of social and economic development objectives as part of an indivisible political global agenda. Since 2015 nature has been embedded in the Sustainable Development Goals.

### Notes

1. Fukuda-Parr 2003. 2. Following the typology in Brondizio and others (2019). 3. This is consistent with the comparative analysis advocated by Amartya Sen (see Sen 2009). 4. Nussbaum 2011, p. 33–34. 5. Essential and instrumental roles can be intertwined in practice. This happens with the role of income in the human development approach. Though the capabilities approach makes an explicit effort to depart from considering commodities as a defining factor of development, income is acknowledged as a constitutive element of capabilities because of its importance in defining basic living standards. 6. Diaz and others 2015. 7. Dasgupta 2020.

bargaining power of young girls in households, reduced poverty<sup>189</sup>—contributed to lower fertility rates in India (especially in the state of Kerala) and Bangladesh. Crucially, social norms shifted in the context of public reasoning and deliberation.<sup>190</sup>

The evidence of the importance of social norms is particularly strong in Bangladesh, where community social interactions determined differences in fertility behaviour even within the same village. Each village was subject to the same interventions, access to information and services, including education. But social norms were largely associated with religious groups, and interactions rarely occurred across religious boundaries. This enabled a study to control for individual differences in education, age, wealth and other factors, resulting in the conclusion that a woman’s behaviour was driven primarily by the predominant choice among other women in her religious group.<sup>191</sup>

This example is used not to suggest that it can simply be replicated as we confront the unprecedented challenges of the Anthropocene.<sup>192</sup> Rather, it shows that when people are the ultimate ends of development, progress in human development through expanded human freedoms also creates the means not only for people to become more productive economically and have higher standards of living but also to be more active participants in public reasoning and able to change social norms.<sup>193</sup> The quality of human agency is enhanced by better education, better health and higher standards of living,<sup>194</sup> dimensions that constitute the Human Development Index. Recall that longevity and education are capabilities that are valued in themselves—not just because they enable people to be more productive economically. As Sharachchandra Lele put it: “The purpose of education is not an instrumentalist ‘skilling’ to produce biddable masses for current economic and political

systems to exploit. Its purpose is transformative: to imbue everyone with broad human values and critical thinking abilities. Only then can we overcome the confines of race, caste, gender and other prejudices, reconnect with our environment and become politically aware and active citizens.”<sup>195</sup>

“The Anthropocene brings new evidence and concepts to inform public debate about the changes—normative, economic, technological, behavioural—needed to ease the unprecedented pressures we are putting on the planet. There can be no doubt that only people can effect these changes, but the Anthropocene and its planetary imbalances are superimposed on social imbalances and tensions.

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—needed to ease the unprecedented pressures we are putting on the planet. There can be no doubt that only people can effect these changes, but the Anthropocene and its planetary imbalances are superimposed on social imbalances and tensions. In some countries people are wealthier than ever, more educated than ever, healthier than ever—but not happier, and they are fearful about the future.<sup>196</sup>

There may not be a clear blueprint of what human development is and will be in the decades to come. Human development is permanently under construction, and the approach is open ended to new and emerging challenges and opportunities (spotlight 1.4). This chapter has attempted to sketch a vision of the human development journey in the Anthropocene in order to navigate towards a better planet for people and the rest of life. It has further argued that advancing human development is not only possible but also the way to address planetary and social imbalances. The vicious cycle in figure 1.1 can be broken.