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NARRATIVES FOR THE 'HALF EARTH' AND 'SHARING THE PLANET' SCENARIOS

A literature review

Background Report

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NARRATIVES FOR THE 'HALF EARTH' AND 'SHARING THE PLANET' SCENARIOS. A LITERATURE REVIEW

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Main findings

In light of the upcoming Conference of the Parties to the Convention on Biological Diversity (CBD) in 2021 on the new global biodiversity framework 2020–2030, an extensive debate around conservation and sustainability is now underway. This concerns many perspectives and proposals for not only halting but also bending the curve of biodiversity loss. Furthermore, coupling biodiversity objectives with other desirable Sustainable Development Goals (SDGs) is increasingly recognised as essential to ensure a good quality of life. Finally, attention has lately been devoted to the plurality of values and knowledge about nature. This recent focus has emphasised the importance of including different perspectives about nature from a wider array of actors, such as, importantly, indigenous populations and local communities, various sectors, civil society, business and finance. This emphasis is essential to achieve a fairer and more inclusive conservation.

As part of the PBL CBD Post-2020 project, this report presents qualitative narratives and a literature review for the following two alternative conservation scenarios: Half Earth (HE) and Sharing the Planet (SP). The literature review delves into the current debate and it directly engages with various proposals and concepts for both conservation and agricultural systems. Next to this, previous scenario exercises were used to develop the two qualitative storylines (narratives). While the two scenarios envision two alternative nature futures — as they adopt different conservation strategies and nature valuation — they both aim at restoring biodiversity and at achieving climate and food security targets. These scenarios were part of a modelling exercise to analyse two different conservation strategies for the Post-2020 period.

The Half Earth (HE) scenario has roots in the scientific debates surrounding species conservation. It directly stems from the proposals of E.O Wilson to protect half of the earth, and its subsequent elaborations, such as Nature Needs Half and the Global Deal for Nature. By explicitly referring to the new framework by IPBES called Nature Futures (NFF), the HE scenario was envisioned to be compatible with protection based on the intrinsic value of nature, that is the value that nature is believed to have independent from any human need and preference. Under this scenario, biodiversity conservation is envisioned to primarily halt species loss, retain ecological processes and protect wilderness. To do so, conservation strategies are mostly directed to separate nature and wilderness from human pressures by protecting half of the earth. According to this scenario, half of the earth is devoted to conservation purposes whereby human interactions with nature are mediated by forms of protection or sustainable use (this means that all the IUCN categories of Protected Areas as well as Other Effective area-based conservation measures are included). Because of the ambitious conservation strategy, the related agricultural system was envisioned to sustainably intensify food production to both feed the world and spare land for conservation purposes. This type of agriculture is premised on technological developments and innovation and a reduction of externalities.

The Sharing the Planet (SP) scenario has roots in both ecosystem services approaches to conservation and in the concepts of 'living with nature' and 'nature as culture'. In this scenario, biodiversity conservation is premised on the idea that separating nature from humans will not lead to bend the curve of biodiversity loss. On the contrary, this scenario envisions human-nature systems in which humans and nature can live and thrive together. This conceptual position lies in the belief that envisioning a world where nature is separated from humans would not only fail to halt biodiversity loss, but it would also come at tremendous costs for human well-being and other sustainability dimensions. Following from

this position and building on the IPBES NFF, this report finds that the SP scenario prioritises a protection centred on the instrumental and relational values of nature. This means that the relationship between humans and nature is central and is valued in both its instrumental (ecosystem services) and non-instrumental (i.e. spiritual, care, etc.) value. Whilst the scenario originally entails both valuations, the non-instrumental one (relational values) could not be operationalised in the modelling exercise. Whilst Protected Areas (PAs) are still an important conservation tool, conservation is centred around sustainable use. This scenario was developed in a way to integrate human and nature systems into working mixed landscapes. Conservation optimises ecosystem services such as food production, carbon storage, water and nutrient retention and others. It follows that the agricultural approach dominating in this scenario is one centred around the ecological intensification of food production (e.g. agroecology, organic agriculture) and the delivery of the above ecosystem services. This agricultural approach is premised on the idea of land sharing, whereby agricultural patches are interwoven with natural elements.

Next to presenting the two scenarios, this analysis briefly elaborates possible governance mechanisms on how to possibly achieve them. Considering that both these scenarios require important governance reshuffling, some similarities can be found. Both perspectives seem to acknowledge the importance of integrating biodiversity conservation with other sustainability dimensions. Both perspectives reflect on the need for governance to take on this challenge. From the HE perspective an example could be the 'Global Deal for Nature', that is a policy framework for nature conservation to be coupled with the Paris Agreement on climate. From the SP perspective, while being very varied, this report found that reflections have been directed towards the local scale, whereby different stakeholders and different interests would play a major role in integrating biodiversity with other SDGs. With regard to the role of local communities, it seems that both scenarios agree on their importance for conservation. However, some analysts (Büscher and Fletcher, 2020) who were included in the SP scenario maintain that large conservation parties (e.g. the global upper class, land-owning capitalists) should be those most targeted to change. This is because, they claim, up until now, much of the conservation pressure has been put onto the shoulders of local communities. Despite this similarity, fact remains that authors in the SP perspective seem to favour local governance systems whereby the value of nature is primally created locally. The HE perspective, in contrast, rests on more centralised and globalised governance systems whereby technological innovation is fostered.

This analysis presents two alternative options that both consist of ambitious conservation strategies and strive to achieve food security and climate goals. At the same time, these alternatives do envision very different worlds, because of their different positions and visions on some conceptual issues. The main conceptual divide that emerged from this analysis is that, in the HE scenario, concepts such as 'wilderness' and 'naturalness' are central. In contrast, the SP scenario values the human-nature interrelationship and, at least theoretically, it refuses the concept of 'wilderness'. This conceptual difference is not merely theoretical but rather has important implications. It is at the basis of the difference in conservation strategies between the HE and SP scenarios, as explained above.

The differences that this report has drawn between the two scenarios are nothing but conceptual lines that are useful to the scenario development and modelling exercise. This means that, in reality, the proposals and concepts underpinning the scenarios are not as different and as static as they might appear from this analysis. On the contrary, they continually modify and evolve, possibly creating some room for synergy. This has evidently caused difficulties in the translation of such concepts into scenarios, which has been particularly true for the SP scenario. As mentioned above, this scenario results from the interaction between two different approaches to conservation: ecosystem services and

'nature as culture'. While this report attempted to conceptualise both of these approaches, it is also true that the operationalisation into models of the 'nature as culture' dimension has been difficult, if not impossible.

These scenarios were not created to further polarise the debate and identify two irreconcilable alternatives. On the contrary, these scenarios can be used to find 'middle ground' and become integrated. In this regard, the recent call by Locke et al. (2019) about the 'Three Conditions' could be a useful framework to articulate an integration between the HE and SP scenarios and acknowledge their similarities and differences.

In conclusion, this report accounts for the background work and the knowledge-based process that informed the PBL CBD Post-2020 scenario development. Additionally, it also hopes to be a valid contribution to the discussion around conservation in light of the upcoming CBD meeting and its further implementation by providing an interpretation of the current academic and societal debate.

1 Introduction

As the 15th meeting of the Conference of the Parties (COP15) to the Convention on Biological Diversity (CBD) approaches, debates on which conservation strategies and guidelines should be adopted at a global level have intensified. There are many approaches to halt and bend the curve of biodiversity loss that demand the attention of the Parties to the CBD and all stakeholders involved (Bhola et al., 2020), ranging from very ambitious Protected Areas (PAs) extensions, to less quantitatively-bold but equally challenging approaches centred around ecosystem services approaches, as well as approaches entailing structural rethinking and reshuffling the world economic and societal systems. This richness of perspectives has fuelled the debate on conservation in the past years, tapping into a plurality of knowledges and disciplines. The urgent need to integrate conservation objectives into broader sustainability frameworks such as the SDGs has further complicated the debate, as it has become untenable to envision human development without considering the supporting role of nature and vice versa (IPBES, 2019; Rosa et al., 2017). This requires connecting conservation to agriculture, energy, urban systems, equity and many more issues and exploring their synergies and trade-offs. This is not an easy task and, to this end, scenarios and models represent a useful tool to explore alternative future pathways for nature conservation in a broader societal context.

Earlier analysis by Van Vuuren et al. (2012, 2015) and Kok et al. (2014, 2018) developed scenarios and pathways that could achieve multiple sustainability objectives at the same time, including halting the loss of nature (the objective of the CBD Strategic Plan 2010–2020). In their analyses, in order to achieve multiple environmental and sustainability goals, they elaborated an 'option space', which includes necessary transformative changes in the indirect drivers of change for biodiversity, including changes in consumption and production patterns, and technological development. While these two contributions have been useful in taking a holistic perspective on biodiversity and sustainability, there is now the need to elaborate scenarios and models that include more ambitious conservation strategies in the 'option space'. Bridging together different sustainability goals such as mitigating climate change and ensuring food provisioning with specific and ambitious conservation targets is an essential step in the elaboration of global targets at the upcoming CBD meeting.

To this end, as part of the PBL CBD Post-2020 project, new scenarios were elaborated that follow in the footstep of the recent work by Leclère et al. (2018 and forthcoming) building on Van Vuuren et al. (2015) and Kok et al. (2018), as well as the IPBES Global Assessment chapter on pathways towards a sustainable future (Chan et al., 2019). The project aims to develop two alternative scenarios that could illustrate how it would be possible to achieve specific conservation targets and multiple desirable sustainability-related goals: a) bend the curve of biodiversity loss, b) achieve the 2050 CBD Vision 'Living in Harmony with Nature' as well as to ensure c) food security and d) the attainment of the Paris Agreement target to stay below the 2 °C threshold. Furthermore, this project also positions the two scenarios within the broader discussion concerning values of nature and human-nature relationships, thereby elaborating on recent debates on the importance of considering multiple perspectives on nature (Pascual et al., 2017; van Zeijst, 2017).

Two scenarios were elaborated, Half Earth (HE) and Sharing the Planet (SP), to include both ambitious conservation targets and a set of measures (e.g. changes in agricultural productivity and diet) which affect other direct and indirect pressures on biodiversity — together defining the 'option space' mentioned above. They show two alternative futures. On

one side, the HE scenario largely focuses on species conservation, thereby envisioning a type of conservation that separates nature from human pressures. This scenario emphasises the inherent value of nature and, to do so, it envisions a large expansion on the protected areas (PAs) to cover roughly 50% of the Earth. On the other side, the SP scenario is grounded in the notion that biodiversity and ecosystems are needed for sustainable production, a good quality of life and human well-being. This scenario focuses on the instrumental value of nature. Strengthening the human–nature relationship will lead to 'shared landscapes' as its main tool of conservation, integrating natural and human systems.

Both these scenarios have been developed in the context of the PBL Post-2020 project. Despite being grounded in the current debate around conservation and sustainability, these scenarios reflect our interpretation of differing conservation perspectives; therefore, they differ from those in the literature, to varying degrees. It is the aim of this report to present the narratives for the scenarios. The narratives operationalise the scenarios to allow for a model-based analysis. Furthermore, this report aims to connect the HE and SP scenarios to the literature, to illustrate the logic by which they have been developed, to specify their essential features, to outline them in storylines and elaborate on their possible interconnectedness and consequences for other societal sectors, such as agriculture, climate, water and the general human–nature relationship.

The development of the HE and SP scenarios has required setting strict boundaries in order to be able to clearly identify their separate elements. This task is far from easy. As already noted by others (Bhola et al., 2020; Büscher and Fletcher, 2020), differences between alternative conservation perspectives are not as clear-cut, let alone static. In fact, conservation perspectives are as dynamic and evolving, and they can be mixed into hybrids. An example of this could be the recent proposal called 'Three Conditions' (Locke et al., 2019) where different conservation strategies apply to different geographical conditions. In other words, the conservation strategies outlined for the HE and SP scenarios may, in fact, be more intertwined than is apparent from the scenarios themselves.

Methodologically, this report has reviewed a vast selection of relevant scientific literature but it has not applied a participatory method. The novelty of this research was its interdisciplinarity focus, ranging from natural to social sciences, passing through a solid background analysis of humanities studies in the development of the conceptual framework of the two scenarios. This literature review has been at the core of the knowledge-base process undertaken to develop the two scenarios and their narratives. Furthermore, this study refers to knowledge from conservation studies as well as from other relevant sectors, such as agriculture, energy, urbanisation, etc. Finally, the two storylines have been discussed and peer-reviewed by experts within the sector, whose feedback have been taken into consideration and included in the final version hereby presented.

This report is structured as followed: Chapter 2 will introduce and present the qualitative narratives. Chapter 3 will present a theoretical and philosophical discussion for both scenarios to describe a conceptual understanding of both perspectives and how they relate to concepts, such as human-nature relationships, values and valuation of nature. Chapters 4 and 5 will present the literature review for the respective HE and SP scenarios. Both chapters will account for the large scientific debate that has been used to identify and shape the two scenarios of this analysis. Particular attention is given to both the conservation and agricultural dimensions. Finally, Chapter 6 will conclude this report with a brief discussion of the main findings.

2 Narratives

The 'Half Earth' and 'Sharing the Planet' scenarios represent two opposing ways of thinking and practicing biodiversity conservation to achieve the same, shared goal, that is to 'bend the curve of biodiversity loss'. On one side, the HE scenario proposes to conserve biodiversity by identifying priorities for the expansion of biodiversity conservation efforts, and to improve management, in those areas that are considered crucial for biodiversity. Large-scale conservation is at the heart of this scenario. On the other side, the SP scenario prioritises the optimal use of ecosystem services and enhances nature's contribution to people, hence conserving the biodiversity that deliver these. In this chapter, the narratives of these scenarios are presented. These two narratives, whose longer and more extensive version can be found in Annex A of this report, have therefore the function to describe the *ratio* of the scenarios as well as their most important features.

2.1 Half Earth narrative

Half Earth (land sparing; further inspired by Nature Needs Half, Half Earth, Global Deal for Nature). Key words: nature first, intrinsic values, protected areas and restoration, sustainable intensification, technological innovations and solutions

In the Half Earth (HE) scenario, nature is mostly valued independently from human preferences, that is, for its intrinsic value. The concepts of wilderness and naturalness are central to this scenario, as they refer to the remnants of untouched nature that must be protected from further human pressure. Accordingly, conservation efforts are founded on science-based ecological criteria and prioritise separating human pressures from nature in order to protect nature's intrinsic value. Next to this, other values and knowledge systems to nature, such as those of indigenous communities, are respected and included in decision-making insofar as they can be integrated towards agreed-on conservation objectives. Instrumental valuation of nature, such as that of ecosystem services and nature's contribution to people, is considered as a co-benefit but it is not necessarily prioritised in this scenario.

In this scenario, the scale of action spans across eco-regions and other large units, thereby requiring coordinated and collaborative global actions in order to implement science-based ecological criteria to maintain ecological process, biodiversity and halt species extinction. The global result of conservation efforts is the protection of 50% within the world's eco-regions and the protection of globally remaining intact forests and peat-land areas. This is achieved by protecting wilderness areas, expanding already-existing protected areas and other biodiversity hotspots as well as rewilding of some agricultural and urban areas. All the six categories of PAs, as recognised under the IUCN categorisation, are included in this scenario — from strict protection (Category I–II) to sustainable use of resources (Category VI). However, there is a clear prioritisation for stricter protection and for the delivery of conservation objectives over other sustainability objectives. Furthermore, as by product of PAs expansion, fragmentation is reduced.

The large expansion of PAs implies a pressure on the availability of land for human use. Intensification of the agricultural production and forestry is needed to fulfil needs of an increasing and more wealthy population, if further expansion of agricultural land is to be avoided. Intensification draws on wide technological developments and innovations (e.g. more efficient nutrient and pest management and genetic modification) and aims for

efficiency and reduction in externalities, to reduce pressures on nature. This trajectory of intensification is aimed at closing the yield gap, feeding the world and sparing nature. No productive agricultural land will be taken out of production for conservation reasons; however, grazing on extensive grassland areas may be limited. Energy generation from biofuels follows the intensification path, too, with a focus on increasing efficiency and biofuel crop yields to facilitate land sparing effects. In the protected half, increases in hydropower dams will be halted and some may be dismantled for ecological reasons.

The process of intensification in this pathway will be supported by globalisation of food markets and a deepening of trade liberalisation that is also responsive to ecological standards worldwide. Next to agricultural areas, urban areas are compacted and highly populated with strict limitations to future spatial expansion in order to spare land for conservation purposes.

2.2 Sharing the Planet

Sharing the Planet (land sharing; further inspired by Whole earth, Convivial Conservation, mixed landscapes). Key words: people first, ecosystem services, nature's contributions to people, nature-based solutions, living with nature

In the Sharing the Planet (SP) scenario, nature is mostly valued through and by humans, that is, for the instrumental and relational values associated to it. This pathway mostly premises on the concept of living with and through nature. Conservation is not envisioned as a separation of human pressure from nature and conservation objectives and priorities are identified in a way that supports and enhances the provision of ecosystem services (ES) and nature's contributions to people (NCP). Ultimately, conservation is centred around the sustainable use of resources.

In this scenario, the scale of action is the landscape, where nature value is created locally. Sustainable use of resources is the cornerstone of this scenario, in which conservation is needed to make optimal use of biodiversity. Nature conservation is still characterised by the presence of existing protected areas and key biodiversity areas, but their qualitative dimension is particularly addressed in terms of equity. Next to this, those areas that provide crucial ecosystem services and nature's contributions to people, such as riparian zones, high value carbon areas (e.g. forests, peatlands), water towers and urban green areas are conferred protection, thereby accounting for 30% of the world land area. While in this pathway traditional PAs still play a role in conservation, OECM and more flexible area-based approaches are employed, whereby nature conservation objectives are either by-products or secondary objectives of management activities. Human and natural systems are thus intertwined and create a shared landscape comprising green corridors and wildlife-friendly agricultural practices.

In agriculture, the dominant type of landscape is shared or mixed, comprising a combination of natural vegetation patches and a matrix of agriculture, resulting in optimal use of ecosystem services. Food production, biodiversity conservation, carbon storage, pollination and other services are achieved within the shared landscape following the path of ecological intensification. This type of intensification is concerned with the maximisation of benefits and it primarily — but not solely — relies on agricultural systems such as agroecology, organic farming, agroforestry, diversified farming systems. Energy production via biofuels follows the same ecological intensification path: crops are produced in a way that supports and enhances ecosystem services and nature's contributions to people provisioning. Cities are biophilic, that is they are designed to support well-being and health benefits by connecting people with nature. In this pathway, cities have lower-densities, and space for nature is

created via interconnected city parks and green and blue infrastructure. Nature-based solutions are applied in both urban and rural landscapes together with technological innovations that respect other knowledge and value systems. Similarly, globalisation and trade liberalisation remain relatively limited to avoid displacement of production processes and ensure local consumption and food sovereignty.

2.3 Conclusion

In this section, two narratives have been presented that will be the basis for the model exercises. These narratives are the result of an extensive literature review. The following chapters in this report presents the literature review, thereby clarifying and tracing the narratives back to existing scientific and societal debate. Chapter 3 outlines the conceptual framework that has been employed to distinguish between the HE and SP scenarios. Chapters 4 and 5 provides details of the two scenarios.

3 HE and SP narratives: conceptual background

This chapter starts to delve into the literature review carried out to provide depth to the process of scenario-development in terms of content, as well as to increase its policy relevance. The literature review has been broken down in two parts. This first part (Chapter 3) sheds light on the conceptual divides that had to be drawn between the HE and SP scenarios and the second part (Chapters 4 and 5) accounts for the respective literature pertaining to the HE and SP scenarios.

In the first section of this chapter (Section 3.1), the scenarios and the narratives are briefly positioned within the debate about values and human-nature relationships in conservation. Section 3.2 then delves into the two scenarios and elaborates in more detail on the philosophical pillars that support them. A detailed discussion on values and valuation of nature in both scenarios is provided.

3.1 Conceptual mapping of the narratives

The two narratives presented in the previous chapter have been developed to describe the main features of the HE and SP scenarios. In developing these, a variegated array of concepts has been examined and, for the sake of this analysis, clustered and assigned to one scenario or the other. This division is summarised in Table 1 and charts the conceptual arrangements constituting the backbone of the scenarios and narratives. The Nature Futures Framework (NFF) has been used in helping allocating concepts and perspectives to develop the respective narratives and scenarios (Pereira et al., 2020). This framework proposes three value perspectives on nature: Nature for Nature (where nature has inherent value), Nature for Society (where nature has value for being instrumental to humans) and Nature as Culture (where the human-nature relationship is valued in itself). Pereira et al. (2020) then articulate visions for nature futures based on these three value perspectives.

This report has built the two narratives and scenarios having in mind this three-values perspective. More specifically, the HE scenario was developed to mostly adhere to the Nature for Nature corner of the NFF, whereas the SP scenario has originally been developed as a hybrid between the Nature for Society and Nature as Culture corners. Next to the NFF framework, the conceptual development of the scenarios was supported by previous work by van Vuuren et al. (2015) and Kok et al. (2018). Notably, the HE scenario further develops the Global Technology scenario presented in their work from a nature's perspective. The SP scenarios further develops the Decentralised development scenario (see also Chapter 6 for a discussion on the operationalisation of this scenario into the model).

In the HE scenario, conserved areas, ranging from those under stricter protection to those with less strict IUCN conservation levels, remain the main pillar of all conservation efforts.

Underpinning this scenario is the prioritisation of the inherent value of nature in conservation strategies. This means that the HE scenario is characterised by separation between pristine and wild areas from human pressures, thereby implying a strict regulation of human use within the limits of conserved areas. Next to this, the HE scenario has been influenced by recent calls to adopt large-scale conservation targets for the Post-2020 CBD Strategic Plan. Particularly, it largely premises on the recent call for protecting Half Earth by Wilson (2016) and similar initiatives, such as Nature Needs Half (Locke, 2015), Global Deal for Nature (Dinerstein et al., 2019) and The Three Conditions (Locke et al., 2019). Conservation areas coupled with large-scale conservation targets for the new Global Biodiversity Framework are core elements to the success of this scenario and they make for the red thread that connects all concepts, theories and frameworks that have been used to formulate this scenario, as indicated in Table 1. In light of this approach, a 'land sparing' approach to agriculture is in line with the HE scenario's aim to provide space for nature. For this reason, land sparing and sustainable intensification have been employed as conceptual cornerstones of the agricultural systems in this scenario.

Unlike the HE scenario, in which a certain degree of conceptual coherency could easily be found, the SP scenario draws on multiple paradigms and perspectives in conservation that cannot easily put into common categories. Notwithstanding this difficulty, the report envisions the SP scenario to premise on the valuation of nature for its economic and social utility to humans, thereby moving beyond conserved areas and PAs as main conservation strategy. Mainstream approaches based on ecosystem service (ES) and mixed landscapes (Kremen and Merenlender, 2018) are combined with the concept of relational values (Pascual et al., 2017) and more radical proposals to conservation, such as Convivial Conservation (Büscher and Fletcher, 2020) and biocultural conservation (Gavin et al., 2018). Overall, these approaches point at a conservation strategy grounded in the attempt of connecting people and nature, rather than separating them, and supporting natures contributions to people and ecosystem-service delivery. It follows that, in terms of agricultural system, a 'land sharing' approach and the concept of ecological intensification are considered to be suitable for the SP scenario.

Half Earth	**Sharing the Planet**
Global Technology (Kok et al., 2018)	Decentralised Solutions (Kok et al., 2018)
Area-based conservation approach	Ecosystem Services Approach, Nature's contributions to people
Nature for Nature	Nature for Society; Nature as Culture
Half Earth (Wilson, 2017) Nature Needs Half (Locke, 2017; Dinerstein et al., 2017); Global Deal for Nature (Dinerstein et al., 2019); Three Conditions (Locke, 2019)	Whole Earth, Convivial Conservation (Büscher and Fletcher, 2020), biocultural conservation (Gavin et al., 2018) (Büscher and Fletcher, 2020), Relational Values (Pascual et al., 2017).
Land Sparing (Phalan et al., 2011)	Land Sharing (Kremen, 2015)
Sustainable agricultural intensification (Cassman and Grassini, 2020)	Ecological agricultural intensification (Tittonel, 2014)

Table1. Conceptual division for Half Earth and Sharing the Planet

3.2 Conceptual divide between HE and SP scenarios

3.2.1 Conceptual background for HE scenario

This section illustrates the philosophical background and implications that justify and explain the HE scenario. Many authors and their work are brought together in this subsection to make for the 'philosophical' background of the HE scenario and they are referred here as 'HE proponents'.

The central point in the debate rotates around the so-called human-nature dichotomy. Despite the evident differences between those authors who seem to embrace — or at least sympathise with — an HE approach to conservation, many agree that there is a distinction between humans and nature, although never referring to it. Nash (in Wuerthner, 2014), for instance, says that humans remain 'natural'. However, along the evolutionary way, humans have learned to think and act as being outlaws, as being detached from nature. In his words, humans have placed themselves far from the rest of nature. In the same line, Kopnina (2016:9) argues that: '[H]umans have set themselves apart from nature with agricultural and later industrial development, which marked the beginning of conquest and control, of stepping outside of natural environments in order to dominate them'.

Despite always referring to humans as part of nature, it is evident that, among these authors, there is a clear distinction between humans and nature. Another example of this is found in Hettinger (Wuerthner, 2014) and his concept of 'naturalness', that is the 'degree to which nature is *not* influenced by humans' (174). He acknowledges that the human influence on nature is increasingly expanding, but he draws this conclusion: 'It is true that there is a decreasing extent of naturalness on the planet and thus there is less of it to value. But it is also true that what remains has become all the more precious'.

Based on this, according to HE proponents, it is necessary to value and to protect the remnants of nature's autonomy. Hettinger is aware of the criticism of the concept of pristine nature, which says that this no longer exists (if it ever did), predominately due to the prolonged impact of human activities affecting the Earth's climate and environment (since the start of the Anthropocene epoch). Notwithstanding, he contends that nature's autonomy from humans is still something that must be valued and protected. This point epitomises the tendency to talk and to think in terms of human and nature as separated across many thinkers connected to the HE scenario.

In light of the acknowledged value that nature supposedly has, HE proponents argue to re-introduce in the debate an ethical principle in order to balance off human dominion over nature. Kopnina et al. (2018:142) put it this way: 'All species have a right to continued existence. It is morally wrong for human beings to cause the extinction of other organisms'. Thus, nature (and wilderness is included in this broad definition) has a value for itself — and a subsequent right to existence — and it has to be protected for its inherent value and rights. The instrumental value of nature for humans is also recognised by these authors, but the protection of nature does not depend on it (Dammers et al., 2017; Wuerthner, 2014). To express it differently: 'The well-being of non-human life on Earth has value in itself. This value is independent of any instrumental usefulness for limited human purposes' (Devall and Sessions, 1985:69; as reported by Washington et al, 2017).

This position is called 'eco-centrism' which, as argued by Kopnina et al. (2018), brings about a sense of pluralism and democracy because every 'value' (nature's inherent value and functional to humans) is included and discussed. Contrarily, anthropocentrism does not consider the intrinsic value of nature and, because of this, it might hamper sustainable solutions as it merely focuses on humans and the impacts of conservation on humans.

The debate around anthropocentrism and ecocentrism — as well as the human-nature dichotomy — is relevant for practical implications that have been picked up by many conservation biologists. Among these implications, two seem to be of particular interest for the sake of this discussion: protected areas (PAs) and ecological justice. PAs have been the cornerstone of conservation efforts since the outset (Schama, 1995). Setting aside their ecological function, PAs seem to be conceptually in line with the human-nature relationship outlined in this section. As mentioned by Wuerthner (2014:172): 'A key dimension of the support of protected areas is the philosophical implications of such decisions. Though it is almost never specifically acknowledged in the designations of such reserves, by setting aside natural areas, we are implicitly countering the human-centred worldview. […S]etting limits on human exploitation becomes a statement of self-restrain and self-discipline'. Thus, PAs are tools to counterbalance human interference with nature.

Authors in this tradition use the term 'ecological justice' to emphasise 'inter-species justice'. What this means is that ecological justice supporters acknowledge the importance of social justice stances and they take the cues from the basic social justice idea that every member of the community should have rights. The only difference with social justice advocates is that ecological justice acknowledges that the majority of the Earth community is non-human (Kopnina, 2016). Therefore, ecological justice is inclusive of all life forms to have access to the resources that they need to flourish (*ibid*.). Concretely, there can be many implications from this idea. One of the most debated in the past decade is that of conferring legal personhood to ecosystems, also known as 'Rights of Nature'. With the establishment of Rights of Nature, the legal system would undergo a dramatic change insofar as it would recognise that nature itself is a subject. This shift is thought to bring an 'ecocentric' perspective in otherwise anthropocentric legal systems (Cano Pecharroman, 2018).

3.2.2 Conceptual background for the SP scenario

The theoretical roots of the SP scenario are more complicated than those of the HE scenario, because the SP scenario includes an array of conceptual frameworks and approaches to conservation. As mentioned already, the ecosystem services (ES) approach is here coupled with new schools of thought such as the 'nature as culture' and 'convivial conservation'. In this section, these schools of thought will be examined about two major points of debate: human-nature relationships and valuation of nature.

With regard to human-nature relationships, the SP scenario is grounded in the belief that humans are not distinct from the rest of nature and it is not desirable to separate them, either. To borrow a term of the French philosopher Bruno Latour, the human-nature relationship can be better described as a 'hybrid' (Latour, 1993) rather than as a dichotomy. This shift, which follows in the footsteps of a multitude of reinterpretations of modernity (Horkheimer and Adorno, 1972), has tremendous implications in the way humans position themselves within nature and, obviously, in conservation thinking and practice, too. Büscher and Fletcher (2020) are in line with this line of thinking and, with others, bring it into the field of conservation. They maintain that a new type of conservation, which they call 'convivial', must go beyond the human–nature dichotomy. They argue that, because we are in an epoch where human influence over non-human systems has been recognised also at a geological level (Anthropocene), it is anachronistic to talk about a nature that is pristine and untouched by humans. Similarly, Kareiva et al. (2011) says: 'Conservation cannot promise a return to pristine, pre-human landscapes. Humankind has already profoundly transformed the planet and will continue to do so…conservationists will have to jettison their idealised notions of nature, parks, and wilderness'. Evidently, the human-nature interrelationship comes out clearly from this debate and it lies at the heart of the SP scenario. From such

conceptualisation, it follows that nature is valued within human systems, and, for the purposes of this report, values are reflected in the ecosystem services (ES) and nature's contribution to people (NCP) frameworks.

The concept of ecosystem services as a way of emphasising the various 'benefits of ecosystems to humans' (Schröter et al., 2014:514) has emerged in conservation practices, in the past decades. Ecosystem services come along with an 'instrumental' valuation of nature, which is to say that nature is valued insofar as it produces services to humans. This position has fiercely been debated (*ibid*.) and commentators have argued that the ES framework misses the point of the human-nature hybridity and rather reiterates the dichotomy (i.e. Büscher and Fletcher, 2020). Following this debate, IPBES has proposed the Nature's Contribution to People (NCP) framework in order to account for a plurality of cultural perspectives and values (Diaz et al., 2018). In this transition to NCP, relational values have been gaining momentum as a way of capturing dialectic human-nature relationships and to account for other ways in which people make choices concerning nature. As mentioned in Chan et al. (2016:1462): 'Few people make personal choices based only on how things possess inherent worth or satisfy their preferences (intrinsic and instrumental values, respectively). People also consider the appropriateness of how they relate with nature and with others, including the actions and habits conducive to a good life, both meaningful and satisfying. In philosophical terms, these are relational values'. Furthermore, the NCP framework acknowledges that 'people perceive and judge reality, truth, and knowledge in ways that may differ from the mainstream scientific lens' (Pascual et al., 2017:8).

Arising from such debate, the SP scenario draws upon both instrumental and relational values in the belief that '[t]he deep value of nature for humans only makes sense through and by humans. Hence, the only solution to protecting nature's value is to build an integrated (economic, social, political, ecological, cultural) value system that does not depend on the destruction of nature but on 'living with' nature' (Büscher and Fletcher, 2020:141). In other words, the SP scenario is one in which 'living with nature' (Turnhout et al. 2013) becomes central and it is centred on the overcoming of human-nature dichotomy and the focus on relational and instrumental valuation.

In translating this position into conservation strategies, the new framework of 'convivial conservation' (Büscher and Fletcher, 2020) becomes relevant for this scenario. Büscher and Fletcher espouse concepts like 'post-wild' and 'post-nature', by positioning themselves as opponents of the idea of fencing off protected areas and 'rewilding'. The whole concept of wilderness, in their opinion is misleading because it plays along the lines of the human-nature dichotomy, i.e. there is something wild (nature) and something non-wild (humans). They argue that wilderness is oftentimes created by humans by displacing local communities. In fact, 'convivial conservation' (i.e. protected areas) is grounded in a strong critique of the social injustices that have often come along with traditional conservation measures. The authors maintain that conservation fails if it does not simultaneously address the indirect drivers of biodiversity loss, that is mostly poverty and, more generally, human inequality. From this point, it is quite evident that SP scenario does not directly address questions of 'ecological justice', though it does not dismiss them either. Rather, social justice is the main concern here.

Finally, Büscher and Fletcher (*ibid*.) position their conservation proposal into a wider critique to capitalism and propose a 'post-capitalist' framework for conservation. Such position is increasingly acknowledged within the conservation debate as more and more evidence has been produced that shows that economic growth contributes to biodiversity loss (Otero et al., 2020). Such critique roots into the acknowledgment that we are living in the so-called

'Capitalocene'. Capitalocene means that 'a pervasive human influence over non-human systems can be seen to characterise this epoch. But this has been most centrally produced by the globalisation of capitalist production over the past five hundred years, not by some general 'Anthropos'' (*ibid.*:106). Within the Capitalocene, the authors argue that capitalism, human–nature dichotomy and conservation make for a crucial nexus to jointly tackle. They contend that the development of capitalism premises on the manipulation of nature which is only possible if humans feel detached from the rest of nature. The implication for conservation is that conservation practice has worked as a means of capitalist expansion whereby nature becomes reduced to 'resources' or 'assets' (Büscher and Fletcher, 2020).

3.3 Conclusion

This section elaborates the conceptual and theoretical divides between the HE and SP scenarios. It describes different human-nature relationships and values and, on the basis of this, the theoretical premises of both scenarios were set up. As a result, the HE scenario prioritises an intrinsic valuation of nature and sets it, with its 'natural' and 'wild' parts, apart from human pressures (conserved areas, protected areas). This position is grounded in a philosophical frame wherein humans are separated or separate themselves from nature. On the other side, the SP scenario includes both instrumental and relational valuations of nature, thereby emphasising the interaction between humans and nature. Despite this being controversial for some conservationists, it can be argued that the SP scenario adopts a perspective from which humans and nature are in a dialectic relationship. This division is schematically represented in Table 2.

Discerning the theoretical divides of the two scenarios hereby proposed is a useful step to understand the differences in conservation strategies and provides a basis for further elaborating the narratives. In fact, the next chapters (Chapters 4 and 5) show that the theoretical division outlined here aligns well with different conservation strategies adopted for the two scenarios. The next two chapters, thus, elaborate on the conservation objectives and strategies of both scenarios and will also further explore other dimensions that are directly related to conservation and that are relevant to this analysis, such as agricultural systems.

	Nature Conceptualisation	**Valuation of Nature**	**Human–nature relationship**
HE	Pristine, wilderness	Intrinsic value	Dichotomy (Contested)
ES approach	Commodities and services provide	Instrumental value	Hybrid (Contested)
Relational values (NCP)	Nature as culture	Relational value	Hybrid

Table 2. Shows how HE and SP scenarios position on certain conceptual issues considered relevant: nature conceptualisation, valuation of nature and human–nature relationship. The SP scenario, here, is broken down into ES approach and relational values for the sake of the conceptual discussion presented in this chapter.

4 Half Earth (HE) scenario: literature review

This chapter presents the results of the literature review that has been carried out to develop the HE narrative and scenario. This literature review has taken the cues from the previous conceptual division to gather knowledge and research insights from different authors under the HE banner. Despite the fact that, evidently, the many positions here presented belong to different schools of thought — and therefore might bring to different implications for conservation strategies — they have been considered as part of the same body of literature for the sake of developing a scenario. This being said, this scenario largely draws on the work on Half Earth (Wilson, 2016), on the Global Deal for Nature (Dinerstein et al., 2019) and on Nature Needs Half (Locke, 2015) and the Three Conditions (Locke et al., 2019). For a conceptual discussion of these ideas and how they are positioned within the scenarios, see Chapter 3.

In constructing the scenario, this chapter first outlines the main conservation tenets and strategies (Section 4.1). Then, in Section 4.2, it makes the case for 'land sparing' and 'sustainable intensification' as the two pillars of the agricultural systems in this scenario. Lastly, it discusses both the governance scheme and the stakeholders that are needed to achieve the HE vision.

4.1 Conservation strategy for the HE scenario

4.1.1 Main tenets and causes of biodiversity loss

Based on Cafaro et al. (2017), the HE scenario premises on three main tenets:

1. Habitat loss (or land-use change) and degradation are the leading causes of biodiversity;
2. Current protected areas are not extensive enough to halt further biodiversity loss;
3. It is morally wrong for our species to drive other species to extinction[1].

The first tenet (and, arguably, also the second) describes the main direct causes of biodiversity loss and is discussed at length in the following sections. Many authors, such as Kopnina et al. (2018) and Cafaro et al. (2017) stress the importance of two other indirect causes as also recognised by IPBES (2019): overconsumption and overpopulation. Consumption is recognised by many authors (Cafaro et al., 2017; Godfray and Garnett, 2014) as a critical factor that leads to habitat loss, land-use change and ultimately biodiversity loss. Interestingly, Kopnina et al. (2018), echoing the concept of bio-proportionality by Matthews (2016), mention the idea of 'planetary modesty', hinting at the idea of reducing consumption (and maybe creating room for other better-known concepts such as that of 'sufficiency'). However, how to tackle overconsumption remains an open question. Some authors focus on food production, land-use (e.g. Lamb et al., 2016) and,

[1] Cfr. chapter 3 for conceptual discussion of HE.

particularly, meat consumption. Next to this, large attention is given to waste reduction that could, indirectly, reduce the consumption. All in all, positions seem to differ slightly when tackling the issue of overconsumption, ranging from a thorough criticism of consumeristic society (e.g. Kopnina et al., 2018), to more specific solutions with regard to food waste and meat consumption. Finally, overpopulation is also addressed as another indirect drivers of change that must be addressed simultaneously with overconsumption (Godfray and Garnett, 2014).

4.1.2 Conservation strategy and target

One of the well-known proponents of HE and 'nature needs half', Harvey Locke (2015), identifies four objectives that conservation biology science suggests adopting in order to ensure 'long-term viability of an ecosystem':

1. All native ecosystem types must be represented in protected areas;
2. Populations of all native species must be maintained in natural patterns of abundance and distribution;
3. Ecological processes such as hydrological processes must be maintained;
4. The resilience to short-term and long-term environmental change must be maintained.

Dinerstein et al. (2017, 2019), in an attempt of connecting biodiversity conservation to the Paris Agreement for Climate Change add two other objectives:

5. Maximise carbon sequestration by natural ecosystems;
6. Address environmental change to maintain evolutionary processes and adapt to the impacts of climate change.

In order to achieve these six leading objectives, HE proponents advocate for Protected Areas (PAs) as the cornerstone of any conservation strategy, combined with restoration and rewilding efforts. Locke (2015) adopts the following definition of protected area: 'specifically delineated area designated and managed to achieve the conservation of nature and the maintenance of associated ecosystem services and cultural values through legal or other effective means' (from Dudley, 2008). This, he continues, includes all IUCN categories of protected areas (strict nature reserve/wilderness area, national park, natural monument, habitat/species management area, protected landscape/seascape and managed resource protected area). Next to these, Dinerstein et al. (2017, 2019) add that, in order to achieve the 6 objectives listed above, other forms of protection must be included as PAs:

- the so-called 'other effective area-based conservation measure[2]' (OECM), that is areas that do not fit into IUCN definition of PAs;
- within OECM, the authors identify one important category: 'Climate Stabilisation Areas' (CSA). Climate Stabilisation Areas are 'areas where conservation of vegetative cover occurs and greenhouse gas emissions are prevented' (Dinerstein et al., 2019: 10). This would support carbon storage and it is considered essential to keep CO_2 emission below 1.5 °C. With this regard, the NNH (Nature Needs Half) project has officially supported the 'Nature Climate Solution' which is, to put roughly, a type of ecological restoration that focuses on plants that can serve the function of carbon storage[3].

[2] "A geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in situ conservation of biodiversity, with associated ecosystem functions and services and where applicable, cultural, spiritual, socio–economic, and other locally relevant values (emphasis added)" (CBD/COP/14/L.19 PROTECTED AREAS AND OTHER EFFECTIVE AREA-BASED CONSERVATION MEASURES Draft decision submitted by the Chair of Working Group II).
[3] https://www.naturalclimate.solutions/the-science

The crucial point here is about the quantitative expansion of conserved areas. As mentioned before, Cafaro et al. (2017) clearly state that the current area of protection is not extensive enough to halt biodiversity loss and both Wilson (2016) and Dinerstein et al. (2017) — despite starting from different perspectives — reach the conclusion that ambitious conservation targets are needed. Thus, the question arises of what portion of the Earth surface is it envisioned to be protected? Or, in other words: what are the conservation targets for the HE scenario?

As hinted by the name, the HE target for 2050 is to protect 50% of each eco-region[4] and ensure a thorough connectivity among the protected areas (in a way that fulfils the six objectives listed above). The target seems quite straight forward and it is probably its simplicity that makes for both the strength and the confusion around HE. In fact, the idea underpinning HE is not as simple and easy as it might appear. HE is not just about protecting 50% of each eco-region and ensure connectivity. As stated by Dinerstein et al. (2017, 2019), the location of the protected areas is as important as its extension in achieving conservation objectives. Furthermore, they continue, it would be too simplistic to advocate for 50% protection in each of the 800+ ecoregions: in some eco-regions it will be easier, in others less so. To tackle this last issue, Dinerstein et al. (2017, 2019) divided the 800+ ecoregions into 4 categories that reflect the current (2017) state of protection:

1. 'Half Protected' where more than 50% of the total ecoregion area is protected. This, according to their data analysis, accounts for 12% of the ecoregions;
2. 'Nature Could Reach Half' where 'less than 50% of the total ecoregion area is protected but the sum of total ecoregion protected and unprotected natural habitat remaining is more than 50%'. Half protection is a reasonable goal for these areas and they account for 37% of the ecoregions
3. 'Nature Could Recover' where 'the sum of the amount of natural habitat remaining and the amount of the total ecoregion that is protected is less than 50% but more than 20%'. In these areas, that account for 27% of the world ecoregions, restoration is needed.
4. 'Nature Imperilled' where 'the sum of the amount of natural habitat remaining and the amount of the total ecoregion that is protected is less than or equal to 20%'. They account for 24% of ecoregions.

Figure 1 shows the distribution of such categories on the globe.

[4] An eco-region, as defined by Dinerstein et al.(2017) "are ecosystems of regional extent. Specifically, ecoregions represent geographically distinct assemblages of biodiversity – all taxa, not just vegetation – whose boundaries encompass the space required to sustain key ecological processes. […T]hey draw on natural, rather than political boundaries". They identified 846 ecoregions. Furthermore, Dinerstein et al.(2017) elaborates on why an eco-region-based approach is best to achieve the biodiversity goals.

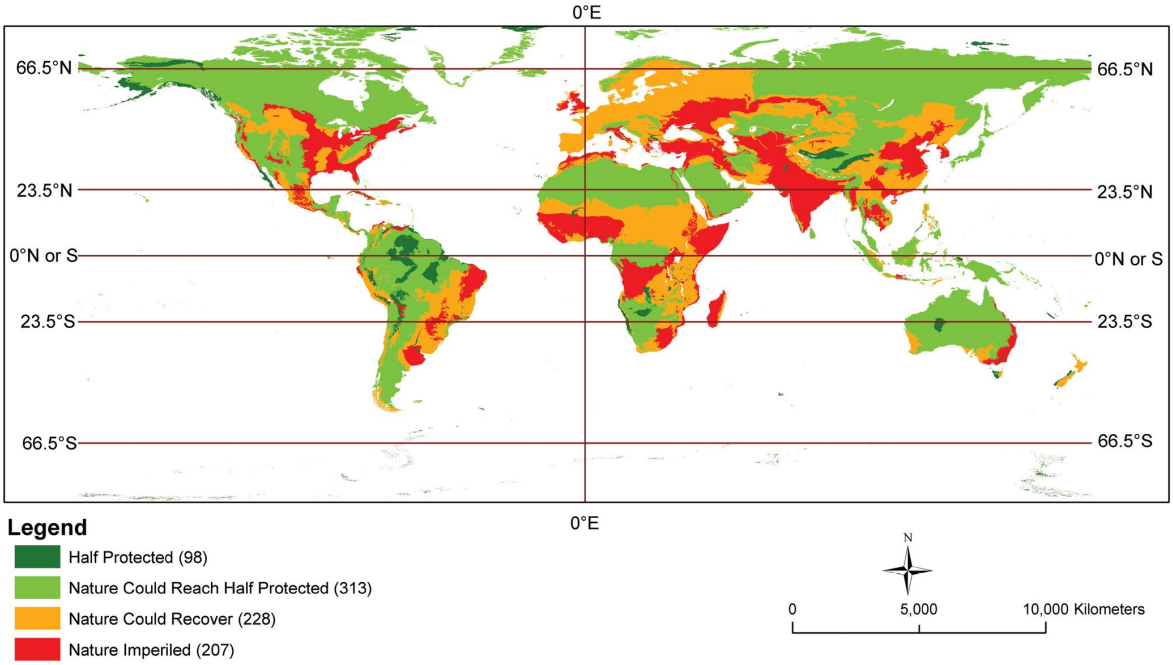

Figure1: Distribution of the 4 categories from Dinerstein et al. 2017

By using this categorisation, Dinerstein et al. (2019) show that, in some ecoregions of the globe, achieving 50% protection is feasible or, even, already achieved (Nature Could Reach Half and Half Protected). In other eco-regions, instead, it will require more effort (Nature Could Recover) or it could virtually be unfeasible, thereby suggesting to direct the efforts towards more achievable targets, (Nature Imperilled). On the basis of this classification, the authors draw conservation priorities:

- Retain protection in the Half Protected ecoregions;
- Establish more PAs in the 'Nature Could Reach Half' ecoregions in order to achieve the 50% protection. This represents the highest priority according to the authors;
- Restoring and later protecting in the Nature Could Recover;
- In the Nature Imperilled areas, the priority will be the protection of Key Biodiversity Areas (KBAs) and the Nature Needs Half (NNH) goal will more likely be aspirational and of secondary concern (Dinerstein et al., 2017).

These conservation priorities help nuancing the idea of protecting half of the earth and it is in line with a more recent proposal from Locke et al. (2019) that goes under the name of 'Three Global Conditions' (visual representation in Figure 2). This framework is a place-based approach that provides a coherent suite of actions that can be taken at a regional, national and international level (*ibid.*). The authors have identified three different land use and human pressures conditions at a global level — farms and cities, shared landscapes and large wild areas — and provide a set of conservation strategies for each of these conditions.

Farms and cities are heavily settled, populated, developed and populated areas and they account for 10% of the worldwide land (Zedda et al., 2019). For these areas, certain conservation strategies are prioritised:

- Preserve all the remnants of an ecoregion;
- Protect endangered species and ecosystems;
- Active ecological restoration (particularly to establish connectivity);
- Sustainable production and consumption;
- Greening of urban areas.

Shared landscapes have a lower human population density but do contain activities, such as fishing, forestry and mining. They account for the 60% of worldwide land, and ambitious targets of conservation can be set up. The following conservation strategies are suggested:

- New protected areas in areas of importance for ecological representation and biodiversity;
- Ecological restoration for connectivity;
- Conserve existing native species and support ecological processes.

Large wild areas have high level of ecosystem integrity (wilderness) and low human population density. They account for the 30% of worldwide land. The following conservation strategies are suggested:

- Retain existing PAs;
- Industrial development is extremely limited and will be mitigated;
- Indigenous people and communities' governance systems are of major importance;

Evidently, the Three Conditions (Locke et al., 2019) and the eco-region approach proposed by Dinerstein et al. (2017) represent an important evolution in the original idea of protecting half the earth. In fact, it could be argued that the Three Conditions framework proposes a mix between strict conservation measures (e.g. in large wild areas) and other approaches, like the 'mixed landscape', that have been assigned to the SP scenario in this analysis (e.g. in the shared landscape). This fact epitomises the dynamism within this body of knowledge and it, indirectly, supports the idea that the two scenarios proposed here are not as clearly divided as they might seem. On the contrary, they share some elements.

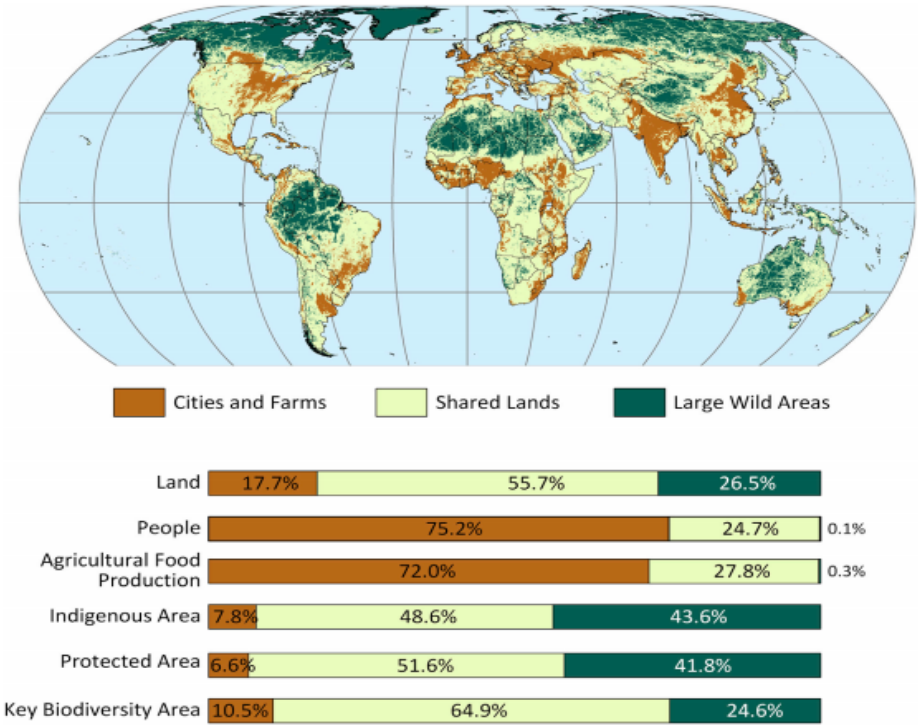

Figure 2. The Three Global Conditions
Shown are the Three Global Conditions for Biodiversity Conservation and Sustainable Use (3C)[18] and the relative global share of each condition in terms of total land area (2015), human population (2015), percentage of area protected (2018), key biodiversity areas, food calories produced by farming and ranching (2017), and percentage of global area under indigenous management or tenure (2017). All analysis is based on Locke et al.[18] Shown is an Eckert equal-area projection.

Figure 2. Three Global Conditions, retrieved from Ellis (2019), p.165

4.1.3 Conclusion

In this section, different proposals for HE have been analysed to understand the underlying conservation strategy and targets. All the considered proposals seem to agree on the necessity to adopt ambitious conservation targets, therefore advocating for the expansion of PAs as the main conservation tool. With the proposal by Dinerstein et al. (2019), conservation targets have also been coupled with climate targets of the Paris Agreement. Evidently, HE positions are highly contested as they have been accused to be too unrealistic and even dangerous (Büscher and Fletcher, 2020; Schleicher et al., 2019; Visconti et al., 2019). Dinerstein et al. (2017) themselves recognise that the actual implementation of the proposed strategy might not be so simple and must deal with political matters. They say that political reasons might bring governments to protect certain areas that are not as relevant in terms of biodiversity. Therefore, it is extremely important to understand, they argue, that the 'location' that is protected is as important as the amount of land that is protected. They maintain that there are two risks that stem from this: 'a) adding more land to reach the global target […] at the expense of underrepresented habitats and species, and b) the temptation by some governments to protect low-conflict areas that may be lower priority from a biodiversity perspective' (Dinerstein et al., 2017,4). Setting aside these political discussions — despite they surely deserve attention -, the HE scenario will require large area-based conservation efforts, and, among many other changes, this implies a drastic intervention in the sector of food and agriculture. The next section addresses this latter issue.

4.2 Agriculture-conservation nexus in a HE world

4.2.1 Premises

It is well known that the nexus between food production and biodiversity is at the core of many current conservation debates. This importance stems from the following question: how do we use the land that we have in a way that allow us to (a) produce enough and nutritious food, (b) respect environmental standards and (c) tackle the current climate crisis? This section answers this three-part question for the HE scenario.

Some authors seem to agree that there is a need to *intensify* agricultural production to (a) close the yield gaps and feed the growing population and (b) to spare land for conservation purposes (Garnett et al., 2013; Foley et al., 2011). This answer comes from the basic understanding that agricultural expansion (change in land use) is the main driver of biodiversity loss, greenhouse gas emission and it negatively affects other ecosystem services, too (Garnett et al., 2013). Thus, it is necessary to prevent agricultural land expansion. To do so, it is suggested to 'increase food production per unit area (yield) on existing farmland, so as to minimise farmland area and to spare land for habitat conservation or restoration' (Phalan et al., 2016: 1). This is the essence of the 'land sparing[5]' that is at the core of this scenario. In order to achieve it, however, it is recognised that a process of intensification of the agriculture should take place, in order to ensure that goals on food security are still achieved also in face of a rising population and climate change.

4.2.2 Sustainable Intensification

'[S]ustainable intensification (SI) seeks to increase crop and livestock yields and associated economic returns per unit time and land without negative impacts on soil and water resources or the integrity of associated non-agricultural ecosystems' (Cassman and Grassini,

[5] Despite the dichotomy land sparing/sharing has been criticized (Tscharntke et al, 2011), for the sake of this analysis, these two strategies will be adopted separately and respectively in the HE and SP scenarios. It remains that the reality might not be as clear-cut as this theoretical distinction.

2020). This definition shows different elements of SI that can be here summarised, based also on the work by Garnett et al. (2013), as followed:

1. Intensification is about increasing production. This is needed considering that food systems will face important challenges and pressures such as: population growth, increasing purchasing power with consequences on dietary habits, environmental and climate changes that might make food production more difficult (Godfray and Garnett, 2014);
2. Intensification is about higher yields and not about further land conversion. This point has recently been confirmed by Cassman and Grassini (2020), who showed that the increase in the global supply of some major food crops (soybean, maize, rice and wheat), over the 2002–2014 period, has largely been derived from agricultural expansion. Evidently, they comment, this is not in line with the original goals of SI.
3. Environmental sustainability is an imperative for SI. This point is highly debated between land sparing and sharing proponents. As a matter of fact, many authors (from both sides) point at the problem that environmental sustainability might be used to 'camouflage' intensive business-as-usual industrial farming that make use of pesticides and other chemicals disruptive for the environment. Whilst acknowledged, this does not dissuade SI proponents to advocate for it. They call for governance and monitoring systems to avoid 'business-as-usual industrial agriculture' infiltrations (Balmford et al., 2018). Furthermore, it is argued that intensification's externalities can be reduced with technologies and practices such as pest management, etc. (Phalan et al., 2011). In general, a more efficient management of nutrient and water cycles is required to both increase production and limit externalities (Foley et al., 2011).
4. Sustainable Intensification can entail many agricultural techniques, ranging from high-tech to organic farming. To be sure, there is some disagreement on this point among land sparing proponents. Garnett et al. (2013), for instance, advocates for a combination of diverse techniques and they contend that, according to the biomes, different techniques and different strategies (land sparing and/or sharing) might and should be adopted. Phalan et al. (2011), despite acknowledging that some wildlife-friendly techniques like agro-ecology could be integrated too, maintains a different position: '[i]nitiatives which improve the wildlife value of farmland without limiting yield increases are to be welcomes. […]. Unfortunately, however, evidence suggests that yield penalties are prevalent and thus that such opportunities are probably rare' (7–8).

Despite this last point of disagreement, Phalan et al. (2014) agree that SI is not a blueprint that should be applied worldwide. SI premises on the existence of trade-offs between conservation and agriculture therefore understanding where these trade-offs are and how to possibly solve them will be crucial to the implementation of SI.

The work of Phalan et al. (2014) is particularly relevant with this regard. One of the end results of their study is Figure 3: 'projected increase in production between 2000 and 2050, if yield gaps are closed sufficiently (within the constraints of what is attainable) to meet projected production of wheat, rice and maize' (7). What this map shows are those 'places where closing yield gaps' — through intensification — 'has the greatest potential to be used as part of a strategy to spare land for biodiversity conservation in natural habitats' (6). By looking at the maps, these areas are West and East Africa, south-eastern Europe, south and southeast Asia (most dark blue areas).

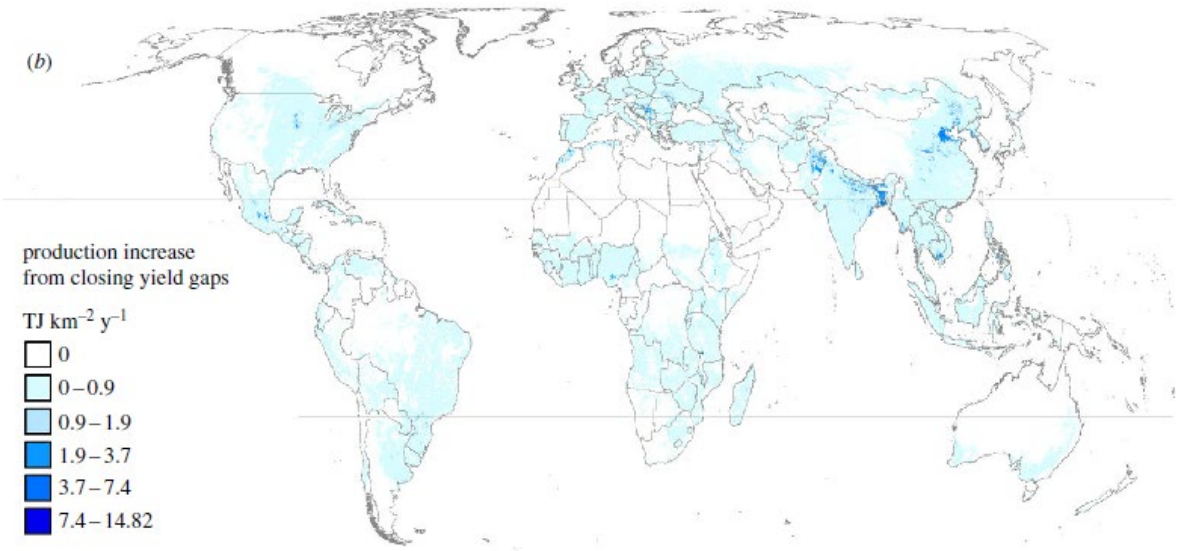

Figure 3: where to close the yield gaps? From Phalan et al. (2014, p.7)

This map shows that different agricultural strategies should be adopted according to the place's conditions (conditions range, for example, from political and economic to biodiversity, soil quality). In other words, implementing SI is extremely context dependent. Once again, location is an important factor to decide which agricultural method to apply and whether it will be effective in sparing and conserving land.

4.2.3 Conditions for agricultural transition

As recognised by Garnett et al. (2013), Foley et al. (2011) and Godfray et al. (2014), there are three fundamental conditions that must come along with SI and that would make SI possible:

1. Reduction of waste;
2. Dietary changes towards a plant-based diet;
3. More efficient and better-governed food systems.

These conditions are premised on the idea that population is growing and that food demand will follow suite. To be sure, production should be increased to fulfil the increasing demand. However, action should also happen on the 'demand' side of the food production system. This discussion ties to the point already raised of overconsumption and overpopulation (Section 4.1.1), therefore we refer to that section. The third condition refers instead to the 'governance' dimension that should come along SI. This aspect seems to be very important in the scientific debate, considering that land sparing and SI have been criticised for neglecting the land-use dynamics that play out in response to policy and market forces (Kremen,2015). Here below, three criticisms are presented.

1. Does SI actually spare land? Critics, like Ceddia et al. (2014: 7242) are sceptical about this and they observed that 'on the one hand a positive correlation between agricultural intensification and agricultural contraction has been reported. On the other hand, it has also been noted how agricultural intensification and yield increase may generate the Jevons paradox [6][…]. Thus, the possibility exists that an increase in agricultural productivity may augment the profitability of land conversion and lead to further agricultural expansion'.

[6] This paradox is well known in the economic field and it occurs when any intervention – technological development, policy measure, etc. – makes the use of a resource more efficient but at the same time the consumption of that very resource keeps on increasing due to rising demands (loosely based on: https://en.wikipedia.org/wiki/Jevons_paradox)

2. SI could lead to 'leakage effect': 'a form of displacement due to land use policies aimed at reducing environmental pressure in a place' and that simply moves the pressure away to another natural ecosystem (Lambin and Meyfroidt, 2011). To clarify this, imagine the case in which SI is applied and it successfully spares land for conservation. The 'spared land' is then protected via PA or any land-use zoning policy. Communities originally inhabiting and exploiting that land for their own livelihoods might be forced away because the land is now protected. This does not eliminate the environmental pressure. It simply moves the environmental pressure somewhere else, wherever this community will go to meet their own needs. The leakage effect might then hamper the actual trade-off between SI and conservation.

3. Agricultural intensification might lead to deforestation. Perfecto and Vandermeer (2016) explains it as follows: 'regions that experience agricultural intensification also experience increased economic activity, higher demand for products and services, immigration, road construction, and consequently, in many cases, higher deforestation rates'

In answering these criticisms, Phalan et al. (2011, 2016) sketch possible concrete governance solutions to these problems. In their most recent work (2016:1), they identify 'four categories of 'active' land sparing mechanisms that could overcome rebound effects by linking yield increases with habitat protection or restoration': land-use zoning; economic incentives, strategic deployment of technology, infrastructure and knowledge; standards and certification. Without venturing into a detailed discussion of these mechanisms, a general discussion is here provided (see also Figure 4).

The solutions offered by the authors need to be thought in an integrated way: multiple solutions must be adopted at the same time to tackle the problems raised above. SI solutions might require capital-intensive solutions (and this is particularly well represented by the third solution: strategic deployment of technology, infrastructure and knowledge; see Figure 4). However, it is also true that Phalan et al. (2011:8) contend that 'if high-yield farming is labour-intensive, it can draw laborers away from frontiers of habitat conversion'. This raises the point that is not necessarily dealt with by land sparing proponents: what is the role of communities and small-holder farmers in SI? In fact, the four categories of solution presented by Phalan et al. (2016) are all to be implemented at a regional, national or even international level. Local communities are not 'active' actors. They are considered to be 'recipients' of policies and interventions. The fact that the four proposed solutions seem to be more capital-intensive, might mean that big actors, such as agro-companies, could play a potentially bigger role.

				
How it could spare (or restore) habitat	Zoning land as off-limits to conversion	Payments for habitat protection, taxes disincentivizing conversion	Concentrates capital away from habitat, and as a condition of support (if reversible)	Requiring habitat protection as criterion of standard
How it could increase yields	Land scarcity incentivizing Boserupian innovation	Land scarcity incentivizing innovation, subsidies enabling investment	Providing inputs, lowering costs, reducing post-harvest losses in established farmlands	Technical advice, market access and increased profits enabling investment
How link between sparing and high yields could be strengthened	Combining with 2 or 3	Rewarding farmers who both increase yields and protect habitat	Combining with 1 or 2 to strengthen protection of areas to be spared	Strengthening criteria requiring habitat protection and high yields
Key risks	Leakage, over-generous agricultural zones, unfair distribution	Poor contract design, poor targeting, inadequate scale, unfair distribution	Poor targeting, unfair distribution, stimulating demand	Selection bias, poor targeting, insufficient monitoring, inadequate scale
Scale at which land likely to be spared	Region, landscape, (landholding)	Landholding, (landscape)	Region, landscape, landholding	Landholding, (landscape)
Principal proponents	Governments	Governments, NGOs	Governments, NGOs, extension programs,	Standards bodies, buyers, producers

Figure 4: Four policy instrument for land sparing (Phalan et al., 2016)

4.1.1 4.2.4 Conclusion

In this section, the agriculture-conservation nexus has been explored for the HE scenario. It was argued that at the centre of the agricultural systems there are two main pillars: a land sparing approach to agriculture and a sustainable intensification. By combining these two, the HE scenario would limit agricultural extension thereby sparing land in favour of conservation practices. This is in line with the ambitious conservation strategies as described in Section 3 of this chapter, despite land sparing and SI are contested concepts and approaches. In the last section (4.2.3), possible governance tools have been proposed that could support a transition towards these models of agriculture and food production and consumption.

4.3 How to achieve a HE scenario: governance scheme and stakeholders

By building on the policy suggestions outlined above for the agricultural sector, this section draws some conclusions on the governance schemes that could enable the realisation of the conservation and agricultural objectives presented in this chapter. More broadly, Dinerstein et al. (2019) proposed a 'Global Deal for Nature' (GDN) that is a policy framework that should work along with the Paris Agreement and should integrate biodiversity conservation with climate change. GDN has three objectives: '(1) protecting biodiversity, (2) mitigating climate change and (3) reducing threats to ecosystem intactness' (*ibid.*: 4). These objectives are then 'operationalised' into detailed milestones for both 2030 and 2050. However, the authors do not specify any governance tool to implement these milestones, except for those elements already accounted for in the previous parts of this document. It can be argued

that, in support of such large and ambitious plans entailed in the GDN — and the same could be said for other similar proposals — an equally bold reshuffling of governance scheme should be put into place. Ellis and Mehrabi (2019) stress the importance of envisioning governance schemes across all the scales, from global and to local and recognise the complexity that this would entail. Despite the issue of governance has often been lacking in discussion concerning these bold conservation targets, it remains that, as mentioned by Locke (2015), bottom-up engagement and particularly participatory schemes with indigenous communities should be put up in place. Similarly, Dinerstein et al. (2019) highlight the importance of indigenous community as they currently manage or have tenure rights on over one quarter of the world's land surface (Garnett et al., 2018). Other important stakeholder, as they have been recognised by Dinerstein et al. (2019:5), will be the private sector, considering that the 'gross costs for nature conservation measures across half the Earth could be $100 billion per year'. With this regard, different initiatives have been launched to raise awareness and gather supporters around the Global Deal for Nature and, more generally, ambitious conservation projects. Examples of this are the 'One Earth[7]' and the petition for a Global Deal for Nature[8].

[7] https://www.oneearth.org/vision/
[8] https://www.globaldealfornature.org/about/

5 Sharing the Planet (SP) scenario: literature review

This chapter presents the result of the literature review that has been carried out to develop the SP narrative and scenario. This literature review has taken the cues from the previous (Chapter 3) conceptual division to gather knowledge and research insights from different authors under the SP banner. And even though the many positions here presented belong to different schools of thought — with accordingly different implications for conservation strategies — they have been considered as part of the same body of literature for the sake of developing a scenario. This being said, the SP scenario draws upon different disciplines and concepts. In fact, this scenario aims at including different perspectives on conservation, going from the more mainstream ecosystem services approach, to the upcoming ideas of relational values and more radical approaches such as Convivial Conservation. For a conceptual discussion of these ideas and how they are positioned within the scenarios, refer to Chapter 3.

5.1 Conservation strategy for the SP scenario

5.1.1 Main tenet and causes of biodiversity loss

Outlining the general features of the SP scenario is not an easy task. Unlike the HE scenario, in which a certain degree of coherency can be detected across the various proposals, the literature used for the SP scenario is less in agreement on what could be the main tenets of this scenario. Notwithstanding this difficulty, it is possible to formulate a general tenet for this scenario, based on the conceptual description provided in Chapter 3. One tenet that is argued for, in order to halt and bend the curve of biodiversity loss, is that separating nature from humans is not a successful strategy. In fact, the SP proponents argue that biodiversity will not be saved if pitted against humans. Rather, nature must be allowed to thrive and expand also in those landscapes that are currently dominated by humans, so as to allow people to live with nature. The creation of mixed landscapes in which this type of conservation could happen represents the main objective of this scenario. Despite not easily operationalisable, this objective signals a clear difference with the HE scenario.

Some authors focus on the indirect drivers of change of biodiversity (Büscher and Fletcher, 2020; Perfecto et al., 2009). Particularly, they argue that the main drivers of biodiversity loss are to be found in the structural components of current political and economic systems and how goods, benefits and burdens are (unequally) distributed. Furthermore, at a more conceptual level, they see the separation of (some) humans from (some) nature as a feature that supports nature exploitation and, consequently, biodiversity loss (Büscher and Fletcher, 2020; Moore, 2017). However, while this position may be shared by most of the authors of the SP scenario, some of them do not seem to mention these indirect drivers (Kremen and Merenlender, 2018)

5.1.2 Conservation strategy and targets

As it evidently results from the main tenet of this scenario, the conservation focus lies in what are called 'shared landscapes' (Kremen and Merenlender, 2018; Perfecto and Vandermeer, 2016; Perfecto et al., 2009). This strategic focus is due to the acknowledgment that biodiversity does not solely exist in pristine and wild areas — which, in fact, according to some authors, do not exist at all in the age of the Anthropocene (Büscher and Fletcher, 2020). Rather, Ellis et al. (2018:440), by looking at the human and natural systems and how they interact at a global level, concluded that 'anthropogenic biomes — landscapes that combine a variety of land uses (from e.g. agriculture to forest) and cover — clearly dominate the terrestrial biosphere, covering more than three quarters of Earth's ice free land'. In other words, we live in a world where the dominant biome is one that mixes human and natural systems, and trying to change this would be anachronistic and impossible (Büscher and Fletcher, 2020; Ellis et al., 2008). Instead, the focus should be on designing mixed landscapes that are suitable for a convivial human-nature relationship and that support the delivery of ecosystem services (ES), Nature's Contributions to People (NCP) and the sustainable use of resources (Renwick, 2020). The sustainable use of resources is particularly relevant when considering that one of the main pressures on biodiversity according to the Convivial Conservation perspective is human inequality and poverty (Büscher and Fletcher, 2020). Biodiversity conservation, they argue, cannot happen to the detriment of local communities.

The focus on shared landscapes does not, however, invalidate the utility of neither PAs nor, more generally, other conserved areas. Whilst recognising their importance and effectiveness, however, the quantitative expansion of PAs is not at the centre of this scenario (Kremen and Merenlender, 2018; Visconti et al., 2019).

The three main conservation strategies that characterised the SP scenario:

- Promotion of shared (working) landscapes;
- Qualitative change of Protected Areas towards Promoted Areas (and inclusion of OECMs);
- Rewilding: ecological restoration to promote self-regulating biodiverse ecosystems.

In the following sections, each of these strategies will be further discussed, so as to account for the conservation strategy and effort of this scenario.

5.1.3 Shared (working) landscapes

Shared landscapes will be the dominant landscape in the SP scenario. This concept mostly refers to the work of both Kramen and Merenlender (2018) and Perfecto and Vandermeer (2016), but it shares similarities with other approaches — such as the Satoyama initiative (Takeuchi, 2010) — and concepts — such as 'cultural landscape' (Taylor and Lennon, 2012). Despite having different approaches and starting points, they all recognise that biodiversity is to be integrated in human-dominated landscapes and, particularly, into agricultural areas. Perfecto and Vandermeer (2016) support this idea by maintaining that the relationship between agriculture and biodiversity cannot be simplified, as often happens, assuming that *any* agriculture will be detrimental to biodiversity. Instead, 'it is the particular kind of agriculture, not the simple existence of agriculture, that relates to biodiversity, on both local and regional scales' (134). Thus, they envision a 'matrix', whereby agricultural and natural systems are intertwined in a way that, based on new ecological findings, supports migration of species.

Kramen and Merenlender (2018) position themselves within a similar approach to that of Perfecto and Vandermeer (2016). They share the belief that conserved areas alone will not be enough to halt — let alone invert — biodiversity loss. Furthermore, they agree that

human-dominated landscapes entail biodiversity and, they argue, this is reason enough to envision landscapes whereby humans and nature can coexist and sustainable use of resources is ensured, too. They called these landscapes: 'working landscapes' and they described them as landscapes that 'a) maintain biodiversity, b) provide goods and services for humanity and c) supports the abiotic conditions necessary for sustainability and resilience' (Kramen and Merenlender, 2018,1). They define the main features of a working landscape as the reciprocity between the human and natural system and their co-dependency. This means that working landscapes will not only support biodiversity but also depends on biodiversity for the prevision of ecosystem services (Kremen and Merenlender, 2019). An example of a shared landscape is given in Figure 5 whereby the delivery of ecosystem services and biodiversity conservation are combined together.

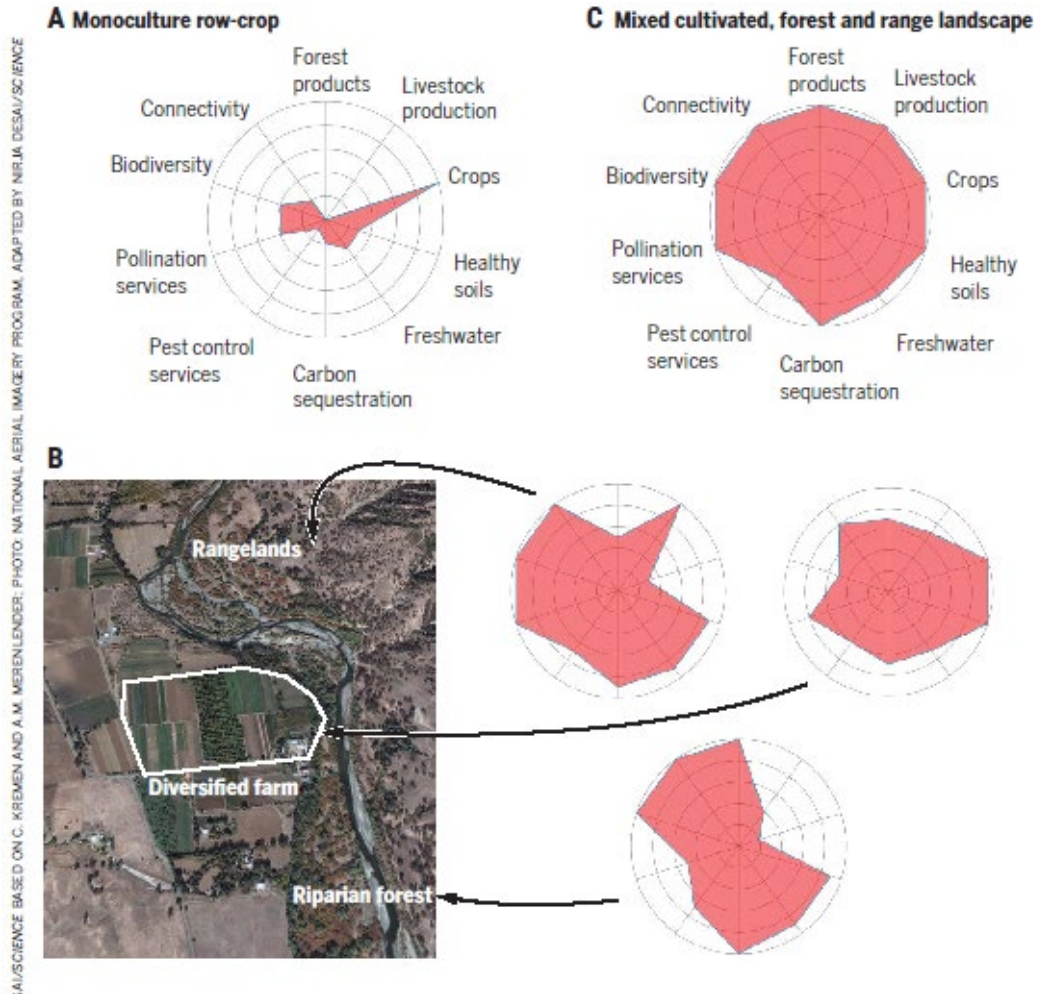

Figure 5: Example of a shared (working) landscape - in the case of agricultural land. From Kremen and Merenlender, 2018.

In an answer to the work of Kremen and Merenlender (2018), Deichmann et al. (2019) propose to broaden the definition of working landscapes to other 'scapes', including urban- and sea-scapes. With regard to the urban-scape, the concept of 'biophilic city' (Beatley and Newman, 2013) is useful to envision urban systems for the SP scenarios. The biophilia framework for cities focuses on the well-being and the health benefits that nature brings to city dwellers (Beately and Newman, 2013). This applies to different scales within the city, from building to community and regional levels, entailing solutions, such as green rooftops, community garden and urban ecological networks (*ibid*.).

5.1.4 Qualitative aspect of Protected Areas

There is a general acknowledgment that PAs and, more generally, conserved areas play an important role in conserving biodiversity (Oldekop et al., 2016; Svennings, 2018). Notwithstanding this, it has also been suggested that a too-narrow focus on quantitative aspects of PAs expansion does not necessarily translate into benefits for biodiversity (Visconti et al., 2019). Of particular interest for the SP scenario are the socio-ecological aspects of PAs and conserved areas. Büscher and Fletcher (2020), for instance, propose to shift from 'protected' to 'promoted areas' and thus define the term: '[P]romoted areas are conceptualised as fundamentally encouraging places where people are considered welcome visitors, dwellers or travellers rather than temporary alien invaders upon a non-human landscape' (140). Apart from this consideration connected to the idea of an 'environmentally and socially just tourism', a paradigmatic element of Promoted Areas has to do with their 'socio-ecological' balance. By drawing upon the evidence presented by Oldekop et al. (2016), Promoted Areas are arguably areas where ecological principles and objectives are not pitted against the local communities that live in and around them. Rather, they are areas where ecological principles co-exist with the provision of socioeconomic benefits for local and extra-local communities. Promoted Areas are centred around the promotion and support of sustainable resource use and the creation of sustainable livelihoods. Also, in this regard, the Satoyama initiative (Takeuchi, 2010) and cultural landscape concept (Taylor and Lennon, 2012) offer valid examples of possible 'promoted areas'. Additionally, the idea of sacred sites reflects similar principles by addressing the cultural value connected to nature (Verschuuren et al., 2007) while Chapter 6 of the IPBES Global Assessment (2019) provides useful references and explanation of the idea of sustainable landscape and sustainable use of resources.

As for the governance of 'promoted areas', Büscher and Fletcher (2020) contend that diverse local communities are key decision-makers in how to conserve the area. As example they give, there are the Indigenous and Community Conserved Areas (ICCA) where indigenous and local communities decide for themselves the course of actions, with the objective to ensure:

- Better conserved territories;
- Territories with higher ecological integrity and resilience
- Territories that support the communities' livelihoods and communities' material and non-material well-being (Borrini-Feyerabend and Campese, 2017)

Oldekop et al. (2016) argue that co-managed areas by local communities and conservation bodies seem to be the most socially and ecologically effective systems in their analysis. Similarly, IPBES (2019) has often referred to the importance of having participatory governance scheme and the centrality of IPLC institution and Indigenous and Local Knowledge (ILK) in such frames. More generally, the SP scenario is characterised by the inclusion of all the IUCN protected area categories, while OECMs also play an important role in this scenario, too, considering that OECMs do not prioritise conservation objectives over other objectives (Mitchell et al., 2018).

5.1.5 Rewilding

Rewilding is something that the HE and the SP scenarios seem to have in common considering that, as mentioned in the previous chapter, the expansion of PAs should be coupled with rewilding efforts, according to HE proponents. However, Büscher and Fletcher (2020:59–60) are critical and comment that 'the basic idea of rewilding is to cordon off spaces that have been previously subject to human alteration so that 'natural' processes can take back over and evolve of their own accord. […Rewilded spaces] are 'man-made to be wild, created from nothing to look as if [they] had never change'. To achieve this, they must therefore be intensely managed to appear as if unmanaged, left to their own devices'.

Notwithstanding this critique, Büscher and Fletcher seem to espouse the idea of rewilding as expressed by Svennings (2018). He defines it as a form of 'ecological restoration to promote self-regulating, biodiverse ecosystems' (ibid.: 964) in mosaic landscapes where human and nature systems coexist and work together. The main difference that seems to emerge with HE is that rewilding in an SP scenario would happen within the framework of mosaic landscapes.

5.1.6 Conclusion

Section 5.1 proposes different perspectives on conservation and analyses them for the SP scenario. What emerged from the discussion is that PAs and other conserved areas are still important to all the advocates of the SP scenario. However, the logic behind conservation is that it should not separate humans from nature, but rather facilitate their relationship and their sustainable interaction. In fact, the achievement of conservation goals should not overshadow other desirable sustainability-related goals. Shared (working) landscapes have been described as the main conservation feature for the SP scenario because of their 'multifunctionality'. Next to this, however, PAs need to be reformed. Authors seem to agree that quantitative targets cannot overshadow qualitative aspects of PAs. With this regard, the concept of Promoted Areas has been described. Evidently, this kind of conservation strategy and practices require a very different agricultural system than that described for the HE scenario. In the next section, the agriculture-conservation nexus is addressed.

5.2 Agriculture-conservation nexus in an SP world

5.2.1 Premises

There are some premises to make in order to understand the agriculture-conservation nexus in an SP framework.

- Many authors (Chappell et al., 2013; Kremen, 2015; Perfecto and Vandermeer, 2016) argue that the ultimate problem to solve hunger in the world is not that we do not produce enough food globally. There is evidence that there will be enough food — within current or alternative, more sustainable production methods. The problem lies in the distribution of and access to food.
- Related to this latter point, the same authors (*ibid*.) insist that the considerable majority of the world's hungry people live in rural areas, mostly in the global South. 'FAO (2014) estimates that half of the world's hungry people are from smallholder communities that survive on marginal lands, an additional 20% are from landless families that depend on farming, and 10% depend on fishing, herding or forest resources' (Perfecto and Vandermeer, 2016: 142).
- Smallholders are not merely objects of marginalisation and poverty. Rather, it is estimated that 90% of the farms are small-scale and only take 25% of total world's farmland. Despite the small portion, they are estimated to be producing most of the food for the developing world. This has consequences that will be discussed in the upcoming section.

5.2.2 Main features

Given these premises and based on the work of Chappell et al. (2013), Kremen (2015), Kremen and Merenlender (2018), Perfecto et al. (2009) and Perfecto and Vandermeer (2016), some general features for agriculture within an SP scenario can be identified.

First of all, the shared landscape, as described in the previous section, will dominate agricultural systems, thereby combining both food production with the delivery of ecosystem services. This is, more generally, referred as 'multifunctionality' (Hodbod et al., 2016; Kremen and Merenlender, 2018). This is achieved by adopting agro-ecological techniques,

agroforestry and silvopastoral systems, cover cropping, crop rotation, intercropping, etc. All of these different approaches are part of what has been called 'ecological intensification', which consists of: 'using farming methods that rely on knowledge and labour, as opposed to other inputs, to increase agricultural production per land unit, and that promote and regenerate favourable biological interactions to produce food; requires assurance of environmental and social sustainability' (Kremen, 2015). Ecological intensification favours the delivery of ecosystem services (Tittonel, 2014) and goes hand in hand with the concept of land sharing, whereby agriculture is not intensified to spare land for conservation purposes but it is rendered 'biodiversity friendly' (Grass et al., 2019).

Agricultural activities, thus outlined, are thought to play an important societal role in this scenario. Some authors (Büscher and Fletcher, 2020; Chappell et al., 2013; Perfecto and Vandermeer, 2016) hint at the link between agricultural practices and the achievement of food sovereignty which is defined at the World Food Summit in 1996 as: 'the right of local people to control their own regional and national food systems, including markets, natural resources, food cultures and production modes […]. It postulates that small-scale sustainable farming, based on a dense agroecological matrix where communities have greater levels of security and control over the land, resources, and management regimes, has the potential to "feed the world and cool the planet"' (Chappell et al., 2013). As a matter of fact, agro-ecological techniques are low-inputs (unlike Sustainable Intensification (SI) that is often criticised to be capital-intensive), as well as less expensive than SI and labour- and knowledge-intensive.

5.2.3 Conditions for agricultural transition

In order to transition to an agricultural system based on working landscapes, some elements must be put into place:

1- Social mobilisations and local actors are determinant. This logically follows from the attempt to nurture human and nature relationships and from envisioning agriculture as a way of empowering communities. At a landscape level this can only happen when local stakeholders — who are the beneficiaries of the services delivered by these landscapes, too — are involved and actively participating, such as in the form of community stewardship (Fischer et al., 2017; Kremen and Merenlender, 2018). Another example of this, more centred on social mobilisation, is taken from Perfecto and Vandermeer (2016) with regard to the 'Via Campesina' movement that nowadays is widely recognised as successful. The authors state: 'Of most importance for the adoption of agro-ecological systems is the farmer-to-farmer methodology, which consists of farmers teaching each other' (145).

2- Agribusiness's advantages relative to smallholders should be reduced. This point finds large resonance with the work of Büscher and Fletcher (2020) and it aims at creating policies such as: land reform, campaign finance reform, control of corporate monopolies, removal of subsidies, and trade policies favouring developed economies and large multinationals (Kremen, 2015). Of particular relevance is land tenure policies that should favour smallholder farms rather than large mono-crop farmlands.

5.2.4 Conclusion

In this section, the agriculture-conservation nexus is explored in the case of an SP scenario. It is argued that the agriculture system would be dominated by shared landscapes that rely on and support biodiversity whilst enabling sustainable use of resources. Considering the focus on achieving an optimal 'multifunctionality' within the landscape, much importance is given not only to the production of food but also to the protection of biodiversity. Social issues surrounding agriculture, such as poverty and food security, are core problems these perspectives grapple with. Despite varied in the solutions they offer, many authors seem to agree on the importance of including local communities in the making of these shared

landscape, so as to enable: i) the creation of value at a local level; ii) participatory management and governance schemes.

In the next section (5.3), the focus shifts from agriculture to broader considerations on governance schemes as enabling conditions for this scenario.

5.3 How to achieve an SP scenario: governance scheme and stakeholders

Since many perspectives are part of this scenario, it is impossible to account for all of them and the respective governance change they premised on. Of particular interest is the proposal by Büscher and Fletcher (2020), named 'Convivial Conservation'. Because of their radical approach and their interpretation of 'transformative change' — as asked by IPBES (2019) — this section will mostly focus on their proposal.

After introducing the main tenets of Convivial Conservation, the two authors list some changes that should occur in the current governance scheme surrounding conservation.

1. Historic reparations: conservation organisations should acknowledge past injustices related to conservation and start a process of distribution/redistribution of resources (mainly towards local communities);
2. Conservation basic income: 'A conservation basic income (CBI) is a monetary payment to individual community members living in or around promoted areas that allows them to lead a (locally defined) decent life. We consider this the conservation equivalent of a 'basic income grant' that is the hallmark of the new 'politics of redistribution' within international development circles. […]. These payments are not meant to 'bribe' or incentivise communities away from their resources. In this sense, payments must be 'unconditional,' that is, not tied to fulfilment of certain actions as in conditional cash transfer programs. They are meant to provide rural residents with options for forms of livelihoods that will always need to include use of and interaction with biodiversity and resources […W]e believe the policy should be substantial and include both communities of place (residing close to the conservation area of concern) and communities of use (those who have been making regular use of the area)'(160).
3. Rethinking relationships to corporations. 'Conservation NGOs should only work with companies if the latter pledge to move towards a different economic model beyond capitalist accumulation and GDP-based economic growth. Ideally, and for the longer term, this should be focused on degrowth, but, for the short term, this could be towards a circular or doughnut economy' (161).
4. Creation of a Convivial Conservation Coalition to hold other powerful actors accountable for their actions and to transform them from within;
5. Rethinking democratic settings: based on community-based conservation with flexibility and decentralisation; enlargement of 'community' to include nature (rights of nature). They signal that there is need for a wider democratisation in general and they are inspired by many experiences around the world, such as the concept of Radical Ecological Democracy (Kothari, 2014);
6. Alternative funding mechanisms: re-utilisation of MBI (market-based instruments) such as Payment for Ecosystem Services (PES) and cash transfer programs because they are form of redistribution of resources. Other solutions could entail: state taxation, grants from international donors, new technologies like blockchain, etc.

As is evident from this list, Büscher and Fletcher envision a system where the majority of actions is taken by large actors, such as nation states, corporations and conservation organisations. This does not mean that they do not acknowledge the importance and the role of local actors and stakeholders. On the contrary, they argue that they mostly address larger

actors because, normally, conservation interventions solely target local actors. In their opinion, conservation interventions focus much less often on extra-local actors responsible for adding to the general pressure on biodiversity. To directly use their words: 'A comprehensive conservation politics, therefore, must simultaneously centre local people as key decision-makers in conservation planning and decentre them as the central targets of interventions aimed at fostering behavioural change' (158).

In detail, they identify the following actors:

1. Rural lower classes: they live in or with biodiversity and depend on the land for subsistence, especially in tropical countries. This is the main target of mainstream conservation strategies.
2. Urban, semi-urban or semi-rural middle and lower classes: they do not have direct dependence on the land for subsistence, involved in consumer markets and global labour.
3. Land-owning capitalist classes such as major capitalist farmers and/or landholders for large agro-industry. They are usually targeted by conservation as partners in the conservation effort or as targets of resistance. They also play a role in land conversion.
4. Global upper classes: if the category before is still local, this is global and it owns large real estate and it belongs to both rural and urban. Hardly ever targeted as part of conservation initiatives
5. State: despite their often-controversial positioning, the authors argue that states still have large power and it can connect the other actors together.

For convivial conservation, effective conservation governance starts 'by addressing actors in the superordinate levels in order to first target their actions, then work down towards the local people in direct contact with the biodiversity in question' (158). Therefore, while local people remain the key decision-makers in conservation planning, conservation burdens should be put onto the shoulders of extra-local actors.

6 Conclusion

Many actors involved in conservation have recently called for radical action to invert the alarming trends of biodiversity loss and environmental degradation. Despite the common call and the shared sense of concern, many alternative solutions have been put forward to achieve the objective of bending the curve for biodiversity. As part of the PBL CBD Post-2020 project, this report gathered many of the currently debated perspectives to provide a literature review that could help formulating two scenarios, Half Earth (HE) and Sharing the Planet (SP), which were later used for a model exercise. More specifically, this report has provided a) qualitative narratives describing the two alternative scenarios and b) an extensive literature review of the current scientific evidence for both scenarios. Additionally, it also shortly reflected on the governance schemes that might be put into place to achieve both scenarios. Despite such discussion could and should further be elaborated, it is considered to be an important and novel element to the scientific discussion about conservation targets.

Large-scale and ambitious conservation targets have been identified to be at the heart of the HE scenario. Many authors and scientists have proposed to protect large areas of land and sea to halt and bend the curve of biodiversity loss. In proposals like those of O.E. Wilson (2016), Locke (2015), Dinerstein et al. (2019), the logic of protection is to separate human pressures from nature by establishing Protected Areas (PAs) and other conserved areas. Rewilding and ecological restoration, however, were also considered and included in part of the conservation strategy. These perspectives are premised on the idea that it is necessary and essential to protect wild areas and they have been found to value nature mostly for its inherent value. In order to accomplish large conservation efforts required under the HE scenario, land sparing was considered an essential agricultural strategy along with sustainable intensification.

On the other hand, this report found the SP scenario to be based on an idea of conservation that does not separate nature from human pressures. On the contrary, it would enable a sustainable relationship and pursue the idea of 'living with nature'. This conceptual position lies in the belief that envisioning a world where nature is separated from humans would not only not halt biodiversity loss, but it would also come at tremendous costs for human well-being and other sustainability dimensions. Nature is thus valued for its instrumental and relationship value. Following this logic, the agricultural system is thought to develop following land sharing and ecological intensification concepts, whereby natural elements and agricultural plots are combined together, thanks to the adoption of practices such as that of agro-ecology. This scenario is also found to put more emphasis on the 'social' dimensions of conservation and agriculture and their attention to local stakeholders testifies this position.

The two scenarios here proposed are theoretical constructs. It thus bears repeating that the perspectives included in this report are not static and have been allocated to one of the two scenarios according to the conceptual discussion of Chapter 3. These choices are far from uncontested as most of the issues discussed here are still very much unresolved in the academic and societal debate. Furthermore, because of their theoretical nature, translating these scenarios into narratives that could then be used for model exercises is a considerable challenge. This is particularly true for the SP scenario. As mentioned in the previous chapters, the original idea of this scenario is to include ecosystem services with the broader framework of Nature's Contribution to People and concepts of relational values, convivial conservation and post-growth economy. While this report has attempted to elaborate these diverse concepts in a coherent frame, their operationalisation into the models has been

difficult if not impossible, due to limitations of available models. It resulted, therefore, that only certain concepts, such as that of ecosystem services, could be fully adopted and operationalised into the models. On the other side, the focus on relational values and post-growth economy could not be fully translated into the models. Despite these difficulties, it was decided to maintain all the original elements characterising the SP scenario, so as to follow the call for new scenarios that could embrace different value perspectives (Rosa et al., 2017) and that move beyond economic growth (Otero et al., 2020).

Despite the fact that the literature review has focused on drawing hard lines and differences between the two scenarios, similarities and synergies can be found, too. As evident from the recent proposal by Locke et al. (2019) named 'Three Conditions' and discussed in this report, different conservation practices could be applied to different areas. Different conservation and agricultural strategies could be applied across regions of the world, thereby bridging PAs with shared landscapes and land sparing with land sharing. Different IUCN categories of PAs, OECMs and managed landscapes should be seen as alternative conservation tools that do not necessarily exclude each other.

In conclusion, this report accounts for the background work and the knowledge-based process that informed the PBL Post-2020 scenario development. Additionally, it also hopes to be a valid contribution to the discussion around conservation in light of the upcoming CBD meeting by providing an interpretation of the current academic and societal debate.

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Appendix A: Longer narratives for HE and SP

As part of the process to develop the narratives for the HE and SP scenarios, these longer versions of the narratives have been produced as intermediate outcome. These narratives can be considered as a 'by-product' of the analysis and are here presented only to render visible the step taken to move from the literature review to the one-page narratives. Because of this and because these narratives follow the same logic and the same conceptual divides as elaborated upon in Chapter 3, there is no need to further introduce them.

6.1 Half Earth narrative

6.1.1 Introduction

This pathway is characterised by a strict distinction between nature and human-dominated landscapes and a large expansion of conservation areas. We imagine that half of the earth will be allocated to conserved nature and the other half to humans with little space for nature. The rationale behind it is that separating nature from human pressures through the establishment of protected areas will ensure long-term viability of ecosystems and biodiversity (Locke, 2013). The allocation of space for nature in the 'nature half' is based on ecological criteria and will be regulated according to different IUCN Protected Areas categories, ranging from strict nature reserve/wilderness areas to managed resource protected ones, as well as Other Effective area-based Conservation Measures.

Next to the nature half, the human-dominated half is characterised with urban and agricultural landscapes where sustainability will be achieved by means of large deployment of technological innovations (Kok et al., 2018). In terms of land use, agricultural production will follow the path of sustainable intensification resulting, ultimately, in a land sparing effect (Garnett et al., 2013; Foley et al., 2011).

Finally, this pathway is characterised by high levels of trade liberalisation, international cooperation and the expansion of global markets that will be adjusted to support the achievement of sustainability goals at a global level (Kok et al., 2018). Technological innovation — supported by further liberalisation — will also pave the way for sustainability, particularly in the agricultural field with the pursuing of sustainable intensification.

6.1.2 Values analysis

Drawing on the recent Nature Futures Framework underdevelopment by IPBES as well as their conceptual framework and their work on Nature's Contribution to People (NCP) (Diaz et al., 2015), the HE approach to biodiversity conservation premises on the prioritisation of intrinsic value of nature while protecting nature. Intrinsic values refer to those non-anthropocentric values that are inherent to nature, independently from human judgement

and evaluation (Diaz et al., 2015). When traditionally considering intrinsic value, there is no reference to possible benefits that could arise to humans nor to their quality of life since conservation aims at preserving ecological processes and biodiversity for their *intrinsic* value. A well-known example of conservation mediated by intrinsic value is the establishment of animals' rights and rights of nature. The choice of prioritising the intrinsic value of nature for this scenario stems from the theoretical debate on human-nature relationship between many HE proponents. Opposite to SP proponents, we imagine for HE to acknowledge and to some extent support the distinction between humans and nature. They argue that humans have placed themselves apart from nature to exploit it, thereby talking about intrinsic value — and more broadly an eco-centric ontology — allows for balancing out an otherwise unequal relationship (Kopnina et al., 2018; Kopnina, 2016). Thus, by polarising the two ends of this relationship, the proponents identify the intrinsic value of nature as separated from other instrumental values.
Despite intrinsic values are connected to other instrumental values, we imagine that in this pathway conservation objectives and strategies are elaborated by considerations of nature's intrinsic value. Many advocates of Half Earth and, generally, of more ambitious extension targets for PAs, contend that the degree of naturalness is declining and this is enough of a moral motivation to trigger radical and ambitious action to preserve the remnants of wilderness and nature (Devall and Sessions, 1985; Kopnina et al., 2018; Nash, 2014; Washington et al., 2017). Wilderness becomes in this pathway a key concept that is developed along with the extension of PAs over 50% of the Earth's surface. To be sure, this pathway values nature for its intrinsic value and not, necessarily, for it to be pristine. In fact, we imagine that reforestation and ecological restoration will play a crucial role in the achievement.

The framework of biodiversity conservation and the strategies that HE proponents bring forward stem from this values analysis, as it is clearly visible by the extensive use of PAs as main tool for conservation. Despite in a later version of HE — as proposed by Dinerstein et al. (2019) — references to protection of certain areas for their potential of carbon capture (instrumental value) can be found, HE is predominantly concerned about valuing nature for its intrinsic value and ecological criteria seemingly trump any others. Ultimately, intrinsic values are translated into strict ecological criteria, as elaborated in Chapter 4 (Half Earth (HE) scenario: literature review) that potentially trump other criteria. Evidently, as opposed to the SP scenario, this pathway presents an approach that could be defined as 'value-monism', arguably ecologically dominated.

6.1.3 The nature half

In this pathway, we imagine that 50% of each ecoregion is allocated as natural areas that go under the protection regime of any of IUCN categories (Locke, 2013). The allocation of PAs aims at achieving four fundamental objectives in biodiversity conservation, that function also as basic ecological criteria shared by many proponents of the HE scenario (*ibid*):

- *All native ecosystem types must be represented in protected areas;*
- *Populations of all native species must be maintained in natural patterns of abundance and distribution;*
- *Ecological processes such as hydrological processes must be maintained*
- *The resilience to short-term and long-term environmental change must be maintained*

For the allocation of PAs in our models, we have not followed these ecological criteria exactly However, they still give a sense of the direction that this scenario is taking: nature has intrinsic value that must be protected; therefore, space should be allocated to nature on the basis of ecological criteria that entail three fundamental variables: population, extinction and integrity (based on Mace et al., 2018). Accordingly, we singled out areas that are already protected as well as others that are considered important for conservation purposes, such as

Key Biodiversity Areas (KBAs), Important Bird Areas (IBA), Alliance for Zero-Extinction Sites (AZEs) and Intact Forest Landscapes. Further adjusting these areas to achieve the 50% objective, we constructed our PAs map.

To achieve the 50% target, some areas will require rewilding and ecological restoration of now degraded lands (Dinerstein et al., 2019; Kopnina, 2016; Garnett et al., 2013). Furthermore, another key criterion for allocating space to nature is to ensure the connectivity among protected patches so as to limit fragmentation (Locke, 2013). In this pathway, connectivity is dealt with indirectly when addressing fragmentation of patches. Fragmentation is assumed to fall — thereby increasing connectivity — because of the large size of the protected patches.
As mentioned above, the latest proposal of a Global Deal for Nature by Dinerstein et al. (2019) suggests to protect vast patches of nature to ensure carbon storage and establish new 'Climate Stabilisation Areas' (CSA) that can be dealt with under the frame of Other Effective Areas-based Conservation Measures (OECM). CSA are '*areas where conservation of vegetative cover occurs and greenhouse gas emissions are prevented*' and these will concentrate in habitats like mangroves, tundra, other peatlands, ancient grasslands, and boreal and tropical rainforest biomes (Dinerstein et al., 2019).
Furthermore, OECM could also encompass indigenous people's land, given their importance to conservation objectives (Garnett et al., 2018), in a way to ensure sustainable use of the natural resources, respect of the local culture and shared decision-making (Dinerstein et al., 2017).

6.1.4 Agricultural Landscapes

In this pathway, we imagine that agriculture will follow the path of sustainable intensification (SI) while producing land sparing effects. Agricultural production will be intensified to a) close the yield gaps and feed the growing population; b) respect the environmental sustainability boundaries and c) to spare land for conservation purposes in the 'nature half' (Balmford et al., 2019; Garnett et al., 2013; Foley et al., 2011). The focus on intensification as opposed to extensification stems from the acknowledgment that land conversion to agriculture is a major causes of biodiversity loss as well as greenhouse gases emission (Garnett et al., 2013). Whilst there is debate on challenges to make intensification sustainable (e.g. Kremen, 2015), many authors suggest that production intensification can still happen within the limits of environmental sustainability. Especially in those areas that are shown to have a larger potential for closing the yield gap, this can be achieved by means of large application of technological and practices innovation such as pest management, more efficient management of nutrient, water cycles, etc. (Kok et al., 2018; Phalan et al., 2018,2011). We imagine that in this approach there will be a considerable focus on 'closing the yield gap', defined as the difference between potential and the real productivity (Foley et al., 2011). This focus stems from the recent criticisms moved to the HE project on the difficulty to conciliate 50% protection of the Earth and enough food production to feed the world (e.g. Mehrabi et al., 2018). As pointed out by Godfray et al. (2010), low yields occur due to technical or economic constraints — or both at the same time — high costs of inputs or low returns from increased production. Thus, despite the impossibility to suggest a blueprint solution to the matter, we imagine that in this scenario these challenges and, more generally, closing the gap can be supported in a framework of further globalisation of the food system (Godfray et al., 2010; Lambin and Meyfroidt, 2011). Despite globalisation processes have been shown to accelerate processes of land conversion as well as to be cause of further environmental degradation, globalisation can be harnessed to increase land use efficiency, thereby further sparing land and closing the yield gap (Lambin and Meyfroidt, 2011). For instance, processes of regional specialisation in the most appropriate land uses increase efficiency, thereby lifting up pressure on other areas and increasing global efficiency of food production, too (Godfray et al., 2010; Lambin and Meyfroidt, 2011). These processes

might also favour large-size rather than small-size farmers as some authors have suggested that the former more easily take up technological innovations to increase productivity and foster environmental sustainability[9].

Technological innovations can be tapped to not only deliver environmental sustainability, increase efficiency and spare land but also to provide healthy and nutritious food. Despite scepticisms of some authors on this point, others contend that SI can provide nutritious food by means of nutritional manipulations, emphasising crop and nutritional diversity and by using land resources efficiently (Godfray and Garnett, 2014).
Overall, in this pathway we imagine that technological innovation should be coupled with large technological transfer to those areas where intensification and closing yield gap is more efficient and promising. By doing so, environmental issues will be addressed and tackled in the process of intensification, globally (Tilman et al., 2011). The need for greater investments and for technology transfer and the capital-intensive essence of SI (Lin and Fuller, 2013) requires a greater degree of trade liberalisation, globally.
Innovative governance and management schemes are needed to ensure a sustainable intensification that does provide land sparing effects and does not unleash sides-effects, like the one that could be caused by globalisation processes as well as others such as deforestation (Perfecto and Vandermeer, 2016), leakage effects (Lambin and Meyfroidt, 2011) or Javons paradox (Ceddia et al., 2014). Work like the one by Phalan et al. (2016, 2011) points at different categories of 'active' top-down land sparing mechanisms that can potentially deal with the above-mentioned challenges: land use zoning; economic incentives, strategic deployment of technology, infrastructure and knowledge; standards and certification. Furthermore, whether we imagine further liberalisation of the trade to allow for technology and capital transfer across the globe, new trade regimes should be established that include environmental protection standards (Lambin and Meyfroidt, 2010). These solutions are to be thought in an integrated fashion and require mobilisation of different actors from the public to the private sector.

6.1.5 Urbanscape

Drawing upon the current debate on land sparing and sharing, we imagine that cities in this pathway will be characterised by a division between compact and highly populated/dense built up areas and natural areas of native vegetation among or adjacent (Sushinsky et al., 2013). In the natural parts of the city, we imagine that there is not urban infrastructure, such as roads, housing, etc., however, people can access these areas for recreation purposes mostly. Probably, there will be high rate of local extinctions in the built areas, however this loss will only be limited to small areas. In this pathway, we imagine a spatial limitation to cities and a top-down set of decisions on the 'nature' part of the city.

6.1.6 Energy Production

In this pathway, the production of biofuels will follow the paradigm already exposed for sustainable intensification. Technological intensification will thus foster efficiency and yields (IRENA, 2017) also with regard to biofuels production from crops, although neglecting the delivery of Ecosystem Services (Anderson-Teixeira, 2012). Despite at a local level sustainability might be harmed, it is believed that this system can have broader positive results at a landscape level, considering the 'sparing' of nature (*ibid*.).
Unlike the WE approach that strives to integrate food with bioenergy production from crops, in the HE pathway, there is a stark competition between biofuels and food production (Tilman, 2009). For this reason, apart from achieving a sustainable intensification that premises on technological and practices innovations, we assume that the focus of biofuels production will be to expand on degraded lands abandoned from agricultural use, so as to minimise the competition (*ibid*.).

[9] https://thebreakthrough.org/issues/food/big-farms-bad-rap

6.2 Sharing the Planet narrative

6.2.1 Introduction

This pathway is characterised by a deep interconnection between natural and human-dominated systems. The rationale is that it is has been pointed out that the dominant landscape on the Earth is a mixed — or anthropogenic — one, that is a landscape that combines a variety of land uses and cover (Ellis and Ramankutty, 2008). Furthermore, most of the biodiversity lies in managed landscapes and not in the few remaining pristine parts (Tscharntke, 2005). Therefore, space for nature and biodiversity is expanded within human-dominated landscapes whilst conservation is strongly focused on ecosystem services. In this pathway, the 'mosaic' (mixed/working) landscape is prevalent — both urban and agricultural — in which natural and managed systems are maintained and developed together and in harmony with each other (Kremen and Merenlender, 2018).

This pathway combines mosaic landscape with small-scale and labour-intensive solutions in agriculture. Nature-based solutions — ranging from agro-ecological and agro-forestry practices to green infrastructures in cities — will play a decisive role to not only contribute to biodiversity levels, but also to food security, climate change, and other relevant societal issues (Cohen-Shacham, 2016). A crucial aspect of it will be fostering the 'multifunctionality' of such landscape, that is the capacity to maintain biodiversity, provide goods and services for humanity as well as support the abiotic conditions necessary for sustainability and resilience (*ibid*.).

The focus on mosaic landscapes and multifunctionality will not rule out more traditional forms of biodiversity and nature conservation, such as different forms (IUCN typologies) of Protected Areas. Other Effective area-based Conservation Measures (OECMs) will play an important role next to PAs.

Finally, this scenario will be characterised by 'small-scale' and 'decentralised' solutions (Kok et al., 2018) that is drawing upon decentralised and democratic forms of governance and resources management (German, 2009). Therefore, we assume that trade liberalisation will follow its trajectory as indicated by SSP2 as the focus will be on local-based solutions with shorter supply chains. We assume that 'localities' will become less dependent on global market dynamics and global supply chains.

6.2.2 Value Analysis

Drawing upon the recent Nature Futures Framework under-development by IPBES as well as their conceptual framework and their work on Nature's Contribution to People (NCP) (Diaz et al., 2015), the SP approach to biodiversity conservation premises on the prioritisation of instrumental and relational values while protecting nature. Both these values are categorised by the IPBES Conceptual Framework as 'anthropocentric values' because they acquire meaning through human evaluation and they are the opposite of intrinsic values which, instead, exist independently of human judgement (Diaz et al., 2015).

With instrumental values, we mostly refer to nature's contributions to people (whether material or non-material) to achieve a good quality of life (Diaz et al., 2015). Examples could be provision of commodities and regulating services. With relational values we refer to

'symbolic relationships with natural entities to the extent that such relationships are embedded in people's identity and every day[10]'. These have more to do with the non-material, identarian and cultural dimensions that impinge upon people's quality of life. Examples could be cultural identity, sense of place. The inclusion of relational values implies a values pluralism as well as inclusion of knowledge systems different from the sole wester-science-based of traditional ecological knowledge. This pluralism will translate in the co-production of discourses and practices of governance and management within the SP scenario (Arias-Arévalo et al., 2017). This aspect of co-production, as explained in Section 3, will be a pillar of the governance scheme we envision.

6.2.3 Discussing governance scenarios

A high level of decentralisation of decision-making and agenda-setting power as well as power devolution to more local levels is believed to be essential to this scenario (Kok et al., 2018; Leventon et al., 2019). As argued by Ellis et al. (2019), a high level of decentralisation enables and allows for the mediation between different values and interests of stakeholders and institutions. Stretching this argument further, Büscher and Fletcher (2020), by drawing on examples from experiences of radical ecological democracy, contend that values of natural resources should be determined at a local level. The degree of decentralisation and devolution of power will allow local actors to be heard and co-define values of nature, at their location.

As discussed in the next section (agricultural/cultivated landscapes), landscape is the preferred unit of action in this scenario, particularly when integrating nature conservation with food production (Perfecto and Vandermeer, 2016). Landscapes are defined as complex socio-ecological systems where different land uses coexist and are nurtured to support its multifunctionality (loosely based on Minang et al., 2014). This turn towards landscape is supported by the emergence of new actors at multiple scales, including public-private partnerships and non-governmental organisations — that work next to more traditional actors in conservation and agriculture such as state and local communities (Kramen and Merenlender, 2018; Leventon et al., 2018). Decentralisation and devolution of power to a landscape level thus requires collaboration between a complex matrix of stakeholders, thereby characterising this governance scheme as profoundly participatory. Enhancing multifunctionality through system improvement and landscape democracy processes

The bottom-up approach that permeates practices of conservation and agriculture is another important feature of the governance scheme. Particularly interesting is the case for indigenous communities and social mobilisations that are believed to play crucial role in the governance within this scenario (Büscher and Fletcher, 2020; Kramen and Merenlender, 2018; Scoones et al., 2015). As discussed in Section 6, an example could be the experience of ICCA Consortium

6.2.4 Agricultural/cultivated landscapes

Mosaic landscapes comprise a combination — or a mix — of natural vegetation patches and a matrix of agriculture in order to achieve multifunctionality. In this pathway, this mixed system adheres to the concept of 'ecological intensification' (also called agroecological intensification, in Kremen, 2015) (Tscharntke, 2005). Ecological/agroecological intensification is defined as: 'using farming methods that rely on knowledge and labour, as opposed to other inputs, to increase agricultural production per unit of land, and that promote and regenerate favourable biological interactions to produce food; requires assurance of environmental and social sustainability' (Kremen, 2015). Ecological intensification is believed to result in 'land sharing' effects. Cultivated land will also be 'wildlife-friendly' and it will allow

[10] https://www.ipbes.net/contrasting-approaches-values-valuation

for species migration through the natural elements of the permeable matrix. This stems from the consideration that agro-ecosystems are fundamental biodiversity repositories (Perfecto et al., 2009). Additionally, agricultural practices will vary across agroecology, organic farming, agroforestry, diversified farming systems, etc. depending on the specific context.

Labour-intensive agricultural practices will be a pillar of ecological intensification, as opposed to more capital-intensive practices of the 'sustainable agriculture' model (Perfecto and Vandermeer, 2016). The rationale behind this is that addressing food security cannot succeed without tackling poverty reduction and food distribution (*ibid*.). Agricultural practices and improvements should not only be concerned with an increase in productivity but also an improvement in the small-holder farmers livelihoods. This pathway relies on the concept of food sovereignty, that is 'the right of local people to control their own regional and national food systems, including markets, natural resources, food cultures and production modes' (Chappell et al., 2013). This dimension of food sovereignty is translated into inclusive, participatory, flexible and adaptive governance and management mechanisms (Kremen and Merenlender, 2018) where social mobilisations and local actors will play a larger role in decision-making processes and agribusiness's advantages to smallholders will be reduced (Kremen, 2015: Perfecto and Vandermeer, 2016; Büscher and Fletcher, 2020). Furthermore, food sovereignty also translates in a limitation to the process of trade liberalisation.

6.2.5 Urbanscape

In the case of urban areas, city will increasingly become 'biophilic'. This means that cities will be considered as socio-ecological systems where the human and nature interconnection is enhanced, thereby generating common benefits. Cities will be designed to support not only human well-being and health through a set of ecosystem services (provisioning and cultural), but also biodiversity and nature itself (Andersson et al., 2014; Beatley and Newman, 2013). Furthermore, at a larger scale, city's infrastructures will create ecological networks and corridors following ecological principles to enhance biodiversity (Goddard et al., 2010).

Drawing upon the current debate on sparing-sharing that also applies to the cityscape, urban areas are envisioned to be in line with 'land sharing' in the urban context, as elaborated by Lin and Fuller (2013). The city expansion will undergo a 'sprawling development' that will result in 'low-density cities with moderately degraded biodiversity-supporting vegetation spread over a much larger area' (1164) but with a larger spatial ecological impact. In this scenario, spatially expanding cities will have low-density areas where vegetated areas are allowed to grow within residential areas (*ibid*). The presence of natural elements within the city will contribute to the biodiversity level as well as the provision of ecosystem services.

6.2.6 Promoted Areas

As suggested by Büscher and Fletcher (2020), Protected Areas will be re-thought to be *Promoted Areas*, that is areas where ecological principles and objectives are not pitted against the local communities that live in and around them. These are areas where ecological principles co-exist with the provision of socioeconomic benefits for local communities (Oldekop et al., 2016). This qualitative change in the way of 'protecting' area translate at the governance and management level, too. In this pathway, local communities will be the key decision-makers in how to conserve the areas (Büscher and Fletcher, 2020). Despite not pre-established blueprint, in this pathway PAs entail a wide array of governance options all centred around democratic engagement and applied at a local and decentralised level. An example of this is the Indigenous and Community Conserved Areas (ICCA) where indigenous and local communities decide for themselves the course of actions, with the objective to ensure: better conserved territories, territories with higher ecological integrity and resilience, territories that support the communities' livelihoods and communities' material and non-material well-being (Borrini-Feyerabend and Campese, 2017).

Promoted Areas will play a decisive role in the conservation of biodiversity next to the mosaic landscape and their interaction will reduce fragmentation, thereby enhancing connectivity. The allocation of land to Promoted Areas is carried out in a way to optimise the provision of ecosystem services, such as pollination, pest control, water purification, carbon storage and others. For instance, with regard to carbon storage, in this pathway we imagine to protect all the High Carbon Forest (HCF). OECM are considered optimal for this pathway for their flexible nature that allows for both conservation of nature and biodiversity as well as the promotion and support of sustainable resource use, the creation of sustainable livelihoods and the provision of associated ecosystem functions and services (Dudley et al., 2018; Oldekop et al, 2016).

6.2.7 Energy - Biofuels

In this scenario, by following the logic of land-sharing arguments, biofuels production from crops should not hamper the delivery of ecosystem services of the land (Anderson-Teixeira, 2012). In other words, biofuels will be produced in mixed landscapes and integrated systems into agriculture and forestry, thereby maintaining the multifunctional aspect (IRENA, 2017). Food production, biodiversity conservation will then be combined with biofuels crops production and other ecosystem services, such as, for instance, carbon capture. Like for agriculture, systems like crop rotations, flexible crops, intercropping and agroforestry can be adopted to achieve this (IRENA, 2017).