

Conference Report

Outcomes from the First European Planetary Health Hub Convening at ARTIS in Amsterdam

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Abstract: A new network of over 72 organizations from 12 countries was activated during a convening at ARTIS in Amsterdam on 26–27 September 2022. Representatives are aligned with the transdisciplinary field and social movement of Planetary Health, which analyzes and addresses the impacts of human disruptions to natural systems on human health and all life on Earth. The new European Planetary Health Hub consists of organizations from various sectors, including universities, healthcare, youth, business, and civil society. The Convening, co-organized by the Planetary Health Alliance (PHA), the European Environment and Sustainable Development Advisory Councils Network (EEAC), and *Natura Artis Magistra* (ARTIS), aimed to develop Planetary Health Working Groups for Education, Policy Engagement, Research, and Movement Building. The Convening resulted in an outline for each of the Working Group’s aims, visions, missions, priorities, and activities, and set the framework for sustaining their activities in the future through the establishment of the European Planetary Health Hub Secretariat in the Netherlands. The Hub members shared lessons learned, built relationships, and developed artwork-inspired perspectives on Planetary Health. In conclusion, the Convening led to the establishment of a strong European foundation to contribute to the transformations needed for sustainable, just, and equitable societies that flourish within the limits of our ecosystems.

Keywords: planetary health; social justice; transdisciplinary research; biodiversity loss; climate change

1. Introduction: The Need for a European Planetary Health Hub

Planetary Health is ‘the achievement of the highest attainable standard of health, well-being, and equity worldwide through judicious attention to the human systems—political, economic, and social—that shape the future of humanity and the Earth’s natural systems that define the safe environmental limits within which humanity can flourish’ [1,2]. Planetary Health is an integrated health science for exceptional action [3]. It has been adopted by over 340 universities and NGOs such as the ICLEI, founded in 1990 as the International Council for Local Environmental Initiatives—Local Governments for Sustainability [4], government agencies, and UN organizations [5], as a frame for connecting sustainability, the health of the planet, and people. It demands new coalitions and partnerships across many disciplines and actors to solve the enormous existential challenges of today [3]. Renewed attention should be paid to governance, implementation, and a more creative imagination among scientists and practitioners to redefine the meaning of human progress, rethink the possibilities for human cooperation and science, revitalize the prospects for the restoration and care of our common home, and develop a new way of thinking [6].

The European Planetary Health Hub can contribute to this urgent demand by addressing planetary habitability, health emergencies, climate, and social justice as key priorities in Europe and on a global scale to restore human society within the sustainable limits of the biosphere through equity. The mission of the Hub is to inspire, promote, and develop interactions and synergies among those interested in developing the Planetary Health approach

in Europe and a European Planetary Health community of practice [7]. It aims to foster an inclusive movement for vision-intended change by (i) building intersectoral alliances, (ii) facilitating education and training, (iii) stimulating the dissemination of mainstream planetary health science and stories and solutions, and (iv) promoting actionable steps. The European Green Deal [8], the Health Environment Research Agenda for Europe (HERA) [9], and the Horizon Health 2023–2024 Work Program [10] contribute to a productive environment in Europe to build collaborations, link to the policy community, and access funding to address Planetary Health priorities at scale.

The new European Hub formalizes and takes forward the work initiated by the informal Northern European Hub, which operated remotely during the COVID-19 pandemic between 2018 and 2022. After an informal gathering at the Geneva Health Forum in May 2022 [11], the initiative was taken to host the Hub's first formal in-person conference in Amsterdam, in which four different Working Groups coalesced (for a detailed agenda of the Convening and the Participating Organizations see Supplemental Files S1 and S2, respectively). These Working Groups focused on (i) education, (ii) research, (iii) policy, and (iv) movement building. The first European Planetary Health Hub convening in September 2022 was co-organized by the Planetary Health Alliance [12], the European Environment and Sustainable Development Advisory Councils Network (EEAC Network) [13], and ARTIS in Amsterdam, The Netherlands (for more background on the environment of the Convening at *Natura Artis Magistra* or ARTIS [14], see Supplemental File S3). These organizations saw a need for a European Hub given the Planetary Health leadership across the region, as well as the possibilities for Europe to become a more formalized global leader in Planetary Health given the fertile policy landscape. A total of 54 individuals, representing 34 organizations from 11 countries, attended the convening in person. The European Hub Convening opened with a speech from the Director of the Planetary Health Alliance, Samuel Myers, in the Planetarium of ARTIS on 26 September 2022 (Box 1).

2. Establishment of the European Planetary Health Hub and Its Working Groups

2.1. The European Planetary Health Hub

In November 2022, a nationwide consortium in the Netherlands was appointed to host the new European Planetary Health Hub secretariat. Day-to-day coordination will be jointly run by Maastricht University, Utrecht University, and the University Medical Center Utrecht (UMC Utrecht). The Hub's secretariat operates as a Community of Practice [7], sharing best practices, and facilitating activities within the Hub to foster their success.

The Secretariat's establishment followed the first inception meeting in Amsterdam in 2022. The concept note resulting from this meeting served as the basis for defining the mission, vision, priorities, and tasks of each of the Hub's Working Groups below. The Steering Committee that was formed organically consists of Prof. Pim Martens, Dr. Maud Huynen, Dr. George Downward, and Dr. Joyce Browne as scientific coordinators, and Dr. Lekha Rathod, Juliette Mattijsen and Martine Veenman are operational coordinators. The Hub can be reached through e-mail: secretariat@planetaryhealth.eu.

March 2023 marked the launch of the Hub's website [15], which was developed in close collaboration with the new Planetary Health Digital Working Group moderated by Ralf Klemens Stappen. The website provides a digital platform, serves as a knowledge base for the Planetary Health European Community, facilitates the four Working Groups to share their activities, engages with active and prospective members, and disseminates their knowledge and activities. The Hub's secretariat will stay in contact with its members via a monthly newsletter and various events (online and in-person) throughout the year. The Hub looks forward to collaborating with its members and regional hubs worldwide.

Box 1. Opening speech of Samuel Myers, Director of the Planetary Health Alliance, and Principal Research Scientist at Harvard T.H. Chan School of Public Health at the First European Planetary Health Hub Convening on 26 September 2022, at the ARTIS-Planetarium in Amsterdam.

The moment we are in requires excellent science and technological innovation, but it requires more than that. It requires of us our whole selves—our scientific rational selves and our artistic, emotional, spiritual selves. At its deepest level, the Earth Crisis and the associated global health and humanitarian crises are underlain by a spiritual crisis, a broken relationship between humanity and the natural world, between the wealthy and the poor, between today's and future generations. This recognition is the origin of the Constellation Project [1] of the Planetary Health Alliance and what brings such a diverse community into solidarity in this field.

Thinking about the emotions we all feel in this field – there are a lot of them, good and bad—there are three that I felt this morning which I thought I would share with you. The first is 'gratitude', enormous gratitude towards (the organizers) for hosting us and (staff and colleagues) for an enormous amount of fairly invisible work that has been going on over the last nine months to create the community you see all around us. The European network already consists of over seventy organizations from twelve countries, and I expect that number will continue to grow quickly, so thank you.

A second emotion that was mentioned earlier this morning, which I second, is 'pride'. Pride for being among you all, considering you are all my colleagues, and getting to be part of such an extraordinary group of mission-driven, hardworking, dedicated people. We are all collectively watching global society sleepwalking towards a cliff. We are not an academic community. This is not a community engaged in curiosity-driven research to build our own illustrious careers and win awards for how great our science is. We are a community forged in urgency, and we carry a critical message: we cannot any longer safeguard human health or the rest of life on Earth into the future, while the natural life support systems that we depend on are crumbling under the weight of our ecological footprint. That is a sober and obviously critical message. I think we as a group need to come together in humility and solidarity, because we are really the ones that stand in the position to wake up that society before we go over the cliff—to help move humanity onto a different trajectory. The final emotion, which was elusive for me this morning, came to me when I woke up and popped out of bed and went for a walk in the beautiful 'Oosterpark'. I was walking along and feeling something light and fluttery in my chest and it took me a while to figure out what it was. It was 'hope'. It has been a long time since I have felt that kind of hope. There is an extraordinary possibility at this moment. I hope the rest of you feel it. We have been watching the remarkable growth of this field, and even more importantly this global community of practice over the last few years. In the last year or so we have seen almost a tidal wave of new initiatives and organizations across Europe popping up like mushrooms after the rain. We have the combination of the EU, the support of the EEAC, the EU's funding apparatus with the new health and environment research agenda (HERA), the new Horizon agenda that is about to be released, both of which specifically single out Planetary Health as a focus area. Thus, we have a supportive government, the potential of funding and we have all this new activity, these new institutions that are popping up to embrace this moment. There is probably nowhere else in the world, based on what we have been seeing as a global alliance, with more fertile soil to become global leaders in showing the world what a planetary health transition can look like. It is an enormous gift to me personally to feel that kind of 'hope' and I trust that we will be able to carry that responsibility with us into the future.

2.2. *The Planetary Health Education Working Group*

The aim of the Education Working Group is to plan and implement the integration of Planetary Health into education and training at all levels, from nursery schools to professorships and from internships to corporate boardrooms, including developing and designing curricula and curriculum materials. A key facet of this is discussing the extent to which planetary health topics should be integrated rather than displacing or replacing existing learning and training [16,17]. For example, planetary health ethics [18] could be taught alongside medical ethics [19] or could be incorporated into the teaching of topics such as antimicrobial resistance by approaching such topics through a planetary health lens [20].

The vision of the Education Working Group is to ensure that Planetary Health is integrated into all levels of formal and informal education, taking into account the dimensions of knowledge (factual, conceptual, procedural, and metacognitive, as set out in Bloom's

taxonomy of learning [21–23]), the values on which the planetary health movement is built (such as those held in many indigenous belief systems [24] and its ethical code [19]), and the skills needed, such as health promotion [25], communication [26], and diplomacy [27], which can be established for all learners in formal and informal education. We believe that Planetary Health Education should be an integral part of formal and informal education, as it has the potential to increase learners' confidence in becoming agents of change [28,29]. This vision welcomes input from many disciplines, including but not limited to medical science, public health, global health, environmental health, veterinary science, One Health (defined as an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals, and ecosystems [30]), geography, Earth Sciences, urban planning, conservation, anthropology, tourism, agriculture, and humanities.

The mission of the Education Working Group is to build educational programs for Planetary Health leadership [31–33]. Such programs need to include ways to communicate Planetary Health and translate knowledge into community movements [34,35] while advancing and promoting the academic field and ensuring the translation of evidence into leadership action. The Working Group would like to see more than 10,000 trained experts by 2030, achieved through degree programs and continuing education across the EU and UK. This requires the creation of a consistent approach to Planetary Health Education in Europe across all educational stages, from primary school to postgraduate level, and across vocational and professional training, aligned with the Planetary Health Alliance Educational Framework [36]. We recognize that Planetary Health education may be as much about how topics are taught, such as through transdisciplinarity and by taking a systematic approach [37], as what is taught, particularly as Planetary Health curricula are embedded across different academic disciplines and departments.

The priorities for the Education Working Group include but are by no means limited to:

1. Recognizing that alignment with the Education Framework [36] and efforts towards implementation will be different at various academic levels.
2. Promoting the framework within medical schools and other vocational settings with consideration of where space for Planetary Health can be made without sacrificing other key and indispensable curriculum activities. This may require planetary health courses to be longer on average (e.g., four-year bachelor's or two-year master's) programs, or be delivered through additional summer school activities.
3. Developing strategies to reach present and future teachers and ensuring that their experiences remain up to date. This might include the development of summer school programs and online courses for professionals, liaising with professional colleges or chartered institutes, and promoting ongoing developments in planetary health through discipline- or sector-specific conferences, which will need to consider education for lawyers [38], economists [39], policymakers [40], and many other disciplines. Planetary Health education must not be just for or by medical or veterinary professionals, and will need to include teaching the teachers (see also Education for Sustainable Development [41]).

The activities of the Education Working Group include, but are not limited to:

1. Producing an inventory of existing academic activities by Hub members and non-members and collecting best practices as resources for others.
2. Mapping how planetary health themes are currently being taught across Europe, at all academic and professional levels.
3. Planning planetary Health outreach activities to academia, the public and wider sectors. These can be linked to existing science fairs and events. For example, the Planetary Health program for the public at ARTIS, Amsterdam, during the summer of 2023 [42] and the Planetary Health 'Living Museum' pop-up venue running at the 2023 British Science Festival in Exeter in September 2023 [43].
4. Agreeing on topics and methodologies to form the core of planetary health curricula.
5. Producing and sharing Planetary Health teaching materials and learning resources within and beyond the hub.

6. Providing mentorship and support to academics from all disciplines as they engage in Planetary Health.
7. Providing guidance and support for schoolchildren, students, and early career researchers interested in Planetary Health.

There are challenges to this vision that need to be identified and acknowledged: to be attractive to early career researchers and young professionals, there need to be clearly navigable career paths through the field of Planetary Health at all levels, with support from institutions dedicated to Planetary Health teaching, research, practice, and action. Initial Planetary Health higher education courses may be better framed as 'add on' PG Certificates to other programs (e.g., MPH), as a 'gap year' from medical training between academic and clinical stages, or as a period of practice (e.g., in policy, economics, or environmental law), on which the award of a Planetary Health degree is dependent. There are also opportunities, for example, to align with teaching on the Sustainable Development Goals through school geography programs, and Development Studies at the undergraduate level may be an ideal place to embed planetary health concepts in university programs. Embedding Planetary Health education into curricula at any level and discipline will need to be mindful of these opportunities and challenges. Challenges may be met in the short term by organizing summer school programs for the first generation of Planetary Health teachers and researchers, who can then cascade programs to their institutions as their numbers increase and their careers develop, supported by online material. Recorded lectures and Massive Open Online Courses (MOOCs) [44] can be created and stored centrally but downloaded and delivered locally by Planetary Health Alliance (PHA) members. The availability of shared core material raises challenges regarding intellectual property and the ownership of such material, considering that such material has been developed independently by Working Group members without core funding from a central agency [45]. In general, the creators of such materials are largely willing to donate them as a common good, which may not be a sustainable long-term model, particularly if some institutions use materials developed by others in courses that students pay to attend. Similarly, the aim of developing textbooks (in multiple European languages) for primary and secondary education will require a realistic funding model. Ambitious plans depend on a combination of the drive from members and funding to realize these particular ambitions.

The Working Group would like to see a network of 'garden schools' established across Europe [46,47] linked to the Planetary Health Next Generation Network [12]. Such a program can also help publicize small, local projects and connect communities of practice across the region, a model for which can be seen in the success of the Imperial College London Climate Cares Group's work with local schools, which has connected children and young people with Planetary Health educators and climate scientists. As this develops, the links between community groups and academics grow, with each learning from and contributing to the understanding of the other. Opportunities for the community to learn the new, practical skills needed for the green economy, from landscape gardening to electronic repair, are as important to the future of Planetary Health as new postgraduate training programs. Likewise, developing research groups and consortia will need to win funding from the Horizon program and other similar funding schemes to maintain initial enthusiasm and momentum. The complexity and interrelatedness of Planetary Health and its desire to keep at least one eye on the whole system while practicing two-eyed seeing [48] means that projects are large, complex, and consequently difficult to fund, particularly when educational budgets remain largely narrow, subject-specific silos [49,50], and academics are tied to discipline-specific departments to establish and advance their careers [51]. Restructuring education on Planetary Health will not occur overnight. Educators need support in navigating complexity theory (a theory that complex systems cannot be reduced to the sum of their parts but need to be studied holistically [52]), socioecological systems theory (in which systems where social, economic, ecological, cultural, political, technological, and other components are strongly linked [53]), and transdisciplinarity (concerning everything

between disciplines, across different disciplines, and beyond all disciplines [54]) to fully embrace Planetary Health as a career path [55].

In conclusion, the initial months of the Education Working Group have seen considerable progress: the mapping exercises outlined above have begun; regular online meetings of the Working Group are taking place, creating a robust network of planetary health educators at a variety of levels who are willing to share existing materials, experiences, and best practices. The Education Working Group has strong links to educators and education programs in other Planetary Health regions, particularly with the Eastern Africa Hub [56], which opens up opportunities for research partnerships, capacity building, PhD-student exchange, and shared summer schools [57,58]. Knowledge is shared across and beyond the network, and the network itself is consolidated and expanded. There is a wide interest in Planetary Health from medical schools and the healthcare sector [59], increasingly across a wide range of academic departments, and although less so at present from schools, promoting the field to schoolchildren and their educators should redress this in the future [60].

2.3. The Planetary Health Policy Engagement Working Group

The aim of the Policy Engagement Working Group is to support policymakers in Europe in adopting Planetary Health as a central line of thought in policymaking.

The vision of the Policy Engagement Working Group is that Planetary Health should be the central mindset of everyday life for all people, to safeguard a livable planet for future generations, and that, therefore, Planetary Health should be in all policies. We need to leverage scientific insights to promote planetary health-related policies while being mindful of the social and economic pressures on populations to ensure that such policies are actionable, more likely to be supported by electorates, and do not further disadvantage poor and marginalized groups by failing to support them through a green transition.

The mission of the Policy Engagement Working Group is to build bridges between researchers and policymakers in Europe (on local, regional, national, and EU levels) to promote Planetary Health as a central line of thought for policymaking. We want to be an interface between views and insights from members of the Planetary Health European Hub and governments, parliaments, and other relevant (academic) actors in the European area, to further strengthen the evidence base for Planetary Health and the position of Planetary Health on the political agenda, to further integrate the concept of Planetary Health and sustainability into various policies, strategies, and policy agendas, and to support enhanced policy coherence and vertical coordination in support of Planetary Health at international, national, regional, and local levels.

The priorities of the Policy Engagement Working Group are as follows:

1. Awareness raising: Policymakers, advisors, and the public (including families and children) on the concept and leverage of Planetary Health as well as on the existence of the European Hub as a framework for external decision makers to gain access to cross-sectoral knowledge. Provide a platform for disseminating information and signposting reliable sources.
2. Policy dissemination and analysis: share and analyze relevant policy initiatives that deal with Planetary Health strategic priority areas, strengthen the information base of organizations that are part of the European Planetary Health Hub, and identify subjects and time windows to provide timely and relevant policy advice on behalf of the Hub.
3. Policy advice and advocacy: Provide a platform to transfer scientific knowledge and informed recommendations to European governments, parliaments, and other relevant (academic) actors at all levels on Planetary Health strategic priority areas. Provide advice and advocate for Planetary Health.
4. Capacity building: Create knowledge and skills on the Planetary Health approach (human, administrative, digital, strategic, and operational) in more than 2500 local and regional administrations in the EU. Development of blueprints/operational

methodologies for national, regional, and local Planetary Health Operations Plans, which build on and optimize existing frameworks such as climate protection and national sustainability strategies. Creativity is required in capacity building, as health services are overstretched and waiting times are very long, and the relationship between human and Planetary Health must be clearly aligned for efficacy.

The activities of the Policy Engagement Working Group include, but are not limited to:

1. Have online working group meetings once every one to two months. In addition, have live meetings linked to Planetary Health events.
2. Identify and contact organizations that are not (yet) part of the Hub but are vital for the Hub's work and impact.
3. Identify, select, and initiate channels for various types of policymakers through which the working group can conduct communication and awareness-raising activities.
4. Create narratives and communication tools (e.g., slide decks) on Planetary Health in the language of policymakers, advisors, and the public. Use their wording, short and crisp, recognizing frames.
5. Involve youth organizations and youth departments of political parties, for example, by inviting them to Planetary Health events.
6. Identify Planetary Health Strategic Priority Areas that can be used to disseminate policies and analyses. Selection should be based (pragmatically) on expertise within the working group and strategic timing (for example, related to EU legislation planning or other policy cycles).
7. Identify current and proposed policies in which the concept of Planetary Health can play a role (with an eye on the status of policy cycles). These insights can be used to support policy dissemination and analysis and plan awareness-raising and advising in a targeted and timely manner.
8. Create collections of policies (best practices, content, narrative, mechanisms, success/fail factors) and policy briefs (describing the scientific bases for policies). Lack of awareness of local policies and translations could be potential issues.
9. Push for or organize research on promoting co-benefit policymaking and how to analyze, assess, and evaluate policy documents on their Planetary Health content.
10. Produce policy briefings (in the format of, for example, UK Government POSTNote briefings) informed by evidence of key priority areas, focusing on interrelatedness and systems thinking, with practical examples and/or good practices for Planetary Health concerns. Provide practical information on the results and costs whenever possible. Participate in public consultations on policies, strategies, and programs to provide research evidence, scientific knowledge, and informed recommendations.
11. Coordinate the drafting of clear, factual statements in which scientific knowledge and informed recommendations are gathered on behalf of the member organizations of the European Planetary Health European.
12. Organize policy dialogue sessions/workshops (in person and virtual) to take place alongside key policy events (for example, the World Economic Forum, World Health Summit, G7/G20 meetings that take place in the European Region), or other useful settings. Such sessions should help to position the European Hub as a framework for supporting governments in implementing and evaluating potential Planetary Health solutions, to break down silos that inhibit system-wide approaches, and to consult with governments and philanthropic organizations to properly fund cross-sector solutions to key Planetary Health challenges.

2.4. The Planetary Health Research Working Group

The aim of the Planetary Health research Working Group is to develop and contribute to a transdisciplinary research agenda for Planetary Health.

The vision of the Research Working Group is to identify research priorities in Planetary Health which European Members should prioritize for their activities aligned with the European Planetary Health Hub's advocacy plan and vision of success for the EU, including

changes in policies, administrative structures, healthcare delivery, or funding and finance. In the Health Horizon Europe Work Program 2023–2024 [5], there is a call on planetary health aimed at understanding the links between environmental degradation and health impacts. In particular, climate change, biodiversity loss, environmental pollution, changes in land use and degradation, deforestation, thawing permafrost, overfishing, and water acidification are considered to be the causes of reduced food and water availability and security and increased exposure to factors causing infectious and non-communicable diseases.

The mission of the Research Working Group is to bring together European Planetary Health Alliance members and their key non-European partners to ensure that world-class transdisciplinary research is undertaken to address the strategic priorities of the Planetary Health Alliance. Horizon Europe and the Green Deal offer enormous opportunities for promoting and strengthening Planetary Health.

The priorities of the Research Working Group are to 1. support, stimulate, and facilitate institutions in adopting a Planetary Health approach, 2. identify key research and operational methodologies and transdisciplinary approaches essential to planetary health, 3. develop guidance and share best practices, 4. build and support multi-center, multi-discipline research consortia to bid for and undertake large research opportunities, 5. develop and run summer schools in various locations on planetary health for prospective and existing planetary health researchers and students, focused on transdisciplinary working, 6. identify potential research bids appropriate to Planetary Health researchers and advertise these in the membership, 7. disseminate and communicate research findings through a variety of methods to various focus groups (politicians, policy makers, decision makers, administration, professionals, and public), 8. conduct research to understand how paradigms in medical practice may be impacted by Planetary Health, considering the role of the doctors and nurses, and systems thinking that may help doctors to improve diagnoses and management decisions, 9. develop and support infrastructures that enable transdisciplinary research on PH, including digital infrastructures for FAIR and open data, 10. identify barriers and resistances that have prevented accelerated sustainable development in the areas of PH such as climate protection and biodiversity in state and society over the last 25 years, 11. develop a basic consensus for an epistemological and operational PH-framework that can integrate the multitude of heterogeneous disciplines, approaches, and methodologies with a strong focus on implementation research to close the Know-Do Gap [6], 12. develop a basic consensus for a ‘Hippocratic Oath for Planetary Health’ [61], based on medical ethics, humanistic and spiritual traditions, as well as global bioethics and the ideas of Joseph Rotblat [62], which ‘regulates’ the cooperation among each other and with the governmental and public sectors, as well as society.

The activities to be developed include (i) biannual sandpit workshops to identify and discuss priority topics and actions, (ii) running summer schools, (iii) developing communication plans to disseminate research results for various stakeholders, (iv) creating and maintaining an up-to-date and accessible research partner Hub membership list, and (v) developing an operational Planetary Health methodology for integrative theory-practice Planetary Health approaches to solve complex problems.

The Planetary Health Research Working Group has developed a webinar series to share research expertise and explore opportunities for collaboration. A list of interested parties was compiled for joint research opportunities (Supplemental File S1), including those presented in the Health Horizon Europe Work Program 2023–2024 [10]. The key message from the webinars facilitated by the Research Working Group is summarized in the following paragraph.

Planetary Health has emerged as a new, transdisciplinary approach. In some disciplines, such as medicine, Planetary Health could be a paradigm shift, similar to evidence-based medicine. Experiencing paradigm shifts is a relatively uncommon event in the individual lives of scientists. Individual academic trajectories in Planetary Health may differ across disciplines, from an abrupt shift in one discipline to a natural paradigm evolu-

tion in the other. Sharing different individual trajectories may facilitate transdisciplinary dialog on Planetary Health. Scientific dialog across disciplines is hampered by the use of various concepts, approaches, methods, and even social and cultural constructs. Sharing personal experiences of embracing the Planetary Health approach may help facilitate mutual understanding, cross-disciplinary empathy, and collaboration [63].

2.5. *The Planetary Health Movement Building Working Group*

The aim of the Movement Building Working Group is to build a movement that can effectively address Planetary Health challenges by connecting Planetary Health initiatives among the European PHA Hub working groups, as well as within the (international) society as a whole.

The vision of the Working Group emphasizes that a characteristic of a flourishing and resilient ecosystem is diversity and cultivating the quality of these diverse connections. This is accomplished by incorporating the principles of transition dynamics, how to create individual and community resilience, and the importance of storytelling and the arts. It is important to acknowledge the past, the present, and the future. Reflecting on lessons that can be learned from the past on movement building will help us gain an understanding of best and worst practices and theories. Sharing thoughts and experiences on movement building aims to foster the envisioning and identification of next steps, both individually, in networks and by the Planetary Health Hub Europe. Starting by cultivating active listening principles and moving towards ‘active hope’, thereby creating space for (re)connection and sharing of thoughts and feelings [64].

The mission of the Working Group is to make the social Planetary Health movement in Europe and beyond grow, flourish, and strengthen by creating strong connections and providing inspiring interactions for planetary stewardship that speak to the heart. We would also like to ensure that movement building will be embedded as a ‘cross-cutting principle’ among the other (education, research, and policy) Planetary Health Working Group strategies.

The Priorities include (i) identifying a core group of four to six members of the PHA Europe Movement Building Working Group who are willing and able to take a leading role, and (ii) organizing an online meeting with this core group in the short term to discuss: (a) the top three topics or activities on which the PHA Europe Movement Building Working Group would like to mobilize and connect. The number of joint actions should be limited to maximize the chance of success and impact and (b) the main mission, vision, ambition, goals, and themes. Finally, we determine the top three joint strategies. Then, collaborate as well as possible, with clear PR, visualization of what is happening and how to create opportunities for new people to get involved easily; (c) how to get or stay involved in the other three PHA Europe Working Groups and to evaluate their activities and plans through a movement-building lens, to ensure that all joint activities are translated into concrete action; and (d) exploration of the time expenditure needed and possibilities for financial compensation.

The activities need to be further discussed with the Planetary Health Alliance Movement Building core group (see the above paragraph) but include at least the following: (i) Organization of a movement building workshop at the Planetary Health congress at Artis on the 6–7 July 2023, and (ii) identification and mapping of the current Planetary Health movements in Europe, and examination of their ‘who, what and how.’ Their identities and actions can be clarified using the toolkit ‘Cycles of Movement Building—Rising Up, Building Up, Standing Up and Shaking Up’ [65]. Inspirational examples include the Falling Walls Foundation [66], Planetary Health Hub NL [67], and Permaculture Action Network [68].

To achieve our goals, as a European Planetary Health Hub, we need to communicate, connect, and conduct community activities for planetary stewardship: (1). connect to serve as a connector across European and key non-European Planetary Health partners. To identify, highlight, engage, and connect the numerous already existing Planetary Health

grassroots movements; (2). communicate: inspire and motivate other individuals and groups to engage and become involved in the Planetary Health movement; and (3). conduct community activities: connect minds, hearts, and souls through cross-pollination between science, activism, citizenship, and arts. This requires both the organization of meetings and workshops, as well as activities with music, dance, and storytelling. We see the importance of interacting regularly to facilitate quarterly meetings that aim to share successes, inspire, and foster collaboration. Before becoming a movement, it is essential to acknowledge the importance of group formation as a Hub. A sense of community for this Working Group is represented by four elements that can be measured through Membership, Influence, Integration and fulfillment of needs, and shared emotional connections [69].

3. Artwork-Inspired Perspectives on Planetary Health

During the first European Planetary Health Hub Convening, the artist collective 'De Beeldvormers' sketched five drawings. 'De Beeldvormers' created images that contribute to the way we perceive the world around us [70]. The drawings tell the story behind a specific theme and allow us to look closely and contribute to the development of the five perspectives described below. Such creative, imaginative approaches positively influence normative value systems, such as the power of inspiration, with the profound example of the Apollo 8 Earthrise, which incited a fledgling planetary health movement over 50 years ago [71]. All attendees were asked to select the drawing that was most appealing to them and write their perspective inspired by the image on the drawing. The various perspectives for each image were merged into a joint effort by the Hub members resulting in the texts accompanying the five sketches below.

3.1. To the Backbone

The Planetary Health Convening in Amsterdam was a unique opportunity to meet a large group of colleagues from diverse backgrounds, all motivated by a new way of understanding human health, which essentially implies thinking about human health in close connection with the health of all living beings and Earth's natural systems [72]. The ARTIS meeting was a special event. It was possible to feel a shared excitement for a new approach to the global challenges of the Anthropocene. It was comforting to see a broad agreement on some key concepts, such as the need to urgently promote transformative actions, the importance of a better understanding of the complex systems that intertwine our health with that of Earth as a whole, as well as the challenge of a new type of transdisciplinarity. However, at the Convening at ARTIS, one could also see the difficulty of establishing fluid communication between disciplines as we speak slightly different languages, and how this difficulty, at some moments, was captured by the artwork 'To the backbone' (Figure 1), mimicking the paralysis we sometimes face in front of complex, wicked problems.

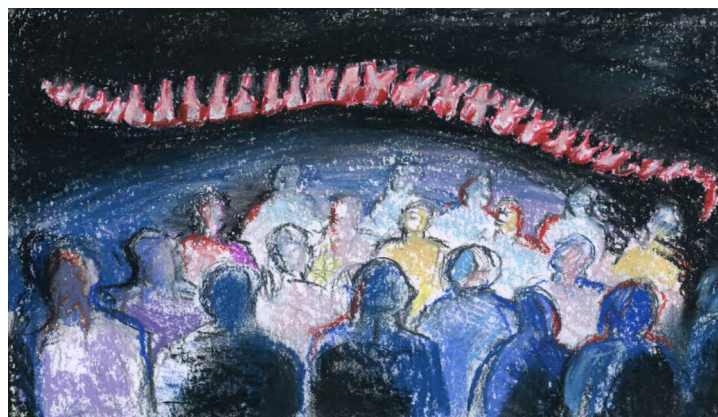


Figure 1. The artwork 'To the backbone' sketched by the 'Beeldvormers' during the European Planetary Health Hub convening at *Natura Artis Magistra* in Amsterdam, 26–27 September 2022.

Scientific evidence has shown that human activities contribute to global warming, biodiversity loss, land degradation, the loss of natural resources, and pollution [73,74]. Therefore, Planetary Health is threatened [75]. While scientific information about these threats is available, actions to safeguard human health and the environment are limited. The European Planetary Health Hub can bring together information and format it in ways that are accessible to decision-makers. We can collaborate by sharing good policies and practices at different levels—local, regional, national, and international [76] to release the paralysis. Now, when Planet Earth is ‘knocking on our door’ [77], we should come together, be enlightened, and hopefully speed up action towards healthy people and the healthy planet that is needed at all levels and all sectors.

3.2. Sketching the River of Hope and Progress

Conventional science does not match well with current complex Planetary Health challenges. There is an urgent need ‘to find new ways to encourage transdisciplinary research teams to investigate scientific questions of societal importance and to develop, reward, and promote students and academic staff pursuing a research agenda informed by the Planetary Health framework’ [72]. This is what we have tried in Amsterdam, and it is well represented in the artwork ‘Sketching the river of hope and progress’ (Figure 2).



Figure 2. The artwork ‘Sketching the river of hope and progress’ sketched by the ‘Beeldvormers’ during the European Planetary Health Hub convening at *Natura Artis Magistra* in Amsterdam, 26–27 September 2022.

Like a river, the urgency to expand our research and education, each in our own field, makes us move forward towards the sea of the future. Hopefully, this is a colorful future. In this river, we see this hope that, despite the difficult times we are living in, through progress and innovation, we will find solutions. These will come faster and better by collaborating; as in the artwork, we are all putting our ideas together on paper and implementing them through our studies in real life. This is primarily a question regarding attitudes and culture. In an open transdisciplinary approach, disciplinary confinement is not self-evident. We seek to approach gaps in our knowledge from a systemic, social-ecological perspective in order to deliver actionable outcomes to society. We open constricted disciplinary silos that are not suited to tackling the big issues confronting humanity and fly the multi-colored banner of imaginative transdisciplinarity, social justice, and multiplicity.

Education is one of the main sources of this river. We will work to embed Planetary Health in the curricula and training of health and care professionals [78] to provide students, young professionals, and staff with knowledge and skills to work in a transdisciplinary manner. This implies a curriculum revolving around real-world experiences, respectful

but without regard for discipline-specific understanding, and manifestly inclusive when it comes to regenerative cultures and voices of minorities that are commonly excluded through the dynamics of epistemic injustice [79]. Our planet is in danger. Because our health depends on the health of the planet, we all are. That is why we act, out of lust for life, out of the professional obligation that comes with being a scientist, out of civic responsibility, out of hope, and affection for all our loved ones. We will turn the hourglass and proceed to reinvent the deep, meaningful reciprocal relationship between people and nature with the environment at large. While the political will is not yet there, new transformative coalitions strive to strengthen awareness and determination for change towards a sustainable and just society. The river and sea are one. Like the Greek philosopher Heraclitus' dictum, 'Everything flows' [80], and we will sit and work near the river, involving an increasing number of people to deepen our knowledge of Planetary Health. Based on our results, we will try to implement ways to better protect the planet and keep it safe for future generations.

3.3. The Earthrise

Scientific research is increasingly demonstrating the dramatic effects of pollution and climate change on Planetary Health, with a steadily increasing and now incontrovertible production of data and evidence. Despite this, people's behaviors and knowledge are struggling to change, reflecting a gap between scientific evidence and habits. Therefore, this condition slows down the possibility of putting concrete actions into practice to fight climate change, which have broad and lasting involvement and lead to real changes in living habits. Therefore, it is critical to raise awareness regarding issues such as biodiversity, marine and freshwater pollution, air pollution, water scarcity, sustainable transportation, clean energy, and food production. However, in addition to transferring and disseminating knowledge, it is also necessary to engage and empower citizens to change their behavior. In this context, the European Planetary Health Hub can combine teaching methodologies and share good practices to ensure a broad citizen involvement. Thus, it will be possible to leverage this common knowledge to implement teaching courses involving students, professionals, and citizens to ensure the dissemination of information and to provide useful tools to foster lifestyle changes. As in the artwork 'The Earthrise' (Figure 3), we can try to foster a new birth of the Earth, starting with the education of its inhabitants, because education is the real engine of societal change.



Figure 3. The artwork 'The Earthrise' sketched by the 'Beeldvormers' during the European Planetary Health Hub convening at *Natura Artis Magistra* in Amsterdam, 26–27 September 2022.

3.4. Everything Is Connected

Symbiosis has a significant track record in the history of thriving natural development [81]. The dependency on uncountable connections, especially those that remain underneath the surface, as depicted in the artwork 'Everything is connected' (Figure 4), is the underlying complexity of thinking that requires more appreciation in our pursuit of development. However, the common interpretation of terms, such as health and well-being, fails to consider the environment, social context, and biodiversity; they fall short of their human point of view. Therefore, the views of the industry and government regarding sustainable development have been subordinate to the dogma of economic growth and have limited their focus to human communities as our place of living. How shortsighted this is, has been illustrated by the various outbreaks of zoonotic diseases, including the recent coronavirus pandemic, the current climate crisis, and a global decline in biodiversity [73,74,82]. Planetary Health is a necessary narrative that provides the widest possible framework for action. It is the original foundation of sustainable development that strives for positive regenerative development to make the planet—and everything on it—healthy.



Figure 4. The artwork 'Everything is connected' sketched by the 'Beeldvormers' during the Planetary Health European Hub convening at *Natura Artis Magistra* in Amsterdam, 26–27 September 2022.

The recent coronavirus pandemic has nurtured innovation, expanded communication networks in alternative ways, and strengthened thinking about the importance of respecting nature [82]. Both art and science have recognized the importance of a genuine return to nature and have found ways to deal with major challenges in daily life, such as the pandemic crisis, climate change, and migration, as well as providing sufficient water, food, and energy for everyone [72]. Planetary Health imposes itself as a path towards finding a solution with space for all scientists, including both the natural and social sciences, artists, decision-makers, and citizens. The threat of an ongoing environmental crisis can be frightening and demoralizing, and focusing on a narrative of hope and possibilities for a healthier future can be a strong argument to empower and reinforce behavioral change [83]. The change in mindset and behavior is a condition for achieving the goals of the Planetary Health concept. Health professionals play a vital role in this transformation to a less selfish and non-anthropocentric future of health [84]. Using storytelling and depictions of feasible

solutions could benefit engagement with environmental problems and positively influence the growth of connections among previously untapped audiences [85].

In line with the concept of symbiosis, the first European Planetary Health Hub convening was a gathering to celebrate and establish further connections. Ambitions for research, policy, and education were created in the thought-provoking environment of ARTIS. Movement building is a key priority for the success of Planetary Health in Europe. A movement to cultivate respect for our planet, therefore respecting life and ourselves. It is time to achieve sustainability at the next level.

3.5. Entangled with Microbes

The earliest signs of life on Earth are fossilized microorganisms, which are considered to be over 3.7 billion years old [86]. All other life forms, including humans, have evolved in the microbial world and have developed a wide variety of symbiotic relationships with microbes [87]. The study and appreciation of our connections with invisible life forms, as depicted in the artwork 'Entangled with microbes' (Figure 5), may provide important answers for the current planetary challenges we face, as nicely framed by Susan Prescott in her book, *The Secret Life of Your Microbiome*: 'I believe that the solutions to many planetary dilemmas would lie in understanding the complex symbiotic interconnections between all things, from the level of microscopic microbial ecosystems that reside within us, to the myriad of environmental ecosystems that we reside in and completely depend on for our survival' [88]. This statement matches well with the mission at ARTIS-Micropia, the world's first microbe museum, which aims at improving 'microbe literacy' in our society [89]. Microbes, in particular bacteria, are not only involved in all nutrient cycles on Earth but also form a connection between biodiversity in our natural environment and the microbial biodiversity in the gut (the gut microbiome), providing an essential link to human health. To put this in a broader context: to restore human health, we must, in multiple ways, restore our relationship with the natural environment.



Figure 5. The artwork 'Entangled with microbes' sketched by the 'Beeldvormers' during the European Planetary Health Hub convening at *Natura Artis Magistra* in Amsterdam, 26–27 September 2022.

4. Conclusions

The First European Planetary Health Hub Convening at ARTIS in Amsterdam provided a solid basis for an effective transdisciplinary network required to address the scope, urgency, and complexity of Planetary Health challenges. We established a strong European foundation to contribute to the local, regional, national, and global transformations needed for sustainable, just, and equitable societies that flourish within the limits of the biosphere

and our ecosystems. We look forward to welcoming new members and collaborate to realize a future in which future generations can prosper.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/challe14030033/s1>, Supplemental File S1: Agenda of the first European Planetary Health Hub convening; Supplemental File S2: Background of Participating Organizations; Supplemental File S3: Background of the Convening environment at ARTIS.

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