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UNDERSTANDING EQUITY PERCEPTIONS OF THE HALF EARTH AND SHARING THE PLANET'S SCENARIO NARRATIVES

Sophie de Bruin

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Colophon

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Contact

willem.ligtvoet@pbl.nl; s.p.de.bruin@vu.nl

Author

Sophie de Bruin

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Summary

Setting the scene

Equity is an increasingly important dimension in current and future biodiversity conservation and food system governance. Several studies have shown that not accounting for equity can undermine the desired outcomes of biodiversity conservation and food-related policies and projects. In this study, equity is understood as having three dimensions: distributive equity, considering the way costs, responsibilities, risks and benefits are shared; procedural equity, addressing how decisions are made and stakeholder levels of power, voice, and/or representation in these processes; and recognitional equity, considering how different identities, histories and values are acknowledged and respected. There are however various understandings of how to operationalise these equity dimensions, since equity perceptions are normative, defined by people their values, beliefs and experiences.

The equity perceptions of 92 experts concerning the Half Earth (HE) and Sharing the Planet (SP) scenarios are presented in this study. The HE and SP scenarios are two distinctly solution-orientated scenario narratives on how to restore and conserve biodiversity while producing sufficient food for all. Both are umbrella narratives that build on a rich spectrum of perspectives towards living with nature. The overall HE narrative focuses on protecting half the earth for nature conservation, while the SP narrative emphasises sharing landscapes between nature and people. Specific ideologies and measures associated with these scenarios are used in governance processes on different levels, such as in the negotiations of the Post-2020 Biodiversity Framework by the Convention on Biological Diversity (CBD). This makes the scenarios relevant and timely narratives, with various potential consequences for equity. For this study, a questionnaire was developed to better understand what experts from various backgrounds and with differing attitudes towards nature perceive to be the main equity implications of the HE and SP scenario.

Equity perceptions in the Half Earth and Sharing the Planet scenarios

The study finds that, overall, distributive, recognitional and procedural equity barriers are perceived to be significantly higher in the HE scenario, as is the perceived possibility of achieving equity. People who particularly depend on local biodiversity for their livelihoods are perceived to face inequities, notably smallholders and indigenous people. The implementation of a HE-orientated future is seen by many respondents as problematic, and the literature on this scenario hardly addresses the numerous equity risks. Perceived risks include unbalanced top-down implementation without properly including affected stakeholders, not addressing existing inequalities between the poor and rich, forced relocation of local communities and land appropriation.

Although overall equity risks are perceived to be lower in the SP scenario, some respondents believe this scenario is too much oriented on human development, while not accounting for long-term risks for biodiversity preservation and equity risks for non-humans and future generations. More profoundly, the implementation of an SP future is seen as a major barrier to fulfilling the promises of this scenario, since existing economic and political power structures ought to change. To change

the status quo, in which rich, powerful businesses and countries profit from the existing political and economic systems, transformations are required that many respondents consider unfeasible in the current political climate.

The equity perceptions can be linked to the respondents' attitudes to nature and their professional focus. Equity risks in the HE scenario are perceived lower by those who work mostly on environmental topics than by respondents mostly working on human development. Respondents who perceive themselves as mostly valuing nature for its intrinsic value, rather than for its value to people and their culture, also perceive equity risks as lower in the HE scenario than those valuing nature more for its value for people and their culture. These linkages show that equity perceptions are shaped by worldviews and experiences. This study does not aim to bridge the differences between how equity is understood but rather aims to recognise and explicate existing perspectives. By explicitly recognising the differences in equity understanding in scenario development and in science–policy interfaces, a step can be made towards more inclusive policies and relevant solution-orientated scenarios.

Implications

This study yields several insights, with the following main implications:

- Including equity in decision-making processes on biodiversity conservation and agricultural development requires a process that includes experts and stakeholders from various backgrounds, since equity perceptions can differ widely. Equity is a normative concept, shaped by worldviews and experiences, addressing equity thus requires dealing with normativity rather than avoiding it.
- Solution-oriented biodiversity and agriculture scenarios should address potential equity implications to remain relevant and useful for policymakers. Since equity considerations are increasingly relevant in policymaking, these scenarios must incorporate equity to remain timely and applicable.
- The relevance and credibility of the HE and SP scenarios for decision-making processes could benefit from addressing equity risks and barriers of policy implementation. The respondents question the feasibility and equitability of implementing both scenarios, although risks are understood differently per scenario.

1 Introduction

The current and future agriculture and biodiversity challenges in an era of human-induced climate change are immense. Food security is decreasing due to a combination of conflict, trade dependencies, climate change and poverty, while biodiversity is declining annually, with agriculture as the main cause of the decline (FAO et al., 2020; IPBES, 2019). Especially those working in agriculture are vulnerable to food insecurity due to high poverty levels, the majority of the absolutely poor and about half of the world's undernourished population are living on farms smaller than 2 hectares (Wiggins et al., 2010). Shifting to a trajectory that reverses the downward spiral of biodiversity decline and food insecurity requires systemic changes; a 'just and fair' transition is fundamental to the complex choices that societies need to make to achieve these changes (Bennett et al., 2019; Leach et al., 2018).

Evidence that more socio-economically unequal societies tend to experience faster rates of biodiversity loss as well as greater food insecurity suggests that inequities, food insecurity and threats to biodiversity are closely intertwined (Pereira and Oliveira, 2020; Pickering et al., 2022). Additionally, there are various examples of conservation projects that turned out to create new inequities, such as forced relocations, or exacerbate existing ones around land ownership and access, which not only hindered human development, but also negatively affected conservation goals (Martin et al., 2020). These findings support the understanding that equity is a necessary condition for successful conservation (Law et al., 2018; Martin et al., 2020; Oldekop et al., 2016). This insight is inter alia mirrored in the Aichi Biodiversity Targets 11 and 16, which address the need for the 'equitable management of protected areas' and 'the fair equitable sharing of benefits' of genetic resources (CBD, 2010). Likewise, preparations for the Post-2020 Global Biodiversity Framework (GBF) of the Convention on Biological Diversity (CBD) consistently underline the importance of equity in conservation (CBD, 2021). When equity is not properly included in governance processes, this can undermine their legitimacy. For example, the UN Food System Summit held in 2021, was widely criticised by scholars and practitioners for addressing equity too narrowly in the way the summit was organised and its overall aims (Canfield et al., 2021; Nisbett et al., 2021). This made several stakeholder groups resign from the Summit, reducing the legitimacy of the Summit's outcomes.

Despite the established importance of achieving equitable governance and management of nature and agriculture, progress is often constrained by the widely differing understandings and operationalisations of what equity means to whom, and who has the authority to decide this (Dawson et al., 2018; Friedman et al., 2018). There are different understandings of what equitable governance of biodiversity conservation and agriculture entails (Gavin et al., 2015; Obura et al., 2021; Vucetich et al., 2018). There is the well-established debate within land-use science as to whether land sparing (separation of nature and agriculture) or land sharing (integrating nature and agriculture) of conservation and agricultural production would maximise sustainability outcomes (Fischer et al., 2014). A related, more recent debate centres around two divergent visions regarding biodiversity conservation and agricultural systems. On one end of the spectrum, there are advocates of a Half Earth (HE) future, in which nature is entitled to at least half of the Earth's land and waters (Dinerstein et al., 2017; Locke, 2015; Wilson, 2016). To feed the world, agricultural productivity ought to be intensified based on innovative, mostly large-scale, technologies, and externalities from agriculture must be removed. In this scenario, people and nature are largely separated. On the other end, there are advocates for an approach in which humans and nature share landscapes, the 'Sharing the Planet' (SP) scenario (Büscher et al., 2017; Gavin et al., 2015; Obura et al., 2021). In this scenario, which draws

on multiple paradigms, landscapes are shared, and agriculture is ecologically intensified via various small-scale approaches, including agroecology, organic farming, agroforestry and diversified farming systems.

Scenarios such as HE and SP can inform decision-making processes by reflecting and thinking through potential consequences of different decisions in a structured manner (Henrichs et al., 2010). Today, the HE and SP proposals are discussed in various forms by a wide range of scholars and practitioners (Immovilli and Kok, 2020). Yet, social implications, such as the consequences for equity, are mostly left out of these types of solution-orientated scenario studies (Visseren-Hamakers and Kok, 2022), while considering ethical dimensions in scenarios add to their policy relevance (Wright et al., 2020). Thereby, by not including equity in discussing these scenarios, an increasingly important dimension of biodiversity conservation and agricultural development is left out of the discussion. But since equity is a normative concept, it is hard to include equity as a measurable feature in scenario development, although measuring some dimensions of distributive equity is possible. Complementing scenarios with assessing perceptions of equity via interviews or questionnaires can contribute to providing a picture of perceived equity implications.

Purpose of this study

In this study, the perceptions of experts working on topics related to environmental sciences and/or human development regarding the equity implications of the HE and SP scenario are assessed. By presenting the results of a questionnaire, this study presents various understandings of equity in two distinct future narratives that shape contemporary policy discussions. It is important to make different perceptions explicit to inform the equity dimension in conservation and agricultural development properly. By providing more clarity on the different understandings of equity in the momentous debate on biodiversity conservation and agricultural development, this study aims to contribute to addressing equity in a comprehensive way. Better addressing equity ideally leads to contributing to better sustained social, political and financial support and more inclusive strategies to deal with the current biodiversity and food crises. The goal of this study is therefore to understand what experts on environmental sciences and human development perceive as the main equity risks and barriers of the HE and SP scenario and whether their views can be linked to specific characteristics. In order to reach this goal, first an overview is provided of the different respondents backgrounds. Second, various background characteristics will be linked to the equity perceptions. In particular, the potential link between respondents valuation of nature and their perceptions of equity in both scenarios will be analysed. Last, the umbrella insights from the answers to open questions are discussed to develop a more comprehensive understanding of the perceived risks. Finally, this policy note discusses what the results imply for striving towards equity in nature conservation and agricultural development.

The findings presented in this policy note are analysed more extensively in De Bruin *et al* (*under review*). In this article the methodology is also discussed in-depth.

2 Conceptual approach

2.1 Understanding equity

Equity can be defined in different ways. In this study equity is understood as having three dimensions (Dawson et al., 2018): distributive equity, considering the way costs, responsibilities, risks, and benefits are shared; procedural equity addressing how decisions are made and stakeholders' levels of power, voice, and/or representation in these processes; and recognition equity, considering how different identities, histories and values are acknowledged and respected. The operationalisation of these dimensions can differ widely among projects and policies (Friedman et al., 2018). Distributive equity can partly be assessed in quantitative terms, what frequently leaves the other dimensions out in science and policy (Martin et al., 2020). The primary focus on distributive equity in academic studies has led to criticism and awareness about the importance of including a broader definition of equity (Martin et al., 2016; Schlosberg, 2013). Some scholars have advocated to use the concept of justice rather than equity, to get rid of the primarily distributive connotation (Martin et al., 2020). In this study the concept of equity instead of justice is utilised since equity is more often used in policy contexts than justice (e.g. CBD 2010 and 2021).

2.2 The Half Earth and Sharing the Planet Scenarios

The HE and SP scenarios are both compilations drawn from various paradigms and perspectives in biodiversity conservation and agricultural development. Table 1 summarises central assumptions and perspectives. The focus of these scenarios is on the interplay between agricultural production methods and biodiversity conservation measures.

The Half Earth Scenario

The HE scenario narrative focuses primarily on securing the long-term viability of ecosystems and draws upon proposals such as that of Half Earth, Nature Needs Half and the Global Deal for Nature (Dinerstein et al., 2019; Locke, 2015). The Half Earth proposal is primarily based on species–area curve calculations and aims to address the species extinction crisis by protecting 85% of species (Wilson 2016). Nature Needs Half stems from various studies deriving from an ecoregional approach protecting at least half the planet for nature (Locke, 2015; Noss et al., 2012). Dinerstein et al. (2019) proposes a 'global deal for nature', which implies that 30% of the Earth ought to be protected by 2030 while an additional 20% is designated as climate stabilisation areas. In this scenario, conservation is envisioned to largely separate human pressures from nature, halt species loss, retain ecological processes and protect wilderness thereby implying a strict regulation of human use within conserved areas (Locke, 2018; Wilson, 2016). Expansion of Protected Areas, with different levels of protection following the International Union for Conservation of Nature (IUCN) conservation levels, are the main pillar of conservation efforts in order to cover around 50% of the earth by 2050. This approach reflects recent calls to adopt large-scale conservation targets for the Post-2020 GBF (Immovilli and Kok, 2020). In the remaining 50%, agriculture undergoes a process of intensification in order to spare land for nature, increase agricultural production and reduce environmental externalities. This intensification is necessary, since Mehrabi et al. (2018) conclude that, depending on the scale of implementing HE (ecoregion, country or global), crop food calories would drop

between 11 and 29%, and other calories (crop feed, biofuel) between 10% and 25%. Technological development and innovation must then close yield gaps to feed the world population and sparing nature. The process of intensification in this scenario can be supported by the globalisation of food markets and further trade liberalisations, which are responsive to high ecological standards worldwide (Immovilli and Kok, 2020; Wilson, 2016).

The central argument for a HE future is that if global conservation does not safeguard the diversity of life today and of tomorrow, the conservation strategy is not effective, and thus not just (Treves et al., 2019). The HE narrative is criticised by both conservationists and human development scholars who argue for a SP future since HE would lead to various inequities for people (Büscher et al., 2017; Obura et al., 2021). Largely separating nature from people would imply tremendous costs for human well-being, particularly in the Global South. If HE would imply closing off large parts of currently inhabited areas, this is supposed to lead to inequities on a large scale, without effectively addressing the actual roots of the ecological crisis (Büscher et al., 2017). Failing to address these roots, the global economic drivers of biodiversity decline, is perceived to lead to repetition and amplification of historical inequities (Obura et al., 2021).

The Sharing the Planet Scenario

The overall SP scenario narrative is an umbrella term for several approaches that focus on the valuation of nature for its economic, social and cultural utility to people. This narrative includes mainstream approaches based on ecosystem services (ES) and mixed landscapes (Kremen and Merenlender, 2018), the concept of relational values focusing on cultural human-nature relations (IPBES, 2022; Pascual et al., 2017) and more radical proposals to conservation, such as Convivial Conservation (Buscher and Fletcher, 2020) and biocultural conservation (Gavin et al., 2015). These approaches imply sustaining dynamic social-ecological systems which are seen as interdependent. Natural and human functions are integrated to form shared landscapes where nature is conserved for its instrumental as well as cultural and natural values. Central are the sustainable use of natural resources and the optimisation of nature's contribution to people. The agricultural system is ecologically intensified by small and large farmers via different approaches, including agroecology, organic farming, agroforestry and diversified farming systems (Obura et al., 2021). The dominant type of agricultural landscape is shared with nature or mixed in terms of crops and livestock, comprising a combination of natural vegetation patches and a matrix of agriculture, resulting in optimal use of ecosystem services. This could lead to a reduction of 0-3% of crop calories and a 0-23% reduction of other calories (crop feed, biofuel). Rather than primarily focussing on agricultural intensification, reducing overconsumption is perceived as an essential strategy to reduce environmental pressures of agriculture (Büscher et al., 2017; Obura et al., 2021).

While the different SP proposals call explicitly for including human development goals in biodiversity conservation, HE advocates blame SP advocates for short-sightedness and speciesism (Kopnina, 2016; Treves et al., 2019; Vucetich et al., 2018). Protecting all current and future life on earth should be the motive for conservation, otherwise efforts are unjust anyway. Several experts see SP proposals as too focused on the human development dimension nowadays, at the expense of nonhuman beings (Kopnina, 2016). Additionally, in anthropocentric-based conservation, the interests of future generations are not well represented, what is implied to cause inequities for these future generations (Treves et al., 2019). Additionally, a more indirect criticism on SP proposals, is the societal and political discussions that exists upon the desired and appropriate role of small farmers in future food systems (Collier and Dercon, 2014; Wiggins, 2009). Some scholars and policy

makers argue that small holder farming is not viable in combination with securing food availability, poverty reduction and economic development for the poorest countries (Collier and Dercon, 2014).

Table 1 Conceptual division for Half Earth and Sharing the Plane (adapted from Immovilli and Kok (2020))

Half Earth	Sharing the Planet
Global technology	Decentralised solutions
Area-based conservation approach	Ecosystem services approach, nature's contribution to people
Land Sparing	Land Sharing
Half Earth (Wilson, 2016); Nature Needs Half (Dinerstein et al., 2017; Locke, 2015); Global Deal for Nature (Dinerstein et al., 2019)	Whole Earth, Convivial Conservation (Buscher and Fletcher, 2020), Biocultural Conservation (Gavin et al., 2015), Relational Values to Nature (Pascual et al., 2017)
Sustainable agricultural intensification, global food systems	Ecological agricultural intensification, reducing consumption, local/regional food systems

2.3 The Nature Future Framework

Nature can be conceived and valued in different ways. In this study, the Nature Future Framework (NFF) is used to operationalise the attitude of respondents towards nature. The NFF is a conceptual tool that captures values for human–nature relationships (Pereira et al., 2020). The NFF has three corners which can exist next to each other, as conceptualised in Figure 1. The Nature for Nature valuation implies that nature has value of itself, and the preservation of nature's diversity and functions as well as ecological integrity is of primary importance. The nature for society valuation means that nature is primarily valued for the benefits or uses people derive from it, understood in ecosystem services and natural capital. The nature as culture valuation means that humans are perceived as an integral part of nature, the reciprocal character of the people–nature relationship is valued. Following this valuation, societies and their cultures are intertwined with nature.

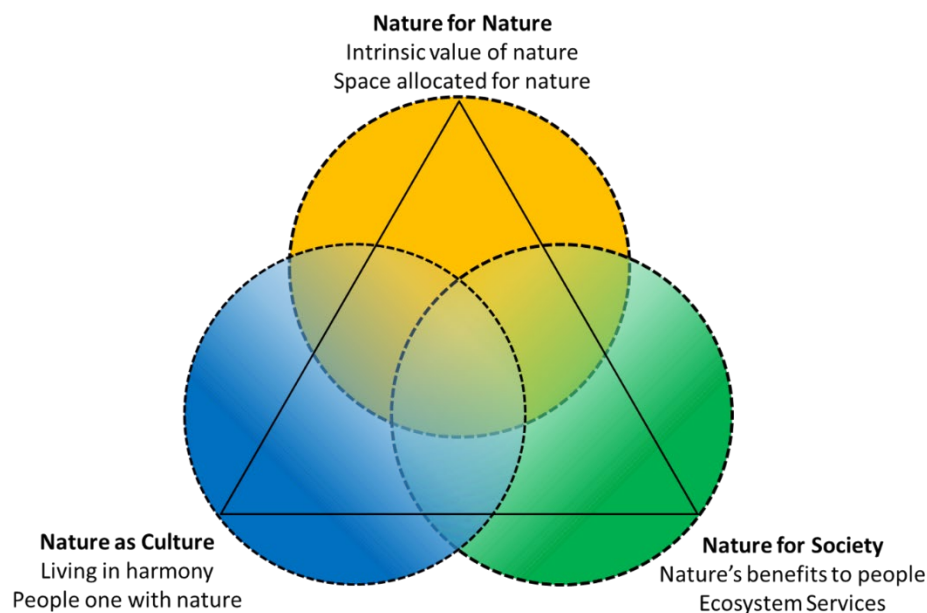


Figure 1 The Nature Future Framework (taken with permission from Pereira et al. (2020))

3 Results

This section presents the results of a questionnaire that has been sent to a wide range of experts on the topics of biodiversity conservation, agricultural development and equity. The questionnaire consisted of 23 questions, of which 18 closed and 5 open questions. See Appendix 1 for a more detailed description of the design and distribution of the questionnaire.

3.1 The respondents

In total, 92 respondents fully completed the questionnaire.¹ Around 75% of them also provided a response to the optional open questions. Table 2 provides an overview of the respondents' characteristics.

Table 2 Characteristics of the respondents (N =92)

Characteristic	Score	N
On what scale is your work mostly focused?	Local	12 (13 %)
	National	17 (18.4%)
	Regional	8 (8.7 %)
	Global	21 (22.8%)
	Multiple scales	34 (37 %)
Where are you from?	Africa	11 (12%)
	Asia	18 (19.6 %)
	Europe	30 (32.6 %)
	North America	18 (19.6 %)
	South America	11 (12 %)
	Oceania	4 (4.4 %)
What is the main focus of your work?	Human development	1 (1.1 %)
	Human development, addressing impacts of/on changes in the natural environment	15 (16.3 %)
	Interactions between human development and the natural environment	37 (40.2 %)
	The natural environment, addressing impacts of/on changes in human development	16 (17.4 %)
	The natural environment	23 (25%)
How do you identify professionally?	Academic	27 (29.4 %)
	Mostly Academic	19 (20.7 %)
	Both academic and practitioner	23 (25 %)
	Mostly practitioner	6 (6.5 %)
	Practitioner	17 (18.5 %)

Most respondents were working on multiple scales (37%), were from Europe (32.6%), were focusing on interactions between human development and the natural environment (40.2%), and identified as academics (29.4%). Although the characteristics of the respondents were not fully balanced, most groups were relatively well represented, except for those with a focus primarily on human development. This minimal number (N=1) may be attributed to our respondents selection process, since our focus was mostly on organisations that work at least partly on issues linked to the natural

¹ See De Bruin et al. (2022) for the full method

environment (i.e. ecosystems, climate system, environmental change). On the other hand, the number of experts working on human development might be low since the discussion about equity in biodiversity and agriculture futures is merely held amongst professionals who are at least partly working on topics related to the natural environment.

3.2 Perceptions of equity in the HE and SP scenarios

Table 3 presents the respondents' perceptions of the possibility of equity and the related barriers in the HE and SP scenarios. The possibility of reaching equity was, on average, perceived as significantly lower in the HE scenario than in the SP scenario. Similarly, barriers to recognitional, distributive and procedural equity, overall, are perceived significantly higher in the HE scenario. Moreover, respondents identified more groups as potentially at risk of facing inequities due to certain measures in the HE scenario (351) than in the SP scenario (263), as shown in Table 4.

Table 3 Responses per scenario. Answers on a Likert scale from 1 (insurmountable barriers) to 5 (no barriers)

Question	Mean HE	SD	Mean SP	SD	Difference P	
To what extent do you believe that equity is possible in the HE and SP scenarios?	2.5	1.1	3.3	1	***	
<i>1 = impossible; 5 = fully possible</i>						
How large are the equity barriers in the HE and SP scenarios?	Recognitional equity	2.2	1.1	2.6	1.0	**
	Distributive equity	2.0	0.9	2.6	0.9	***
	Procedural equity	2.1	0.8	2.6	0.9	***
<i>1 = insurmountable barriers; 5 = no barriers</i>						
<i>** P ≤ 0.05, *** P ≤ 0.01</i>						

Table 4 Groups perceived to be at risk of facing inequities in HE scenario and the SP scenario.

Question	Group	HE Count	% of respondents	SP Count	% of respondents
Which groups are most at risk of inequities?	Smallholders	67	72.8%	33	35.9%
	Herders	53	57.6%	27	29.3%
	Workers in industrial agriculture	14	15.2%	31	33.7%
	Indigenous people	67	72.8%	38	41.3%
	All people living in or close to biodiversity hotspots	62	67.4%	25	27.2%
	Future generations	29	31.5%	34	37.0%
	Wildlife	21	22.8%	45	48.9%
	Animals in industrial facilities	20	21.7%	17	18.5%
	Other	18	19.6%	13	14.1%
		351 total		263 total	

3.2.1 Equity risks and barriers in the HE scenario

Following the responses to open questions, 27 respondents drew attention to equity risks in the HE scenario for the people depending on local biodiversity for their livelihoods. These people include smallholders and indigenous people.

Table 4 confirms the explanation of the respondents; 72.8% expect smallholders and indigenous people to be at risk in the HE scenario, and 67.4% thinks this to be the case for all people living in or close to biodiversity hotspots. Following the answers to the open questions, a major procedural equity concern is about the exclusion of these groups from decision-making processes, and the lack of recognition of historical stewardship and ownership. This result links to the responses to the second question in Table 5, asking whether the HE scenario will lead to distributive inequities for smallholders and indigenous communities living in and/or depending on natural areas for their food, livelihood and culture. Almost all respondents perceive this worry as justified (94.6%). But respondents vary on whether this worry is unavoidable (46.7%), possible to overcome by implementing the right equity mechanisms (34.8%), or defensible when the implementation of the HE scenario results in the preservation of global biodiversity and agricultural systems (13%). Over one third of respondents perceived HE as the only future scenario that could pave the way for equity for future generations and non-humans (

Table 6). However, over half of respondents (52.8%) disagreed about HE being the only scenario that could safeguard equity for these groups.

The equity risks and barriers in the HE scenario brought up by the respondents also point towards global governance and implementation fitting this scenario. Some respondents see the domination of a top-down governance system as a procedural equity concern, implying that historical and contemporary power and economic inequalities between North and South are not, or not adequately, addressed. One of the respondent noted: 'We don't start with a clean slate; we start in an existing power balance where those who are in power have most to lose will not let go of their advantages. Those preserving biodiversity now are the ones least present/represented in the decision-making processes.' Respondents foresaw issues relating to distributive equity concerning the spreading of protected areas and responsibility towards payment schemes between industrialised and less industrialised countries with high biodiversity levels. In addition, some respondents mentioned that the HE scenario is developed by academics from the North, or as framed by some, the global elite, without hearing voices of the South, which results in limited or absent recognitional and procedural equity. This perceived risk is also discussed by scholars, who propose more inclusive scientific processes (Cariño and Ferrari, 2021; Friedman et al., 2018). Multiple respondents noted that possibilities for equity in the HE scenario will largely depend on whether biodiversity protection is intended as 'set aside' without any possibilities for human use, or whether people could be living in these protected areas. There are multiple respondents who perceive the HE scenario as a future in which half of the earth would be fenced-off against any human use, which implies enormous distributive and recognitional inequities for those currently living in these regions.

In the current HE literature, limited attention is paid to potential distributive and recognitional equity implications or to the implementation of the scenario, involving procedural equity (Ellis and Mehrabi, 2019; Wienhues, 2018). Neither the Half Earth proposal nor the Nature Needs Half coalition address potential equity implications. Both proposals do not elaborate on funding mechanisms, governance strategies and precise land allocation priorities (Ellis and Mehrabi, 2019). Ellis and Mehrabi (2019) assess distributive equity barriers in the HE scenario, raising several challenges in a HE future,

including potential relocation and displacement issues, unfair burdens of conservation and the issue of financial costs, issues that also come up in this study. They conclude that HE proposals must build trust by embracing and addressing its many wicked challenges, rather than avoiding these. Ellis and Mehrabi (2019) hardly touch upon procedural and recognitional equity, whereas our study shows there are multiple perceived risks, such as top-down governance systems and limited or no participation by certain stakeholders in decision-making processes.

Table 5 Responses to two questions posed in the questionnaire

Question	Answers	Count
To what extent do you agree with the statement that because SP approaches are focused primarily on human development, they ignore other important equity considerations, such as ecological equity and the right of nature?	Agree that SP conservation approaches are primarily focused on human development, which makes the scenario inequitable	17 (18.5%)
	Agree that SP conservation approaches are primarily focused on human development, but this does not make the scenario inherently inequitable	38 (41.3%)
	Disagree that the SP conservation approaches focus solely on human development, nature outcomes are also important in the scenario	37 (40.2%)
Following the critics, HE will lead to major distributive inequities for smallholders and indigenous communities: To what extent do you perceive this worry as justified?	The worry is justified and unavoidable in an HE future	43 (46.7%)
	The worry is justified but could be overcome by implementing the right equity mechanisms	32 (34.8%)
	The worry is justified but this conceivable trade-off is defensible with the implementation of the HE scenario results in the preservation of global biodiversity and agricultural systems	12 (13%)
	The worry is not justified and not a concern for future conservation projects	5 (5.4%)

Table 6 Responses to two statements posed in the questionnaire

			Mean	SD
To what extent do you agree with the argument that only the HE scenario is equitable to future generations and other species?	5 Fully agree	15.2%	2.7	1.5
	4 Somewhat agree	21.7%		
	3 Not agree or disagree	9.8%		
	2 Somewhat disagree	22.8%		
	1 Fully disagree	30.4%		
To what extent do you agree with the statement that the roots of the ecological crisis can only be addressed in a SP future?	5 Fully agree	25.0%	3.7	1.2
	4 Somewhat agree	48.9%		
	3 Not agree/not disagree	7.6%		
	2 Somewhat disagree	10.9%		
	1 Fully disagree	7.6%		

3.2.2 Equity risks and barriers in the SP scenario

Although risks and barriers to reach equity are perceived as significantly lower in the SP scenario than in the HE scenario (Table 3), several issues are brought up by the respondents. An equity issue foreseen by seven respondents in the SP scenario is that of a lack of equity for non-humans. In line with this worry, several respondents understand the SP scenario as not fit for purpose due to the understanding that this scenario lacks large-scale conservation plans to sustain biodiversity in the long term, resulting in confrontations between humans and wildlife and mass extinctions, amongst

other things. This is mirrored by the number of respondents who believed wildlife will be at risk of facing inequities: 48.9% (

Table 4). Around 60% of respondent thought SP is mostly concentrating on human development, although 41.3% did not agree about this making a SP scenario inherently inequitable (Table 5). A smaller share (18.5%) agreed that SP conservation approaches primarily focus on human development, which they perceived as inequitable.

Several respondents noted that, although the SP scenario contains ingredients to work towards distributive, recognitional and procedural equity in theory, fulfilling this will be almost or fully impossible. Reaching equity would require major shifts in dominant socio-economic values and structures, along with correcting global political power asymmetries within and between countries. Examples include the powerful lobby of agricultural industries that profit from the status quo, and unexpected geopolitical events, such as wars that obstruct global progress. Another dimension that was mentioned by 29 respondents was the contemporary and historical unequal consumption patterns of natural resources, with the lower consuming part of the world population carrying the burden of global overconsumption. Fixing the inequitable status quo regarding the balance of power is understood as a major barrier to an equitable SP future. One of the respondents noted: 'It will take a long time, unless there is some kind of radical leadership or massive public demand in most countries and on a global level.' Still, almost 74% of respondents thought that the roots of the ecological crisis can only be addressed in an SP future (Table 5).

Respondents were doubtful about the political possibility of implementing the SP scenario. An SP future was associated with a systematic change in the contemporary socio-economic global power structures, with existing distributive, procedural and recognitional inequities (Büscher et al., 2017; Obura et al., 2021). Since existing inequalities in terms of social, political and economic power relations as well as global consumption serve the already powerful, changing this status quo was perceived as close to insurmountable to the implementation of an SP scenario.

3.2.3 Inequities in food systems

Twenty respondents referred to potential inequities in food systems or agriculture, and/or smallholders in both two scenarios. Especially regarding the HE scenario, respondents foresaw several equity issues, mostly distributive and procedural. These issues include increasing economic inequality within and between countries due to further liberalisation of the food trade, as well as the concentration of means and resources of high-standard, technologically intensive and scaled production remaining in the hands of large-scale agribusinesses. A respondent noted: 'The paradigm of how we produce and consume food could remain uncontested [in an HE future]: concentration of intensive production will rely heavily on energy and efficiency while consumerism is not addressed.' The prolongation of the status quo in the HE scenario also includes the alleged unfair agricultural subsidy systems in the global north, land grabbing and the disappearance of livelihoods for those who cannot meet the increasing efficiency criteria in agricultural production. According to some respondent, this may result in increased rural migration to cities possibly leading to poor living conditions in urban areas, particularly for those living in extreme poverty.

Also with respect to the SP scenario, several respondents perceived food security as an equity risk due to potentially rising food prices and disrupted supply chains locally affecting food availability. The locality of the scenario is seen by some as a risk to demand and supply mechanisms, empowering those with access to or control over agricultural land and productions means. Urban residents,

especially the poor, may face decreasing access to food. A major perceived barrier in working towards an SP future is failing to address current global inequalities in wealth and agricultural production.

3.2.4 Linking equity perceptions to respondents' professional focus

The professional focus of respondents can be linked to their equity perceptions. Figures 2 and 3 illustrate that the more respondents focus on the natural environment in their work, the more they perceive the HE scenario as equitable.

Figure 2 To what extent is equity possible in the HE and SP scenario? Answers ordered based on professional focus (N=92).

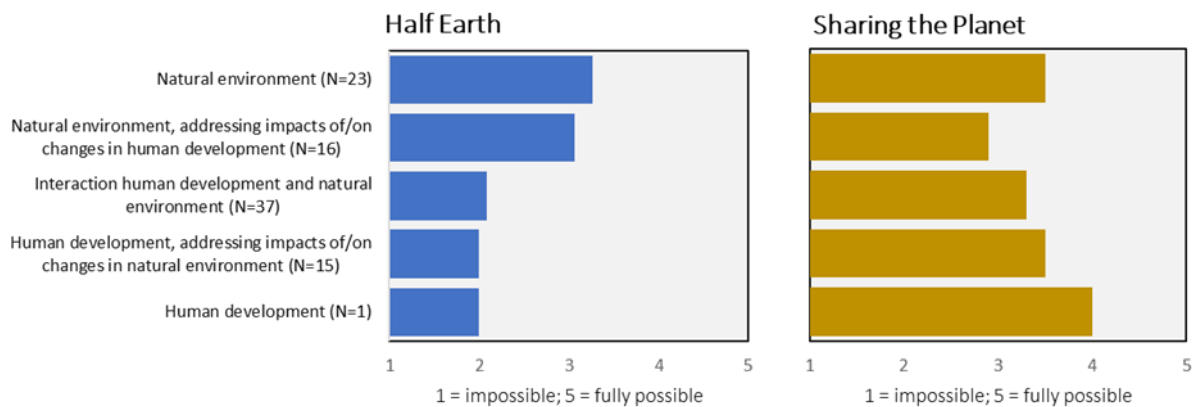
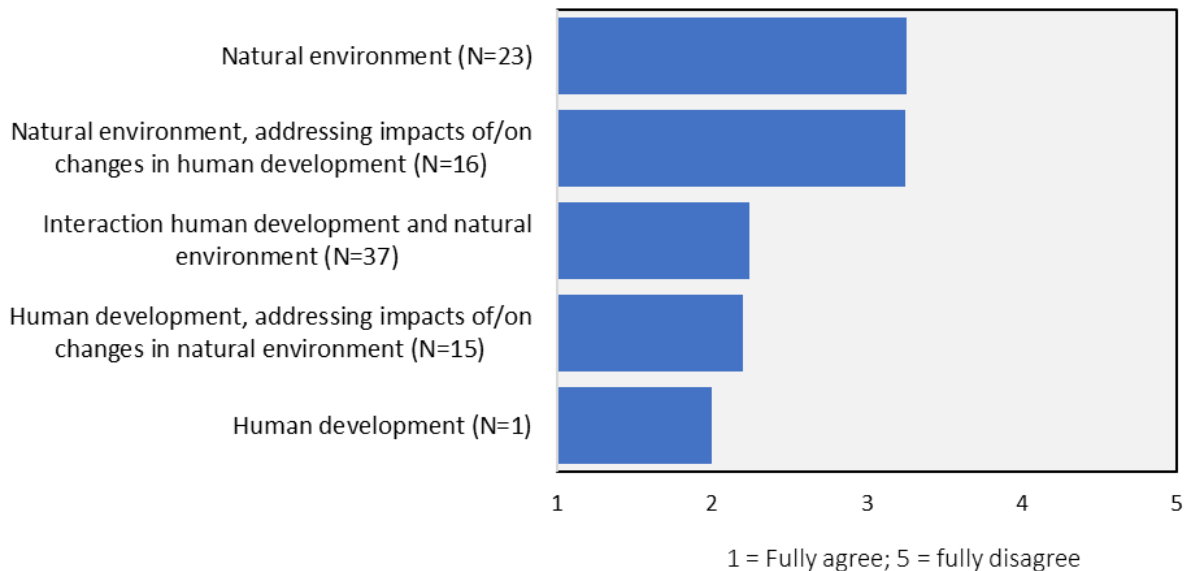


Figure 3 To what extent do you agree with the argument that only the HE scenario is equitable for future generations and other species? Answers ordered based on professional focus (N=92).



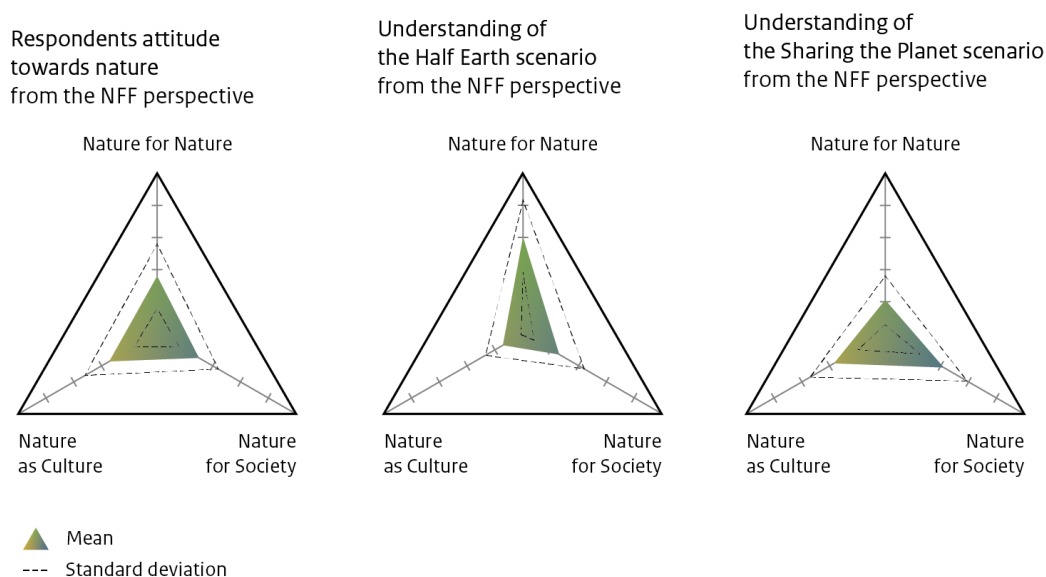
Although the more respondents focus on human development, the more the SP scenario is seen as equitable, this correlation is not as profound. This might be explained by the fact that people who work mostly on environmental topics, on average, are more often confronted with the impacts of the physical degradation of the natural environment, while people who work more on human development are more frequently confronted with human development problems. Other

characteristics, such as the scale at which people are working or where they are from, could not be linked to equity perceptions.

3.2.5 The Nature Future Framework

Figure 4 shows the personal attitudes of the respondents towards nature following the NFF conceptualisation, as well as their perception of the HE and SP scenarios. Respondents were asked to divide 100 points between the Nature for Nature (NN), Nature for Society (NS) and Nature as Culture (NC) themes. The personal attitude of respondents, on average, was found to be well-balanced across the three themes. The perception of the HE scenario is less well-balanced, with the *nature for nature* theme scoring almost 60 out of the 100 points. Agreement among the respondents is relatively low, considering the comparatively high standard deviation of the nature for nature mean in the HE scenario. Agreement amongst respondents about the low nature as culture dimension in the HE scenario was considerably higher, with a standard deviation of 13.3. The respondents' perception of the SP scenario was more balanced than of the HE scenario. The SP scenario was mostly perceived as being oriented towards *nature for society* (42/100), while *nature as culture* scored 36.7 and *nature for nature* 21.3.

Figure 4 Respondents' attitude towards nature and their understanding of the HE and SP scenarios.



Source: PBL

A low to moderate correlation can be observed between the attitude of respondents towards nature and their equity perceptions of the HE and SP scenarios. Especially their attitude towards *nature to nature* can be correlated with their equity perceptions. There were significant correlations between a respondents' position on *nature to nature* and how they perceive equity barriers and the overall possibility of equity in the HE and the SP scenarios. The more *nature to nature*-orientated, the more positive the respondents were about the possibility of HE achieving equity and the lower they perceive the related barriers. At the same time, this group was more negative about equity in the SP scenario. A reverse correlation exists between the respondents' attitude towards *nature for society* and *nature as culture*, but this correlation was not always significant and the overall correlation was smaller (Tables 7 and 8 in Appendix 2). The proportion of the variance in the responses towards equity

barriers in the two scenarios that can be explained by their NFF attitude was weak to moderate (for the detailed Table, see Appendix 2). In social science, following Cohen (1988), a R^2 of <0.02 is very weak, a R^2 of ≥ 0.02 and <0.13 is weak, and a R^2 of ≥ 0.13 is considered moderate. The highest R^2 is 0.18, for the link between a respondent's score on *nature for nature* (between 0 and 100) and the possibility of distributive equity in the HE scenario. The NN attitude of the respondents provided the highest overall correlation with equity perceptions, as was the variable that explains the variance best – although the explanatory power is still moderate.

4 Implications

This publication presents the respondents' equity perceptions of the HE and SP scenarios and the linkages with the respondents' characteristics. Overall, the results from the survey show that respondents perceived equity risks and barriers as significantly higher in the HE scenario than in the SP planet scenario. This section discusses the implications of the results for science and policy.

Including equity in decision-making processes requires a process that includes experts from various backgrounds, since equity perceptions can differ widely.

Earlier studies show that addressing equity in biodiversity policies and projects is necessary to reaching desired outcomes. This study shows that people's personal attitudes towards nature following the NFF conceptualisation can be linked to their perception of equity, and this also applies to the professional focus of experts. These findings imply that, in order to incorporate equity in decision-making processes, groups with various worldviews, experiences and knowledge systems must be included. Work on acknowledging and including various value systems, such as done by IPBES (IPBES, 2022; Pascual et al., 2017), is a prerequisite to working towards equity in decision-making processes on biodiversity and food systems. However, since IPBES is a scientific body, the diversity of perspectives also has to be brought to the relevant decision-making bodies in organisations such as CBD, IUCN and FAO on the global level. Although it is difficult to bridge differing perceptions of equity, analysing normative perceptions provides insight and deserves a central place in the toolkit of developing conservation and food programmes and policies (Bennett, 2016). Recognising and respecting various equity perceptions is a first step towards effectively and equitably providing space for different value systems in both conservation and food system research. And although it is challenging to identify the diversity of values of individuals or specific groups, not including the diversity of values in decision-making processes can undermine the objectives of those decisions and produce unsustainable outcomes (Martin et al., 2016).

Solution-oriented biodiversity and agricultural scenarios should address potential equity implications to remain relevant and useful

Since equity considerations are increasingly important from local to global policies and agreements on biodiversity conservation and food systems, solution-oriented scenarios should discuss this dimension as well to remain relevant for policy. The function of these scenarios is to serve as tools to inform long-term policies and strategies by elaborating on possible futures. These scenarios may not be fit for purpose if their plausibility and credibility is doubted because of lacking insight in potential equity implications, as noted by respondents to this questionnaire. Although most dimensions of equity cannot be quantitatively modelled, perception studies such as this one can show how equity dimensions are perceived and which scenario dimensions deserve more attention to make the scenarios relevant to a wide group of experts and stakeholders. In a world that is

increasingly aware of the importance of incorporating equity in decision-making processes on biodiversity conservation and food systems, scenario development must include the dimension of equity. The fact that understanding equity perceptions implies engaging with normativity, must then be embraced rather than ignored.

The relevance and credibility of the Half Earth and Sharing the Planet scenario for decision-making processes could benefit from addressing equity risks and barriers of implementing either scenario

Equity risks and barriers that result from implementing scenarios is perceived as worrisome by the respondents. For the HE scenario, worries include the domination of a top-down governance system, in which historical and contemporary power and economic inequalities between North and South are not, or not sufficiently, addressed. Respondents foresee issues relating to distributive equity concerning the spreading of protected areas, and responsibility towards payment schemes between high-income, industrialised and low-income, less industrialised countries with high biodiversity levels. In the HE literature, limited attention has so far been given to potential distributive and recognitional equity implications nor to the implementation of the scenario (Ellis and Mehrabi, 2019; Wienhues, 2018). The Half Earth project (Wilson, 2016) and the Nature Needs Half proposal (Locke, 2015, 2018) do not elaborate on funding mechanisms, governance strategies and land allocation priorities (Ellis & Mehrabi, 2019). The implementation of a SP future is by several respondents perceived as a major barrier to work towards an equitable future, due to the existing dominant socio-economic values and structures, along with global political power asymmetries within and between countries. Changing this status quo, required for a SP future, is perceived as (almost) impossible.

These concerns considering implementation implies that when measures are proposed to be implemented, negotiating and communicating the 'how' of these measures is utterly important acceptance. Take for example the large-scale conservation targets – as proposed in the HE scenario – that are proposed in the new Post-2020 GBF. Certain stakeholders are likely to remain very critical towards the this measure (Obura *et al.*, 2021), if there is little focus on how to deal with existing unequal economic and political power structures or with inequities arising from implementation. An important dimension of implementation is the way funding is arranged, and who has a voice in decision-making processes. Today, many protected areas are not managed effectively and are underfunded (Watson *et al.* 2014), what might be a precedent for future plans. Additionally, several respondent brought up equity risks in the global food system for both scenarios. Implementation of – aspects of – either scenario would also require more focus on required changes agricultural practices and anticipated equity implications, especially nowadays into the Post-2020 GBF (Delabre *et al.*, 2021).

Appendices

Appendix 1: Methodology and approach

Questionnaire design and distribution

To perform this study, I developed a questionnaire to collect responses from a wide range of experts on the topics of biodiversity conservation, agricultural development and equity. The questionnaire was developed based on literature review by the authors. Literature was selected based on searches in Google Scholar and Semantic Scholar, using a combination of the following search terms: equity, biodiversity conservation, agriculture, food systems, half earth, sharing the planet, and scenario. I selected articles that discuss equity in one or both scenarios, solely discuss one or both of the scenarios, or discuss equity in biodiversity conservation or agriculture/food systems, theoretically. More articles were derived through snowballing. The questionnaire was reviewed and tested by several colleagues on logical structure, internal coherence, content and user interface. Additionally, I performed an ethical review provided by the Ethics review committee of the Faculty of Science (BETHCIE) of the Vrije Universiteit (VU) Amsterdam to make sure the study complies with the VU Code of Ethics for Research involving Human Participants.

The questionnaire consists of 23 questions, of which 18 were closed questions and five were open. Answering the closed questions was obligatory to resume the questionnaire, while the open-ended questions were optional to answer. The questionnaire was made with the survey program Qualtrics (<https://www.qualtrics.com>), and designed in such a way that the responses could not be linked to persons, nor to the email addresses that participants could leave if they wished to be informed about the outcomes of the study.

The distribution of the questionnaire was online. The questionnaire was launched 17 January 2022 and closed 17 March 2022. The questionnaire was distributed via various channels, mostly via email to potentially relevant experts. All authors of the IPBES' regional assessment reports of who an email address could be found online were approached, as were authors of relevant scholarly research articles. Various practitioners working on equity issues in agriculture and biodiversity conservation, for organisations such as UNEP, IUCN, UNDP and local organisations, were approached via email. A request to participate in the questionnaire was included in the two-monthly newsletter of the Global Land Programme.

Data preparation

After collecting the responses, the data were prepared for analysis. To start with, the IP addresses were checked for doublings. Subsequently, only fully completed questionnaires were included in the data set, which was prepared in Excel. Finally, quotes that have been included in the manuscript were slightly edited for spelling mistakes and abbreviations.

Data analysis

To interpret the responses and logically present the results, I performed descriptive statistics, inferential statistics and interpreted the open questions. First, I made an overview of the respondents' characteristics and the responses to the equity questions. Subsequently, the questions considering equity aspects in both scenarios were linked to the characteristics of the respondents.

Lastly, all open answers were read. Topics that were mentioned multiple times were scored and included in the results section.

Limitations

The study has several limitations that result from its methodological and conceptual approach. An important limitation is the distribution of the questionnaire. I digitally reached out to English speaking experts connected to global or regional organisations or partnerships, leaving out non-English speaking and solely locally orientated experts. In addition, people potentially affected by the scenarios, notably smallholders and indigenous people were not included in the study. Although the sample size (N=92) provides an indication of existing perceptions, a larger number of respondents from Africa, South America and Asia would have given a more balanced understanding. Another important limitation is our interpretation of the answers to the open questions. The answers provided very rich insights which could not all be addressed in this publication. Interpretating these answers inherently leads to a certain level of subjectivity, since I decided which topics deserve additional attention based on the number of people that brought them up, and which quotes might be interesting to include.

Appendix 2: Detailed tables on the relation between the respondents' attitude towards nature and their understanding of equity

Table 7 Relation between the respondents' attitude towards nature and the perceived possibility of equity in the HE and SP scenarios

Half Earth	R²	r
NN	0.24	-0.49***
NS	0.09	0.30***
NC	0.09	0.30***
Sharing the Planet	R²	r
NN	0.14	0.38***
NS	0.03	-0.16
NC	0.08	-0.29***

**** $P \leq 0.05$; *** $P \leq 0.01$**

Table 8 Relation between the respondents' attitude towards nature and their understanding of distributive, recognitional and procedural equity barriers

Distributive equity					
Half Earth	R²	r	Sharing the Planet	R²	r
NN	0.18	0.43***	NN	0.07	-0.27***
NS	0.04	-0.21**	NS	0.02	0.14
NC	0.09	-0.30***	NC	0.03	0.19
Recognitional equity					
Half Earth	R²	r	Sharing the Planet	R²	r
NN	0.13	0.36***	NN	0.12	-0.35***
NS	0.03	-0.18	NS	0.01	0.08
NC	0.06	-0.25**	NC	0.1	0.31***
Procedural equity					
Half Earth	R²	r	Sharing the Planet	R²	r
NN	0.03	0.18	NN	0.17	-0.41***
NS	0	-0.16	NS	0.02	0.14
NC	0.03	-0.06	NC	0.11	0.33***

**** $P \leq 0.05$; *** $P \leq 0.01$**

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