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Engaging diverse experts in a global environmental assessment: participation in the first work programme of IPBES and opportunities for improvement

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The need for interdisciplinary expert groups from different regions of the world to be involved in the fields of sustainability science and environmental change research is increasingly recognised. The Intergovernmental Platform on Biodiversity and Ecosystem Services (IBPES) was established in 2012 as a science-policy interface and has gone beyond previous initiatives in its articulation of a clear commitment to inter- and transdisciplinary approaches that mandate a diversity of genders, disciplines and regional backgrounds within its expert groups. The first IPBES work programme, carried out between 2014 and 2018, has been supported by 17 expert groups, comprising over 1000 experts, who have been selected from over 2000 government and stakeholder nominations through formal procedures. In this paper, we present and critique the framework through which IPBES identifies and selects experts to participate in its processes. In addition, we synthesise and carry out a quantitative analysis on the expert nomination and selection data relating to the first assessment activities of IPBES. Identifying that the balance of regions, genders, disciplines and knowledge systems represented within these expert groups is still disproportionally dominated by male natural scientists from the Global North, the paper makes recommendations of how to better engage knowledge holders from different disciplines and diverse knowledge systems in future iterations of the IPBES work programme.

Keywords: IPBES; science-policy-interface; knowledge production; expert engagement; stakeholder engagement; inter- and transdisciplinary research; biodiversity knowledge

1. Introduction

The Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) was established in 2012 as an international institution under the auspices of the UN in which to gather and synthesise available knowledge on the global and regional state of biodiversity and ecosystems, as well as identify strategies and policy support tools available for

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their conservation (IPBES 2014c, Decision IPBES-2/5). IPBES finds its institutional model in the Intergovernmental Panel on Climate Change (IPCC), which since its creation in 1988 has convened governments and experts to provide authoritative knowledge for decision makers relating to the science of climate change, as well as potential mitigation and adaptation strategies. The IPCC is often considered the "gold standard of scientific opinion" on climate change (Reid and Mace 2003), however it has been subjected to broad criticism for failing to take account of a greater diversity of perspectives in its work (Ford, Vanderbilt, and Berrang-Ford 2012; Hulme and Mahony 2010). In contrast, from the outset, IPBES has sought to embrace inter- and transdisciplinary approaches by including a broad range of knowledges and experts on biological diversity and natures contributions to people in its work (e.g. Borie and Hulme 2015; Díaz et al. 2015). However so far bringing together experts with different epistemological backgrounds while achieving geographical diversity has proved challenging (Montana and Borie 2016; Obermeister 2017).

The need for greater diversity in the production of science on sustainability and global environmental change is now broadly accepted (Castree et al. 2014; Koetz, Farrell, and Bridgewater 2011; Kates et al. 2001; Miller 2007; Montana 2017). There are normative, substantive and instrumental reasons underpinning this shift (Amano and Sutherland 2013; Blackstock, Kelly, and Horsey 2007; Brown 2009). In IPBES, for instance, it is considered necessary for equitable engagement that diverse participants are welcomed into the process (Kovács and Pataki 2016). Furthermore, it is also largely considered that biodiversity-related issues require more than scientific knowledge to be addressed (e.g. Sutherland et al. 2013; Tengö et al. 2014). Finally, it is recognised that expertise is also a form of representation and ensuring diverse expertise is needed to make IPBES legitimate to a "global" audience (Montana and Borie 2016; Turnhout et al. 2012). Despite these established considerations, the procedures through which diverse expertise can be effectively mobilised to contribute to global environmental assessments remain poorly developed. In achieving this task, IPBES has been expected to negotiate new procedures that would guide the process of nominating and selecting this wider range of experts. Furthermore, despite good intentions, institutional and cultural barriers have had to be confronted. This paper examines the challenges faced by IPBES in the first two years of its first work programme in engaging a more diverse expert base. It first sets out the agreed procedures developed for the selection of experts, and then evaluates the progress IPBES has made in achieving its stated goals of achieving balanced representation in its expert groups. In particular, the analysis will present empirical findings that focus on the regional, gender and disciplinary balance of the participating experts. Drawing on the experience of previous analyses (i.e. Montana and Borie 2016), such stocktaking can help contribute to greater reflection on the processes of global environmental assessments and support their continued improvement. The paper furthermore discusses barriers IPBES has had to face and presents proposals on how the platform could improve if it is to become even more inclusive.

2. The IPBES context

IPBES emerged from a call for a more formalized and iterative science-policy interface, which was made both by governments and stakeholders throughout the MA follow up consultation process (e.g. Larigauderie and Mooney 2010). To some extent IPBES can be seen as emerging from two previous initiatives: the so called International Mechanism of Scientific Expertise on Biodiversity (IMoSEB) which was a series of international and regional consultations that led to a concept note for an IPBES, presented at the ninth meeting of the Convention on Biological Diversity, and the follow-up of the MA which was closely

associated with the United Nations Environment Programme (CBD 2008; IISD 2013; Koetz, Farrell, and Bridgewater 2011; Vadrot 2014). While the first assessment report of the IPCC preceded the establishment of the United Nations Framework Convention on Climate Change (UNFCCC), the idea for IPBES emerged alongside the existing multilateral arrangements of the Convention on Biological Diversity (CBD; Koetz, Farrell, and Bridgewater 2011; Koetz et al. 2008; Laikre et al. 2008). The IPBES reports are expected to feed into the scientific reports of the CBD (CBD 2015), especially into the fifth Global Biodiversity Outlook, as well as the five other biodiversity-related conventions (i.e. CITES, Ramsar, ITPGRF, CMS, WHC). The regional assessments should also support the development and revision of regional and national biodiversity strategies and vice versa.

The activities of the first work programme were based on proposals by governments, international organisations, UN conventions and stakeholder organisations and were formally requested by the IPBES Plenary, comprised of over 125 member states, in Antalya in December 2013, (IPBES 2013, IPBES/2/INF/9). The work programme covers a broad range of issues including the role of pollinators for food production, the impact of land degradation on biodiversity and ecosystems and the identification of diverse values of biodiversity and nature's benefits to people. The assessment reports work at multiple scales, to include both global and regional assessments. In addition, the IPBES deliverables go beyond assessment reports to include a specific focus on knowledge generation, capacity building and policy support (e.g. Brooks, Lamoreux, and Soberón 2014). The work programme's development and implementation has been overseen on a day-to-day basis by the IPBES subsidiary bodies: the Bureau and the Multidisciplinary Expert Panel (MEP). Comprised of 25 experts from all five UN regions, the MEP is the scientific advisory board of IPBES that selects participating experts, oversees the scientific functions of the platform, and is responsible for the scientific quality of the assessments (UNEP 2014). Since IPBES is not tasked to conduct new research, it requires the expertise of people with an overview of publications, data and other knowledge sources. For the realisation of the activities contained in the work programme, IPBES relies on the voluntary contribution of hundreds of experts with different backgrounds and qualifications from around the world. According to the IPBES secretariat, over 1302 experts had already been selected for the first work programme by the end of 2016 (IPBES 2017a, IPBES/5/2). The following section provides an overview of the framework through which IPBES has reached out to, identified and selected experts that can provide the required diversity of expertise and knowledge needed to implement the IPBES work programme.

3. The expert selection process

The principles and rules surrounding expert selection in IPBES reflect a long period of negotiation in the lead up to its establishment as well as during the first years of the implementation its first work programme. The need for a platform that would take into account different disciplinary perspectives, including indigenous and local knowledge, was raised by several parties during the IMoSEB consultations (ISSD 2007). In the subsequent establishment of IPBES, the requirement of a balanced and inclusive knowledge base became contractual in the "Busan outcome" of 2010 (UNEP 2010, UNEP/IPBES/3/3). Subsequent agreement on the processes for the production of the IPBES deliverables noted that expert groups should " … reflect the range of scientific, technical and socio-economic views and expertise; geographical representation, with appropriate representation of experts from developing and developed countries and countries with economies in transition; the diversity of knowledge systems that exist; and gender balance." (IPBES

2014a, 3.6.2 in IPBES/2/17). It has been on this basis that the administrators of IPBES have sought to carry out the expert selection process.

The selection process begins with a call for nominations from the IPBES secretariat. Nominations are invited from both governments and relevant stakeholders. While governments submit nominations through their national IPBES focal points, stakeholder organisations send nominations through the confirmed director or responsible contact person within the organisation. Experts could not nominate themselves without a supporting government or organisation. In order to expand the reach of the nomination process, the third IPBES plenary adopted a communication and a stakeholder engagement strategy to increase the outreach activities of the platform and hereby attract more experts (IPBES/3/18). While this decision was broadly welcomed, there was concern amongst many stakeholders that this had come too late in the process, due to it being postponed at an earlier meeting (Hotes and Opgenoorth 2014).

Once nominations have been received, the MEP plays a central role in the selection process (Figure 1). While the size of the expert groups for thematic, methodological and regional assessments can vary from around 80–150 experts, the size of the theme-specific task forces is fixed at 20 experts. The received nominations are compiled by the Secretariat, and the MEP in consultation with the Bureau, carried out the selection process. Here, it is expected that the MEP will follow the principles and rules in order to produce a balanced expert community for the IPBES work programme. Rules introduced at the second Plenary in 2013 also stipulated that each expert group could not include more than 20% of its experts from non-government stakeholder nominations, ensuring that government-nominated experts formed the bulk of all experts (IPBES 2014a, Decision IPBES-2/3, p.20). The MEP, in consultation with the Bureau, is also responsible for identifying the co-chairs of each expert

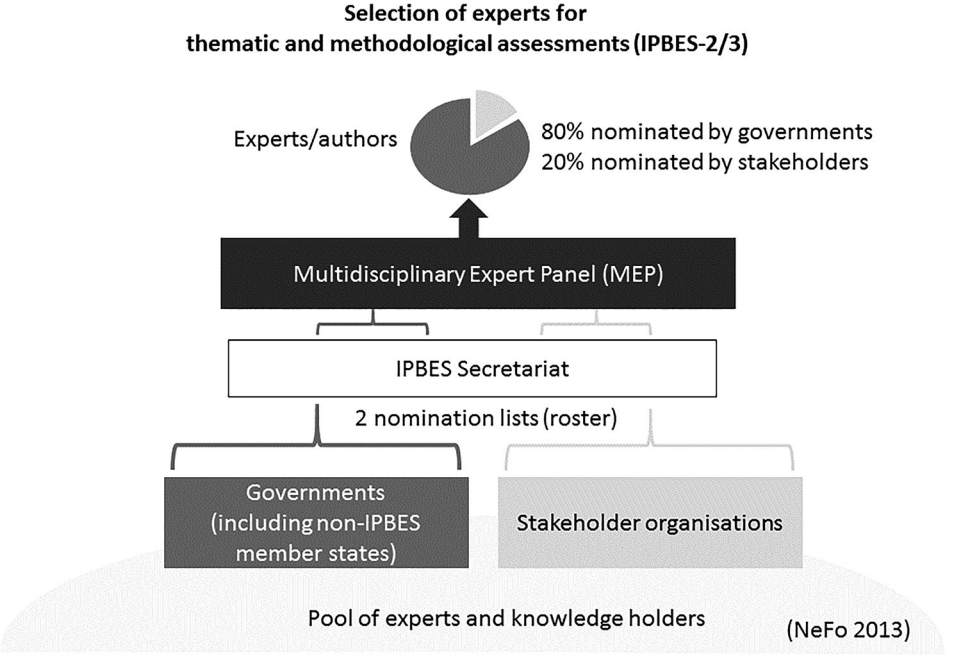

Figure 1. IPBES expert nomination and selection process (Timpte for the German Network-Forum for Biodiversity Research – NeFo 2013).

group and, in the case of assessments, selecting the coordinating lead authors for each chapter. Selected experts for these leadership positions can also be asked for advice on the selection of remaining experts, and can request assistance from contributing authors that have not been part of the nomination process. Noting the challenges associated with recruiting experts from Eastern Europe, and those with expertise in the social sciences, indigenous and local knowledge holders and policy practitioners, additional rules were introduced in 2016 to allow further nominations to be sought from governments after this selection process in order to "ensure geographic, disciplinary and gender balance among experts" (IPBES/3/2 2015a). This so called "Procedure for filling gaps in the availability of experts" (IPBES 2016a, Annex I, Decision IPBES-4/3) formalised a practice that was already applied to a certain extent for the first deliverables and requests the MEP to inform governments and relevant stakeholders about gaps and invite them to propose additional experts. Once underway, additional resource persons can also be invited to contribute to the work of expert groups by the Bureau. Each expert group is overseen by two Bureau members and up to three MEP members, representing the different UN regions between them (IPBES/2/5 2013).

4. Data and methodology

In the early years of the first work programme, IPBES invited governments and stakeholder organisations to nominate experts for the first set of deliverables through four "calls for experts" in January 2014, May 2014, February 2015 and March 2016 (Table 1.). To date, IPBES has not published a conclusive report about the selection process for these different deliverables, and only some information on the regional, gender and disciplinary balance of nominated and selected experts has been made available, either in information documents or in progress reports by the secretariat at IPBES plenary meetings. The names of selected experts, and for the majority also their affiliations and nominating country or organisations have been published on the IPBES website (www.ipbes.net). However, a website update in 2017 has led to the affiliation and nomination of each expert being removed and replaced with their gender and nationality.

This paper compiles data on nominations and selections for the first three rounds of selection in the IPBES work programme in 2014 and 2015, but not 2016. Data was drawn from different publicly available sources, including the IPBES website and official documents, as well as an anonymised data set that had been provided on request by the IPBES secretariat in August 2014. From this data, the balance of gender, age, region and academic career level and the balance between nominations from governments and stakeholders were analysed for each of the different IPBES expert groups. Demographic information on the experts (nationality, gender, age, degree and discipline) were taken from the anonymized data set provided by the IPBES secretariat, while information on whether nominations came from governments or stakeholder organisations was based on public data. While many of these categories were self-explanatory, the evaluation of whether the experts represent different disciplines or knowledge systems required the application of further meta-categories. For these, categories were adapted from Montana and Borie (2016), who have previously analysed the academic background of the members of the MEP. We decided to apply additional categories used in research funding by the research boards of the German Research Association (DFG). As such, the experts where grouped in "Humanities and Social Sciences", "Life Sciences", "Natural Sciences", "Engineering Sciences" and "Others" including several discipline related sub-categories (DFG 2016). Given individual CVs were unavailable for analysis, our categories were based on limited information provided by the secretariat on the

Table 1. Overview of the invitations by the IPBES chair to nominate experts for the different deliverables (based on IPBES.net)*.

IPBES calls for expert nomination / Deliverables of the IPBES work programme
1st call – January 2014 (IPBES 2014d)
• Task force on capacity building (Deliverable 1a and 1b) • Task force on indigenous and local knowledge systems (Deliverable 1c) • Task force on knowledge and data (Deliverable 1d) • Expert group on the development of a guide to the production and integration of assessments from and across all levels (Deliverable 2a) • Methodological assessment on scenario analysis and modelling of biodiversity and ecosystem services (Deliverable 3c) • Scoping of a methodological assessment on the conceptualization of values of biodiversity and nature's benefits to people (Deliverable 3d) • Expert group to develop a catalogue of policy support tools and methodologies (Deliverable 4c)
2nd call – May 2014 (IPBES 2014e)
• Scoping of a thematic assessment of land degradation and restoration (deliverable 3bi) • Scoping of set of regional and sub-regional assessments (deliverable 2b)
3rd call – February 2015 (IPBES 2015c)
• Four regional and subregional assessment for the regions Africa, Americas, Asia and Pacific and Europe and Central Asia (deliverable 2b), Experts on Invasive Alien Species and Sustainable Use will be included in the regional lists of experts • Thematic assessment of land degradation and restoration (deliverable 3bi) • Scoping of a global assessment of biodiversity and ecosystem services (deliverable 2c)
4th call – 11 March 2016* (IPBES 2016b)
• Global assessment of biodiversity and ecosystem services (deliverable 2c) • Workshop to further scope the thematic assessment on sustainable use (deliverable 3biii) • IPBES fellowship programme for the global assessment

*Experts selected after the 4th call were not considered for the analysis, since the names had not been published by July 2016.

academic degrees and backgrounds. To analyse the engagement of knowledge holders with other backgrounds, such as non-academic expertise or local and indigenous knowledge, detailed information beyond that available for this analysis would be needed. Furthermore, publically available lists were sometimes inconsistent with data provided by the secretariat. The data set did not contain all experts that contributed. Some positions changed during the ongoing assessment and some experts were selected outside the nomination and selection process related to the call for experts. Therefore, the analysis of the academic background was restricted to the experts selected at the middle of 2014.

5. Findings from the expert groups of the first IPBES work programme

In the first three rounds of nominations by governments and stakeholder organisations over 2500 experts had been put forward for the IPBES work programme. From these nominations, over 900 experts were then selected. However, discrepancies remain about this exact

figure. When the data was obtained (12.2015), IPBES had published the names, affiliations nominating country or organisations of 1063 experts engaged in 3 IPBES task forces, 4 scoping reports and 9 thematic, methodological and regional assessments on their web site (1021 excluding MEP / Bureau members). The total number of selected experts mentioned in IPBES information documents was 1050 and the latest report by the IPBES secretariat on the progress of the work programme counts 945 selected experts (IPBES/4/2 2016). This section sets out the achievement of IPBES in meeting its ambition to create balanced expert groups that represent a diversity of regions, genders, disciplines, and academic backgrounds.

5.1. *Regional balance*

The WEOG states lead the group of total selected experts with 34%, almost twice as many as GRULAC 18% and Africa 17%. About 21% of the experts were proposed by Asia-Pacific states and only 10% from Eastern European Countries (Figure 2). Having a look at the 1106 (330 selected) nominations IPBES received for the first call and the second call (635 nominated, 153 selected) shows that between 40% and 62% of the total nominations by governments for the different expert groups came from WEOG countries.

Experts nominated by WEOG states or stakeholder organisations represent the two largest groups in most IPBES assessments or task forces. This is perhaps unsurprising if we consider the leading role of some European countries (e.g. France, Germany, UK) at the inception of the IPBES process. An exception is the scoping for the global assessment, where experts nominated by WEOG states are the minority with 11%. Experts from Eastern European states are mostly the smallest group. One example is the thematic assessment of pollinators and pollination and their role for food production (deliverable 3a). According to the published names on the web page, 29% of the selected experts came from WEOG states, 23% from Latin American and Caribbean states, 10% from African and 10% from Asia-Pacific states and only 3% from Eastern Europe. The group of selected experts nominated by stakeholder organisations made up 26% of 62 selections.

While the task force on capacity building needs (deliverable 1 (a&b)) gets closest to a fair regional balance with 16 to 20% per region, it is also the expert group with the fewest experts proposed by stakeholders (two out of 25; or 8%).

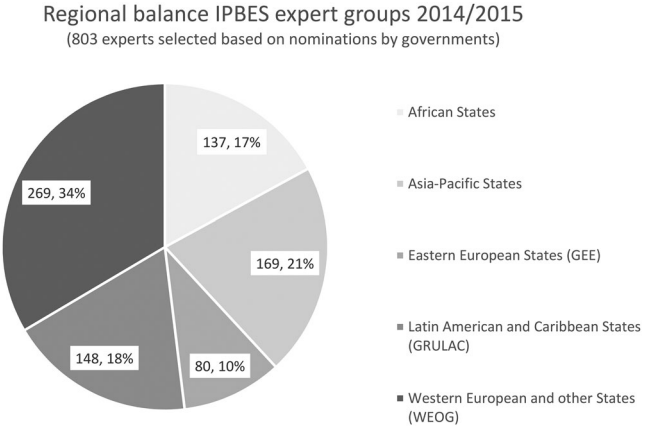

Figure 2. Regional balance among all experts selected for IPBES expert groups based on names published on the IPBES website (www.ipbes.net) at December 2015.

The analysis of the others expert groups shows that regional balance has not been reached based on nominations by governments. Here it is noteworthy that experts from the WEOG states also play a role in the regional assessments outside the ECA region.

Although the experts nominated and selected during the 4th call were not included in this analysis, the latest information released before IPBES-5 on the experts selected until the end of 2016, including the global assessment, show however, that e.g. the regional balance of the expert groups only differs slightly (1%–2%) from the results of this analysis (IPBES 2017a, IPBES/5/2, p.5).

The MEP selected 761 experts nominated by 91 governments, the number of selected experts per country however differs a lot. France is leading the top 10 of countries with most selected experts with 46 selections. Germany is ranked on the 10th rank in this group with 23 experts (Table 2). Half of the countries in the top 10 are from the WEOG region, Asia-Pacific is represented with three countries and Africa and Latin American and Caribbean States with one. In total 42% of the selected experts nominated by governments came from the 10 countries. More than half of the nominating countries (54) are represented with 5 or less experts in the IPBES expert groups (22 with only 1 expert). Besides the overall regional balance, the balance within the regions is far from even, hiding inequalities and disagreements between the regions themselves, with a strong representation of countries with well-founded and internationally recognized education and research sectors. It also needs to be considered, that experts nominated by 91 governments were selected, while IPBES has currently over 125 member states. Since one of the IPBES objectives is capacity building for expertise in biodiversity and ecosystem related research, it is necessary to identify, motivate and enable the participation of knowledge holders from more countries, especially from regions currently underrepresented.

5.2. *Balance of government and non-government nominated experts*

The overview over the regional balance in the different expert groups presented above (Figure 3) also shows the balance between selected experts nominated by national

Table 2. The ten countries with the most selected experts nominated by governments, based on names published on the IPBES website (www.ipbes.net) at December 2015 (Timpte/Apkes 2016).

Rank	Country (selected experts)	Regional group	Rank	Country (selected experts)	Regional group
1	France (46)	Western European and other States (WEOG)	6	Australia (30)	Western European and other States (WEOG)
2	Japan (39)	Asia-Pacific States	7	United Kingdom of Great Britain & Northern Ireland (29)	Western European and other States (WEOG)
3	South Africa (35)	African States	8	China (28)	Asia-Pacific States
4	Brazil (32)	Latin American and Caribbean States (GRULAC)	9	United States of America (25)	Western European and other States (WEOG)
5	India (31)	Asia-Pacific States	10	Germany (23)	Western European and other States (WEOG)

governments and those who were nominated by stakeholder organisations. The nationality of experts nominated by stakeholder organisations can of course differ from the country if residence or where the organisation is based, therefore a grouping according to nationality would have an impact on the regional balance. IPBES however did not publish the nationality of experts publicly until 2017. It is however worth to mention that a large number of experts in this group was nominated by international organisations based in WEOG states.

The target established in the "Procedures for the preparation of the Platform's deliverables" (IPBES 2014a, Decision IPBES-2/3), stating that a maximum of 20% of the selected experts should be nominated by stakeholder organisations was not strictly followed according to our analysis. While the rule originally covers only thematic and methodological assessments, it was mentioned at the IPBES plenaries that it should also be applied for the other expert groups to make the selection comparable. The data published on the IPBES website (www.ipbes.net) shows however, that the number of experts nominated by stakeholders varies between 20% and 30% in the different expert groups and is especially high in the task force on local and indigenous knowledge and the regional assessments in Africa, Asia-Pacific and the GRULAC region. Our analysis of the expert groups covered in the first call also showed, that 38% of the proposed experts where nominated by stakeholder organisations.

An assessment of the organisations that nominated experts shows that a few international organisations play a central role (Table 3). The International Council for Science (ICSU) and the International Union for Conservation of Nature and Natural Resources (IUCN) lead the list of organisations with most selected experts. They are followed by Diversitas International and International Human Dimensions Programme on Global Environmental Change (UNU – IHDP), both initiatives phased out in 2014/2015 but some activities continue under the umbrella of the research initiative Future Earth.

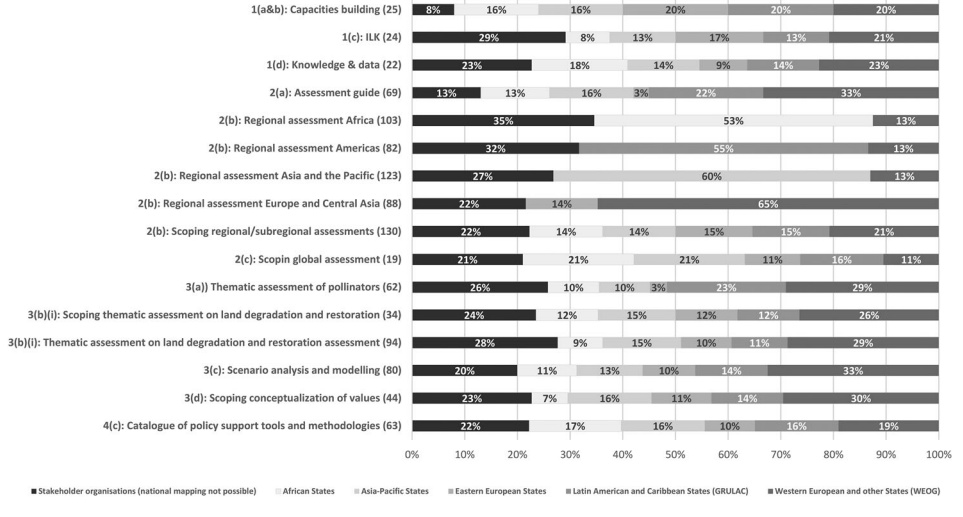

Figure 3. Regional balance in IPBES expert groups based on names published on the IPBES website (www.ipbes.net) at December 2015. The number of selected experts per deliverable/expert group is shown in round brackets (Timpte/Apkes 2016).

These organisations have been active voices in the development of IPBES and at IPBES plenaries. They also draw on institutional capacity and large networks of experts working on biodiversity related issues.

Among the 147 stakeholder organisations that nominated experts that were also selected are scientific institutions, universities and international organisations and conventions like UNEP, UNESCO, the CBD and the Ramsar Convention. Fourteen organisations are represented with 4 or more experts, while from 111 organisations, only one nominated expert was selected by the MEP. Only a very small number of the selected experts has been identified as associated with business organisations or local communities and indigenous people's organisations, based on the public data.

5.3. *Gender and, education / career level*

While the first half of the analysis was based on publicly available data, more socio-demographic information could only be obtained from an anonymised data set on experts provided by the IPBES Secretariat. This data set only includes the data for the first and the second call for experts.

For the 9 expert groups covered in the first call for experts (see also Table 1), IPBES received 1106 nominations, 690 from governments and 416 from stakeholder organisations. Out of the 1106, 330 experts were selected in the first round. The second call for

Table 3. The fourteen stakeholder organisations with the most selected experts based on names published on the IPBES website (www.ipbes.net) at December 2015 (Timpte/Apkes 2016)*.

Rank	Stakeholder organisation (selected experts) Rank	Headquarter based in	HQ region
1	International Council for Science – ICSU (14)	Paris, France	WEOG
2	International Union for Conservation of Nature – IUCN (12)	Gland, Switzerland	WEOG
3	DIVERSITAS international (10)	Paris, France (until 2014)	WEOG
4	International Human Dimensions Programme on Global Environmental Change – UNU – IHDP (9)	Bonn, Germany (until 2014)	WEOG
5	United Nations University-Institute for the Advanced Study of Sustainability – UNU-IAS (7)	Tokyo, Japan	AP
6	Ramsar Convention Secretariat (6)	Gland, Switzerland	WEOG
7	Observatoire du Sahara et du Sahel – OSS (5)	Tunis, Tunisia	AF
7	Instituto Alexander von Humboldt (5)	Bogota, Colombia	GRULAC
7	International Social Science Council – ISSC (5)	Paris, France	WEOG
7	United Nations Convention to Combat Desertification – UNCCD (5)	Bonn, Germany	WEOG
8	National Museums of Kenya (4)	Nairobi, Kenya	AF
8	Helmholtz Center for Environmental Research – UFZ, Leipzig-Halle-Jena, Germany (4)	Leipzig, Germany	WEOG
8	Intergovernmental Panel on Climate Change – IPCC (4)	Geneva, Switzerland	WEOG
8	Group on Earth Observations Biodiversity Observation Network – GEO BON (4)	Leipzig, Germany	WEOG

*Most experts nominated by governments are also affiliated to stakeholder organisations, therefore the total number of experts selected per organisation can be higher. The ranking shows only the number of experts selected by the MEP based on the nominations by stakeholder organisations. In total, 260 experts were selected based on nominations by 147 organisations.

experts included only nominations for two scopings (deliverable 2b and 3bi). The secretariat received 635 nominations and selected 154 experts, 118 for 2b and 35 for 3bi.

6. Overall gender balance

IPBES did not publicly publish the gender of selected experts before 2017, therefore any analysis of gender balance had to be based on anonymised data provided by the secretariat.

Out of the 1106 nominations IPBES received for the first call for experts, 30% were female. The 330 selected experts for the 9 expert groups reflect the gender balance of the nominees, 32% are female and 68% male. The balance in the groups differs however, while the task forces are more balanced, the assessment groups have around 30%–35% female experts with the assessment on scenarios and modelling being with 22% a negative exception.

After the second call IPBES received 28% nominations for female experts for the two deliverables. The MEP tried to improve the gender balance and selected 39% female experts for the 154 positions. The data shows that even if IPBES aims for more gender balanced groups, the number nominated female experts makes it difficult to reach this objective.

The IPBES secretariat also mentions in its last progress report, that only 22% of the all experts nominated by governments where female (IPBES 2017a, IPBES/5/2, p.5) and a quick look at the latest list of experts selected for the global assessment shows that about one third of the selected experts are female.

7. Overview of education / career level

To assess the career level of the engaged experts, their formal education and degrees have been analysed. Although IPBES recognizes that experts can be practitioners and individuals with knowledge and experiences gained outside the academic sphere, the vast majority of the nominees and the selected experts for the first and second call for experts have an academic degree. About 70% of the nominees stated that their last degree was a PhD and about 80% of the selected experts. This high level of education goes with a form of homogenization: many experts from developing countries having studied for their PhD in Europe or in the United States. However, only about 4% of nominees and 3% of the selected experts for the first call have a professor title. The numbers for the second call is even lower. About 12%–14% (1st & 2nd call) of the nominated experts have a Master or a similar degree and 7%–8% of the selected candidates. The group of nominated experts that did not indicate whether they have an academic degree is very low with 6% for the first call and 5% for the second call. These findings could be a challenge for the aim to include also non-academic knowledge sources, even if the experts could of course work for organisations and institutions outside the science sector. With regards to early career experts, our analysis of this expert groups showed, that about 40%–50% of the experts where under 45 years old. IPBES also introduced a fellowship programme with the third call for experts when the regional assessments where launched to target especially young scientists from non-WEOG states and to provide specific capacity-building and the chance to participate in the work of IPBES.

7.1. *Disciplinary and knowledge system balance*

The data set for the first call unfortunately only contained information about the field of study for 43% of the 1106 nominees, since this information was not obligatory in the

application form, which took the form of a word document at that time. Out of this group of 481 nominees, 65% have a natural science background, 12% economics, 10% law and 10% come from the field of social science applying the categories introduced by Montana and Borie to analyse the members of the MEP in 2015. Also data was available only for 44% (143) of selected 330 selected experts. Again, a majority of 60% of this group comes from natural science, 14% from economics, 15% from social since and 3% have a background in law. The data for the second call was more comprehensive, so a more detailed analysis for this sample was possible.

7.2. *Academic background*

The disciplinary balance of the selected experts reflects almost the balance of the nominations (Figure 4). About 84% of the nominations were natural scientists as well as 80% of the selected 153 experts. The share of social scientists was very low (only 4%), being the same the same for both nominated experts and selected experts. A closer look at the two different scoping groups shows that for the regional assessments 8% economists and 3% social scientists were selected and for land degradation 11% economists and 9% social scientists. The group of total selected economists is with 9% a little larger than the 7% of the nominees. In comparison, 4 out of 5 experts in law were selected.

A detailed analysis of the experts nominated and selected for two expert groups of the second call indicates (Figures 5 and 6), that the group of non-natural science experts the MEP could choose from was very small. In contrast, the group of nominated experts for the scoping of the thematic assessments on land degradation and restauration included 23% of non-natural scientists (e.g. social scientists, lawyers, economists).

For the scoping of the regional assessments, only 12% of the nominees were non-natural scientists and that amount is reflected in the selections. The analysis based on these categories however, has limited significance for the analysis of disciplinary balance when just considering the broad categories of “social science” and “natural science”.

Indeed, by breaking up these categories under different headlines and subcategories, the diversity among the experts nominated and selected becomes more visible.

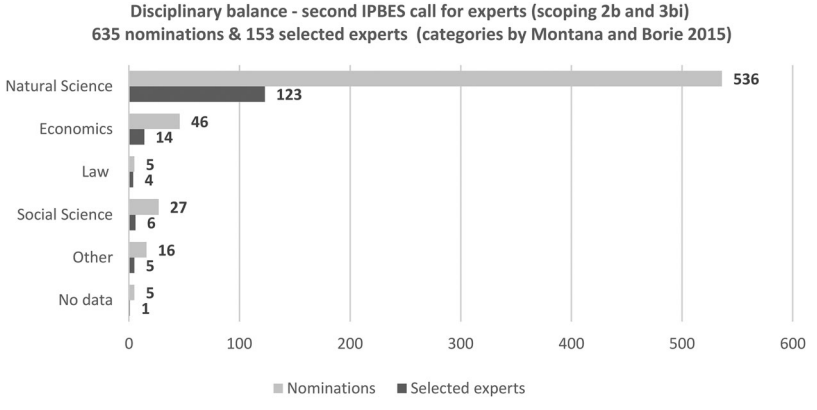

Figure 4. Disciplinary balance of experts nominated and selected for the 2nd IPBES call for experts (Deliverables 2b and 3bi in May 2014) based on data provided by the IPBES secretariat in August 2014 (Timpte/Apkes 2016).

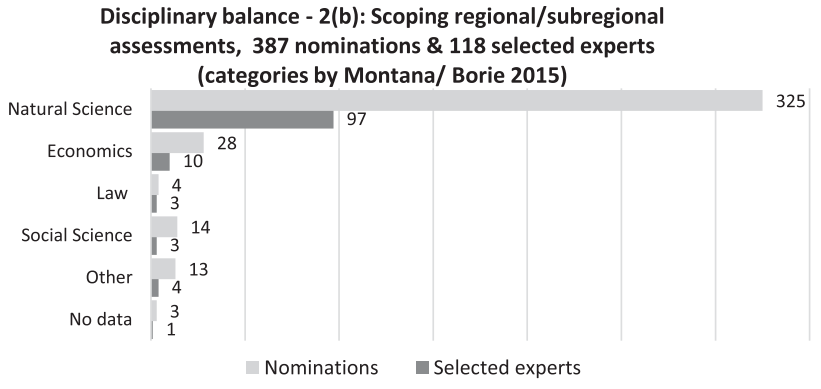

Figure 5. Disciplinary balance of experts nominated and selected for the scoping of the regional assessments (Deliverable 2(b)) based on data provided by the IPBES secretariat in August 2014 (Timpte/Apkes 2016).

Using the funding topics of the German Research Association DFG to reorganise the experts according to their highest degree mentioned in the application forms, the variety among the natural sciences and life sciences can be seen (Figures 7 and 8). The social sciences now include law and economics, but also the humanities, a research area that was missing in IPBES language before. Social sciences are of course still underrepresented, economist and lawyers were preferred and humanities, as well as indigenous and local knowledge, are missing.

Within natural science and life science, there are however several experts from interdisciplinary research fields e.g. environmental science, human geography or agriculture economics. Research areas that have a long tradition in the assessment of biodiversity and ecosystems like biology, ecology, forestry and conservation are naturally strongly represented among the nominations as well as the selected experts for the scoping of the regional assessments. In the expert group for the scoping on land degradation, these classical biodiversity disciplines are however not the majority.

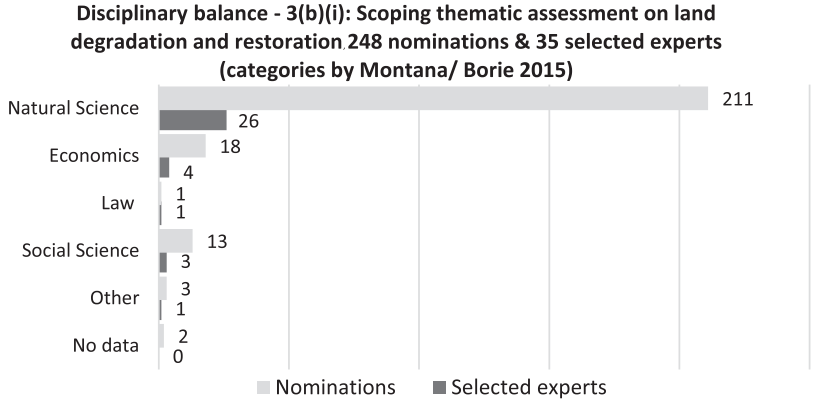

Figure 6. Disciplinary balance of experts nominated and selected for the scoping thematic assessment on land degradation and restoration (Deliverable 3(bi)) based on data provided by the IPBES secretariat in August 2014 (Timpte/Apkes 2016).

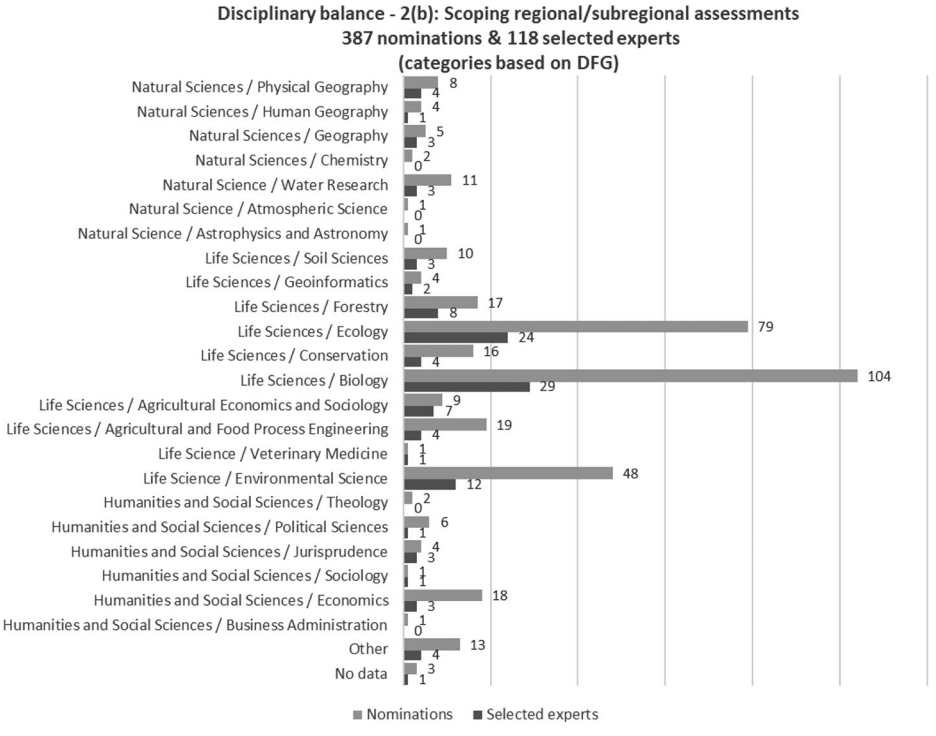

Figure 7. Disciplinary balance of experts nominated and selected for the scoping of the regional assessments (Deliverable 2(b)) based on data provided by the IPBES secretariat in August 2014. (Timpte/Apkes 2016).

8. Discussion

With the establishment of IPBES there was a commitment that this new expert institution would embrace a greater diversity of knowledges and experts compared to previous initiatives. In doing so, IPBES has committed to an ambition to achieve balanced representation in its expert groups. It is understanding how this balance has been achieved in the first years of the IPBES work programme that is the focus of this paper. Perhaps the most pertinent illustration of this challenge is the pursuit of expert groups that are geographically balanced with " … appropriate representation of experts from developing and developed countries and countries with economies in transition." (IPBES 2014a, Decision IPBES-2/3). In this case, what "appropriate" means is not defined in the rules, but considering that other bodies like the IPBES Bureau or the MEP have an equal representation of the five UN regions this is often taken as the model. After the three rounds of expert selection in 2014 and 2015, experts from the WEOG region (Western Europe, US, Canada, Australia and New Zealand) were overrepresented in 10 of 12 expert groups and task forces and they also played a role in the scoping of the regional assessments outside the WEOG region. This overrepresentation could be a result of the fact that countries from the WEOG region nominated far more experts than the other regions and the MEP could only try to create regional balance from that pool of given candidates. The reports by the secretariat at IPBES-3 and IPBES-4 indicate, that additional selections were necessary in order to create the final regional balance presented here. Among the other regional groups, Eastern Europe had the fewest nominations and also the fewest selected experts. While

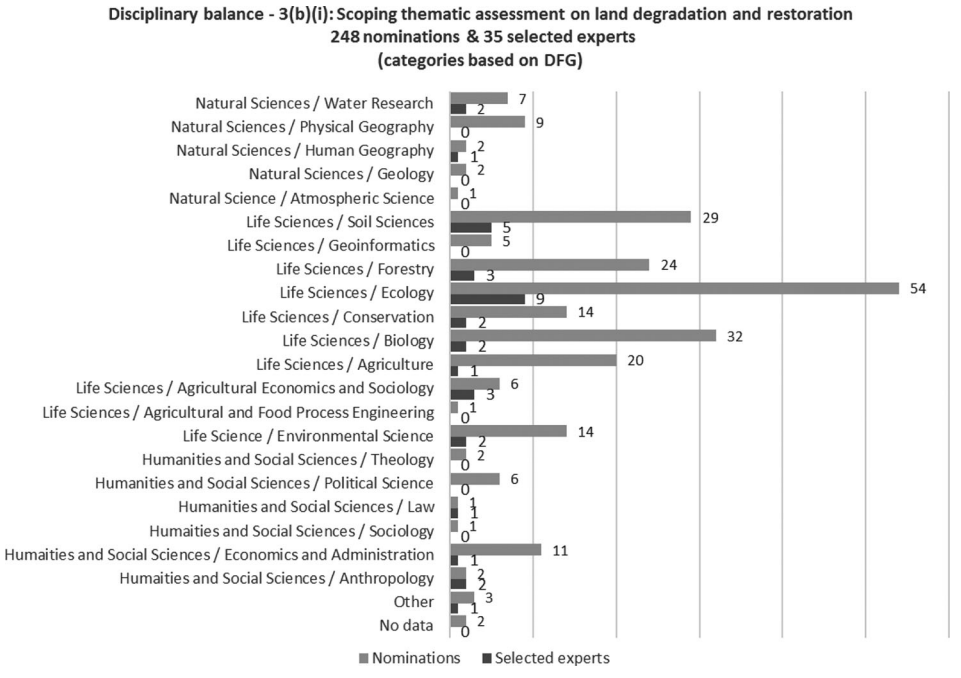

Figure 8. Disciplinary balance of experts nominated and selected for the scoping of the thematic assessment on land degradation and restoration (Deliverable 3(bi)) based on data provided by the IPBES secretariat in August 2014. (Timpte/Apkes 2016).

dimensions such as the variable population of each region should be taken into account in considering these outcomes, there is also an issue of how IPBES engages with the specificities of regional scientific communities that needs to be considered (Kovács and Pataki 2016). Beyond regional imbalance, the range of countries who actively mobilised experts for the IPBES process also showed dramatic variability. Although experts from 91 countries were eventually selected based on national nominations, the analysis showed that 42% of the selections came from just ten countries (see Table 2). As such, challenges remain to bring about more even regional engagement with the IPBES process.

The challenges associated with achieving a good balance between the genders in IPBES have previously been noted (Montana and Borie 2016). In particular, the constraint of the MEP being only allowed to select experts based on the nominated candidates by governments and stakeholders means that gender balance needs to be addressed at the nomination stage, as well as the selection stage. While the balance in the expert groups after the first call for nominations reflected the same proportion of nominations of women (30%), expert selections based on the second call resulted in a higher proportion of women being selected (39%) than were initially nominated (29%).

Concerning the disciplinary balance, the MEP has the challenging task of assembling expert groups that have a good overview of the existing knowledge in very broad areas. They have to take into consideration both epistemic and political criteria when selecting experts using their CVs, their publication records and their reputation, while considering the need for regional and gender balance. On top of that the MEP and coordinating lead authors have to assemble teams that are able to work together based on online consultations and a few meetings. Our analysis of the selected experts for the two expert groups of the

second call (scoping for the regional assessments and scoping for land degradation and restauration) shows, that IPBES received a great variety of nominations from different disciplines that goes beyond classical biodiversity related subjects like biology, ecology, forestry and conservation. Those disciplines however are naturally strongly represented in the group of nominated as well as selected experts. This variety would not be visible, if experts are only grouped in the categories "natural scientists" and other meta subjects. Experts from social sciences disciplines and humanities are clearly underrepresented, both among the nominations as well as the selected experts. However, it is in generally difficult to measure the diversity of represented knowledge systems and disciplinary research represented in an expert group just based on quantitative data of academic degrees the experts have earned at some point of their career. In the end, only the work experience of experts and the willingness and ability to contribute their expertise to IPBES deliverables would make a difference. That might be the reason, why IPBES has not published information about the disciplinary balance of the engaged experts.

8.1. *Enhancing the diversity of knowledges and experts in the IPBES expert groups*

Our analysis has shown that to date IPBES has so far fallen short of its own target to establish expert groups that reflect a balance of regions, genders and disciplines. From the first rounds of expert selection, we found that the IPBES expert groups are still disproportionally dominated by male natural scientists from the Global North. However, we recognise that what is considered to be a good balance of participating experts is a subjective judgement, that cannot only be based on quantitative criteria. Instead, the balance in IPBES will be a brokered outcome of different perspectives and actions of the member states and interested experts. Furthermore, we recognise that ensuring inclusion in the process is only one step towards achieving equitable participation. Attention should also be paid to how the process accommodates and excludes some voices despite their inclusion in IPBES (Kovács and Pataki 2016; Montana 2017). Yet, if the aim of an inter- and transdisciplinary approach that is inclusive of expertise from different regions, perspectives and knowledge systems outlined in the conceptual framework (IPBES 2014b) and specified in the procedures for the preparation of the IPBES deliverables is to be achieved in the future, all involved actors will need to increase their efforts in this area. While the IPBES bodies like the secretariat, the Bureau and the MEP can only make proposals and improvements based on their capacity, resources and responsibilities, most changes would have to be made by the member states in the IPBES plenary and supported by interested stakeholders. Here, we present a set of recommendations based on our analysis and established literature on how diversity may be enhanced in future expert selection processes. These improvements apply to different stages in the IPBES process and are as follows:

8.2. *Recommendation 1: implement and improve outreach, communication and engagement strategies*

The IPBES nomination process relies on engaging with and incentivising potential experts to participate in the Platform. In order for this to be achieved across the diverse fields of research and world regions, IPBES first has to improve its outreach and information strategies. More institutional resources need to be directed to communicating the work of IPBES to wider audiences and making clear the benefits of participation in a targeted manner. Researchers, for example, have different views regarding knowledge that matters and this shapes their "epistemic commitments" and how they choose to allocate

their time and for which expert activities (Granjou and Arpin 2015). Since the inception of the first work programme, the IPBES secretariat has been limited by staff shortages and has been occupied with the facilitation of many expert groups and management meetings. This resulted in less effort being invested in explaining what IPBES is, what it was working on, and the types of experts needed to implement the different deliverables. In addition, calls for experts often required an in-depth understanding of the IPBES process and its documents further limiting their audience. Although strategies for communication, outreach and stakeholder engagement to mobilize and attract knowledge holders and increase awareness for the platform and its products were passed by the IPBES plenary in early 2015 (IPBES 2015b, Decision IPBES-3/4), nine expert groups were already working and six to be launched soon after the meeting. Most of the activities contained in these strategies were not implemented as planned during 2015 due to a lack of capacity.

There have been some signs of change, however. The Secretariat mentioned the need for particular disciplinary backgrounds (including natural and social sciences, ILK and policy experts as well as practitioners) in the third call for experts and added the humanities in the fourth call in March 2016. The need for more experts from the social sciences and humanities has also been highlighted repeatedly by the Secretariat (Larigauderie 2015; Larigauderie, Stenseke, and Watson 2016) and other academic publications (see also Reuter, Timpte, and Nesshöver 2016; Vadrot, Jetzkowitz, and Stringer 2016). The implementation and further development of the engagement strategies could help IPBES reach out to a larger audience and make sure that underrepresented groups will be included in the early stages of the development of a new work programme. However, it is also important to recognise that communication channels and the incentives for participation will not be uniform across the diversity of expert networks. A more targeted approach that takes account of these differences is required and a participative analysis of the needs of engaged experts and stakeholders could be a first step.

8.3. *Recommendation 2: reconsider the cap for experts nominated by stakeholders (80/20 rule)*

Although potentially controversial amongst some of the member states, the plenary could reconsider the rule that 80% of the experts have to be selected from government nominations. Our analysis showed that stakeholders contributed a considerable number of nominations, which could provide greater opportunity for the selection of more balanced expert groups. By loosening the 20% rule scientific organisations, civil society and business organisations could be motivated to provide more capacity to the IPBES process. In the absence of this amendment, the bulk of the action to improve diversity will need to come from government focal points However, not every member state has a designed focal point for IPBES until today.

The 80/20 rule was negotiated at the second plenary meeting in 2013. It emerged as a compromise position between those governments who wanted full control over nominations and those who wanted a completely open nomination process: at stake were different conceptions of what it meant for IPBES to be scientifically independent. Although the IPBES secretariat proposed the option to revise this rule as a result of their lessons learnt from the first selection rounds (IPBES/3/2) at IPBES-3, the plenary did not re-enter discussions on this occasion. Instead, the plenary approved an additional procedure at IPBES-4 to identify and engage additional experts after a first selection round, in case that the exiting process would not lead to balanced groups. Furthermore, the new chair of IPBES, Robert Watson, who also chaired the negotiations that led to the selection

rules the plenary adopted at IPBES-2 in Antalya 2013, was quoted that in his opinion, governments are better placed than non-governmental organizations to make recommendations for IPBES (Heffernan 2016). If IPBES continues into a second work program, the inter-sessional period may provide an opportunity to revisit this rule.

8.4. *Recommendation 3: create regional partnerships to coordinate government nominations*

At present, to be nominated by a government experts have to be accepted by their national IPBES focal points, located mostly in ministries for environment, research or development. This creates a bottleneck for interested knowledge holders. This process relies on the expertise and capacity of national focal points to identify, mobilize and nominate experts, which varies across the IPBES member states. Some national platforms, such as the UK, Germany or Switzerland, have their own network structures, outreach channels or pre-selection process. Others provide capacity building for their national science and expert communities to facilitate their engagement (e.g. Marquard et al. 2016). This has resulted in variable nominations across countries, with some only nominating a few candidates to IPBES. While this could be due to a small number of interested experts or the lack of resources or capacity to support the nomination process, it could also be caused by a more restrictive pre-selection of experts. Some countries have established advisory boards including e.g. government agencies, science and civil society networks to advice the focal points in the mobilization and expert selection process. While the approaches being adopted by some countries seem promising, not all member states can or will want to follow these examples. A set of regional platforms or partnerships between countries in or across regions that provides coordination of the government nomination process and provide further capacity could be one solution For example, countries with the same language could develop and exchange information material and facilitate regional capacity building meetings.

8.5. *Recommendation 4: increase financial resources for expert participation*

Another possible improvement for more balanced expert groups would be an increase of financial resources provided by the member states. Only if more resources are available to facilitate the participation and also the work of the engaged experts, including the members of the MEP, will the platform be able to attract more relevant knowledge holders. Firstly, IPBES member states might consider additional funds for the IPBES trust fund, which supports the participation of experts from developing countries and the general coordination of the Platform's activities. In its first few years, IPBES has struggled to raise the finances to implement the full work programme, which has resulted in the delay of activities such as the methodological assessment on the diverse conceptualisation of values. Such activities are recognised to be invaluable for attracting experts from different disciplines (Turnout in Heffernan 2016), and member states could consider increasing their contributions to ensure the potential of IPBES is not diminished. Secondly, experts from developed countries must raise their own funds or obtain financial support from their national government to participate in the process. Since government financial support is more the exception rather than the rule, participation in IPBES is a practical challenge for many experts. Even those who are selected have found difficulty attending scheduled meetings due to high costs. Furthermore, increased funding might overcome structural differences between institutional backgrounds. Due to the main subjects of IPBES, it might

be easier for larger organisations and institutions with a focus on natural and environmental research to support participation of their researchers in IPBES. Smaller institutions or universities, which have other funding structures than big non-universitary institutions, might lack the financial resources to support the engagement of their scientists in IPBES, especially when they do not have a background in the classical biodiversity research disciplines. This financial strain might discourage others to apply for nomination and limit the range of experts from those disciplines that might not traditionally participate in assessment activities.

8.6. *Recommendation 5: support the engagement of non-natural scientists*

There are recognisable structural differences between disciplines that are currently not accounted for in the IPBES process. It is likely that these have impacted on the mobilisation of experts for nomination to IPBES. In particular, it has been recognised that the integration of the social sciences and humanities into processes that have been traditionally dominated by natural sciences can be confronted with ideological, institutional, knowledge and capacity constraints (Stenseke 2016; Bennett et al. 2017). Overcoming these may require not only increases in funding and changes to the organisational culture of IPBES itself, but also efforts to restructure the institutional support systems outside of the Platform as well. Developing approaches to working with knowledge and experts from the social sciences and humanities requires sensitivity to the particular cultures of these disciplines. Without dedicated attention, the absence of social scientists in the expert groups could have significant implications on the usability of the reports (see for example, Rankovic et al. 2016). Resources should therefore be dedicated to better supporting their inclusion in future work. Moreover, particular attention should be given to the roles attributed to these diverse experts: leading positions (Lead Authors, Coordinating Lead Authors) are often attributed to natural scientists and it would be worth ensuring that experts with different disciplinary backgrounds can also access these so as not to reinforce already existing imbalances.

8.7. *Recommendation 6: improve the interdisciplinarity of the IPBES bodies*

Finally, the interdisciplinarity of the IPBES subsidiary bodies could also be improved. In particular, the MEP plays a major role in supporting the development of the Platform's deliverables, engaging in outreach activities and selecting experts. As Montana and Borie (2016) describe, the disciplinary balance of the MEP could be further improved in the next work program. Arguably, a truly multidisciplinary MEP would be able to reach out towards a broader range of networks and audiences, beyond the natural sciences. This would require concerted effort from the IPBES member states to ensure that a highly diverse group of experts are nominated and selected in the next round.

9. Conclusion

As this paper has shown, despite noteworthy efforts IPBES is still lacking in achieving an even balance of experts across its suite of first deliverables. Even if this novel platform has demonstrated that it can adapt to the challenges of embracing diverse expert participation, with processes like the "filling the gaps" mechanism and the fellowship programme, more efforts are needed both within, and also beyond IPBES. First of all, full transparency about the expert groups and the expert nomination and selection process at every stage is crucial

for the credibility of the platform, recognising the nominating governments and stakeholder organisations but also the many interested experts that were not selected (IPBES 2017b, IPBES/5/15 p.7.). To achieve its stated goal for an inclusive inter- and transdisciplinary science policy platform, IPBES needs to increase the range of experts from different regions, disciplines, perspectives and knowledge systems as well as gender balance. This diversity is important for IPBES to succeed in its ambitious objectives, because collective efforts of knowledge-making are not neutral activities and the credibility of experts doesn't depend solely on their scientific excellence. Geographical representation also matters (Biermann 2006), and disciplinary diversity is key to ensure that multiple ways of understanding and making sense of biodiversity issues are represented and accounted for (e.g. Turnhout et al. 2013).

The means through which the diversity of experts and knowledge involved in the production of sustainability science and environmental change research can be increased are not always straightforward or of immediate effect. With the fourth call for experts for a global assessment completed in 2016/2017 (notwithstanding the request for additional deliverables), the selection of experts for the first IPBES work programme is likely to be complete. IPBES, its member states and stakeholders, therefore, have time to reflect on the procedures adopted for the nomination and selection of experts before another work programme is requested by the IPBES plenary. This will be an important opportunity to assess the successes achieved thus far and the opportunities for further improvement in the next iteration of the IPBES work programme. Lessons learnt from this reflexive process will not only serve IPBES itself, but will also inform broader activities in sustainability science and environmental change research and sow the seeds for more inclusive approaches to the production of environmental knowledge for decision making.

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