

## The Planetary Health Alliance: A Concept Note to the Rockefeller Foundation

### BACKGROUND

By most metrics, human health is better today than at any time in human history. Over the past several decades, life expectancy has soared from 48 in 1955 to 70 in 2012. In 1955 there were 21 million deaths in children under the age of five; by 1997 that number was more than halved to 10 million. These advances have occurred coincident with a vast degradation of nature's ecological systems, again on a scale never seen in human history, leading to what some have termed the Ecological Paradox. Numerous global assessments from the GEO 4, to the Millennium Ecosystem Assessment, to the IPCC reports have warned that accelerating change to the structure and function of Earth's natural systems represents a significant threat to global human health. And yet, global health has mainly improved as these changes have accelerated.

How is this possible?

The explanation is straightforward and sobering: we have been mortgaging the health of future generations in order to realize economic and development gains in the present. By mining nature's resources at an unsustainable rate, global societies can flourish in the short term, but face significant health impacts from the degradation of nature's life support systems over the longer term. It's become undeniable that human activity is rapidly transforming most of Earth's natural systems. The global health impacts of accelerating climatic disruption, land degradation, growing water scarcity, fisheries degradation, biodiversity loss, and pollution threaten the global health gains of the last several decades and are likely to represent the dominant global health threats of the next century. By altering the composition of the atmosphere, degrading arable lands faster than they can be replenished, overfishing, polluting, and changing the chemistry and temperature of our oceans, withdrawing ground water faster than it can be recharged, and dramatically reducing the number and population size of species who co-inhabit the planet with us, we are putting the poor and future generations in harm's way. *It is striking that many assessments of future challenges for global health entirely overlook the potential for significant environmental changes to disrupt and potentially reverse the marked progress that has characterized recent human history.* Current environmental trends indeed raise the grave prospect that many of the health gains we have recently experienced have been fueled by a pattern of resource use that is fundamentally unsustainable. It thus appears that these gains are built on shaky foundations, and that an urgent course correction is required, one that recognizes that the health of the environment and the health of humanity are inextricably linked.

The scale of anthropogenic change to Earth's natural systems is difficult to overstate. The combination of exponential growth in the human population with rapid growth in per capita income has led to an extraordinary ballooning of humanity's ecological footprint. Most measures of human impact on ecological systems show similar patterns: a gradual rise in impact over the

first part of the nineteenth century with a very steep rise in impact starting around 1950 and continuing today<sup>1</sup>. We human beings now appropriate between one third and one half of global ecosystem production for our use. We have converted more than half of the ice-free, desert-free land surface of the planet to cropland or pasture. We appropriate roughly one half of the accessible freshwater for human uses. We have cut down about half of the temperate and tropical forests globally and are fishing greater than 80% of monitored fisheries at, or beyond, maximum limits. We have placed dams on roughly 60 percent of the world's rivers and are driving species extinct at roughly one thousand times baseline rates. Those species which still exist have seen their population sizes cut in half over the past 45 years.<sup>2</sup> As a consequence of these and other impacts, humanity has become a primary determinant of Earth's biophysical conditions, giving rise to a new term for this geological period: the Anthropocene<sup>3</sup>.

In short, much has been written about the social and economic determinants of health but all too often the need to address these determinants within finite environmental limits has been overlooked. Now is the time to transform the discipline of public health into one that integrates knowledge of the underpinning earth systems with understanding of the determinants of health and develops evidence-based, integrated policy solutions that address environmental sustainability together with human health and development goals.

## INTRODUCTION

The Rockefeller Foundation-Lancet Commission on Planetary Health has thus recognized an urgent need to support the growth of an interdisciplinary field at the intersection of accelerating global environmental change and human health—the field of Planetary Health. We propose to address this need through the formation of the Planetary Health Alliance—a next generation of the Health & Ecosystems: Analysis of Linkages (HEAL) effort that the Rockefeller Foundation has been supporting since 2009. The Alliance, a consortium ideally comprised of academic, nongovernmental, and governmental partners, would be based at the Harvard University Center for the Environment (HUCE) and the Harvard T.H. Chan School of Public Health, and would support the growth of a robust field of planetary health across the United States and globally.

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<sup>1</sup> Steffen W, Broadgate W, Deutsch L, Gaffney O, Ludwig C. The trajectory of the Anthropocene: The Great Acceleration. *The Anthropocene Review*; 2015.

<sup>2</sup> Living Planet Report; 2014.

<sup>3</sup> *Anthropocene*: a proposed (not yet formally recognized) term for a new geological epoch demarcated as the time when human activities began to have a significant global impact on the Earth's systems. Several dates have been proposed to mark its beginning.

The Commission’s Report recommends that we “expand trans-disciplinary research activities and capacity substantially and as a matter of urgency” in order to “address significant gaps in knowledge through research including the links between health and environmental change.” The Report notes that:

Research funders and the academic community frame what questions get asked by scientists and can steer development of new ways of addressing massive gaps in knowledge, scientific awareness and academic focus. Planetary health as a field straddling many silo-ed disciplines demands investment and the development of a culture of inter-disciplinary research. The health research community should forge links with the full range of relevant disciplines in the natural, physical and social sciences to understand complex systems and evaluate potential policy solutions.

To achieve the goals outlined in the Commission Report will require educating the next generation of planetary health scholars, supporting their research efforts, and helping to forge a cohesive community of practice. It will also require focused efforts to improve the funding environment for research in this field and for proactive outreach to global health and environmental leaders so as to move this science into policy and action—leading to more robust, rational policy and resource management decisions that incorporate both important environmental *and* human health outcomes.

## FORGING A COMMUNITY OF PRACTICE

Generating a community of practice from across a variety of disciplines requires creating common ground. Educational materials, a shared literature, a common source of communication about new scientific findings, alerts regarding job opportunities and meetings, shared methodologies, protocols, and datasets, and an online journal club are ways to generate this common ground and stimulate the growth of the field. With support from the Rockefeller Foundation, the Planetary Health Alliance would perform several functions:

### A. Develop a Professional Community of Practice

1. Foster the community with shared tools, literature, data resources, and input into the Planetary Health (PH) field
  - a. Establish and coordinate a network of scientists and practitioners
  - b. Engage the Community of Practice in the strategic design of the emergent discipline of Planetary Health
  - c. Develop protocols for best methodologies and practices (sharing methods, tools, and data) to support young investigators.
  - d. Utilize practitioner and policy-maker input to inform research questions, increasing likelihood of downstream uptake and application of science generated
  - e. Publish a monthly e-update on new research, professional opportunities, meetings, etc related to Planetary Health.

- f. Create a “virtual review board” of respected research scientists who have agreed to be available to journals which need referees for trans-disciplinary, Planetary Health-related research and policy products. It is often an enormous challenge for even the most respected journals to have articles that span multiple disciplines reviewed by appropriate reviewers. By providing a list of scientists and other practitioners working in Planetary Health and accustomed to trans-disciplinary approaches, we could improve the review process for numerous journals and remove a significant hurdle to publishing this type of work.
2. Training of young investigators:
    - a. Develop teaching materials for a publicly accessible web-based platform to assist faculty around the world in designing and teaching courses on Planetary Health. Materials would include short, videotaped lectures from experts around the world and representing multiple disciplines on PH topics. PowerPoint slides, course syllabi, and links to other content would be included. The goal is to facilitate the “inverted classroom” model whereby students access lectures and supporting material online and classroom time is used for discussion of the material and questions. University affiliates of the Planetary Health Alliance would pilot these materials in courses at their sites, including a new course to be taught at Harvard. An EdX course on Planetary Health, accessible to a global audience, would also be developed using these materials.
    - b. Create a new, web-based textbook on Planetary Health.
    - c. Build a curated bibliography maintained by core faculty and staff to help trainees identify important core literature and new papers. This is particularly important as there is no single disciplinary journal which captures the relevant literature of this field—one of the challenges of such trans-disciplinary work.
    - d. Create an online journal club accessible globally with a faculty drawn from Planetary Health Alliance institutions and others to identify and discuss new literature, methods, and datasets on a regular basis.
    - e. Generate a curated index of datasets available globally to ask and answer questions about global environmental change and human health. Often these datasets are not well known, particularly to new investigators. Part of the curation could be to provide contacts of investigators with familiarity with these databases who could provide some orientation for new investigators, which can be enormously helpful.
  3. Convenings:
    - a. Annual Meeting of the Planetary Health Alliance Community of Practice—designed along the lines of professional society meetings (like the American Public Health Association meetings) to share research developments, approaches to influencing

policy, new methods, new datasets, networking opportunities, and job announcements).

4. Planetary Health Fellowship:

- a. There is a dearth of post-doctoral fellowship opportunities that allow young investigators to work across disciplines related to human health and environmental change. The fellowships tend to track along strict disciplinary lines, and interdisciplinary fellowships are extremely limited. We propose a high profile fellowship (perhaps the Rockefeller Planetary Health Fellowship, if appropriate) which would be competitively awarded by a Review Committee. Applicants would be encouraged to address gaps in PH knowledge by moving beyond their strict disciplinary backgrounds to work across disciplines in addressing an important, and inadequately researched question in Planetary Health. In addition, each cohort of fellows would be expected to spend 10-15% of their time supporting some of the core functions outlined above including maintaining the online journal club, assisting with convenings, developing educational materials, working on a text, etc. according to their interests. Because of its interdisciplinary nature, few graduate departments, if any, offer training of the scope needed to address many of the gaps in planetary health knowledge. Classes of scholars would be selected to bring together individuals with backgrounds across critical areas, and offer them further training in the context of a community focused on planetary health. Entraining scholars at this early point in their career will help build the foundations for a community with the skills needed to address emerging critical questions.

## **POLICY SUPPORT**

All of the major research recommendations within the Report of the Rockefeller Foundation-Lancet Commission on Planetary Health are accompanied by a description of their primary policy relevance. A strong theme is the need for outreach to the policy community around issues of Planetary Health. The report underlines the need to “improve risk communication to policymakers and the public” and to “support policymakers to make evidence-informed decision making.” “A transparent interdisciplinary process of research agenda setting is needed, which takes into account the needs of decision makers and builds on the restricted knowledge available.” In short, there is an urgent need for the Planetary Health community to inform ongoing local, national, regional, and global policy discussions, and vice versa.

The Planetary Health Alliance needs:

- knowledge of the necessary decision support tools and types of scientific data (at what spatial scale, level of certainty) that decision-makers need
- understanding of the relevant national and multilateral contexts and priorities; and

- relationships which enable the identification of entry points into existing policy processes at relevant national and multilateral levels.

The Commissioners on the Rockefeller Foundation-Lancet Commission on Planetary Health clearly believe that degradation of ecosystems often leads to negative public health impacts. Unless, however, these impacts are proven and quantified in actionable ways, they remain vague externalities that are not factored into decisions about public health or natural resource management. The emergent field of Planetary Health must be more than academic in nature, and if proactively conceived in the context of recognized policy gaps and needs, it is poised to deliver powerful new and convincing arguments that demonstrate the range of critical relationships between the state of natural systems and health.

As we have seen through our HEAL-related policy efforts, there is a ‘policy appetite’ for the type of integrative thinking that underpins our work. Collaboration has been ongoing with UN and other multilateral groups including (for example) the World Health Organization (WHO), the Food and Agriculture Organization (FAO), the Convention on Biological Diversity (CBD), and the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), and is already bearing fruit. As an example, our work helping to develop the guiding analytic framework for the IPBES has led to health being *a required metric in terms of how countries will quantify the values of various ecosystems and ecological processes*. It is fair to say that without our science and direct engagement, the public health-related valuation of conserved ecosystems, despite how large this valuation increasingly appears to be as our science delves deeper, would have been neglected in this first-ever global attempt to better account for and thus manage the world’s ecosystem services. Effective science to policy mobilization helps maximize the impact of PH research activities at a time when there is increasing focus on human development that considers the co-benefits of environment and health interventions (e.g., Sustainable Development Goals, UNFCCC-COP21).

Working at local and national scales, we are seeing policy uptake in our primary field research sites—again by design. Our Rockefeller Foundation-supported work in Madagascar investigating the importance of ecosystem integrity to the dietary diversity and nutritional status of vulnerable Malagasy populations has become widely used by health and development practitioners in the country. Dr. Chris Golden has been working closely with Dr. Herlyne Ramihantaniarivo (Dr. Ihanta), the Director General of the Malagasy Ministry of Health. She has personally visited the Harvard School of Public Health as our guest, and has been closely following our work throughout the research and analytical phases. She is the most influential decision-maker in Madagascar when framing strategic plans to improve health and rural development in the country, and is primed to use our work to frame the country's future vision of health and food security. In concert with our work with Dr. Ihanta, we have also been working with UNICEF-Madagascar so they can use our results and analysis for all of their future nutritional programming (a very important applied policy outcome). Bringing cutting edge science to influence policy, a Planetary Health approach is already making a real difference in affecting the

health of the Malagassy throughout the country, while simultaneously supporting environmental stewardship. This could not be more important in a place that is the 5<sup>th</sup> most stunted country in the world, and where 94% of the population lives on less than \$1 per day.

The Planetary Health Alliance would continue building upon experiences and lessons learned from HEAL and expand its active engagement with many of the groups described above by taking advantage of the globally distributed in-country presence of PHA partners like the Wildlife Conservation Society (WCS) and the WCS Health Program as overseen by HEAL founder Dr. Steve Osofsky. Paired with our extensive field contacts and in-country relationships would be the convening power of the Harvard Kennedy School of Government. With support from Dan Schrag, the newly appointed Director of the Kennedy School's Science and Technology Public Policy Program, PHA would have the opportunity to bring world leaders together at policy/resource management fora at Harvard as well as organize regional workshops to address PH topics of regional significance. We believe that this combination of "bottom up" field presence and networking with "top down" convening authority would be a powerful combination in injecting PH analyses into policy and resource management deliberations.

For example, we anticipate a regional conference in sub-Saharan Africa to discuss subsistence and artisanal fisheries management and its significant human health implications for coastal populations. High-level decision makers could be brought to the Kennedy School for initial discussions and planning, while our in-country relationships with Ministries of Health and Environment in Madagascar and our network of relationships across sub-Saharan Africa would be invaluable in organizing a regional, follow-up conference with fisheries managers in the region. The goal would be to help generate new understanding that fisheries management is a public health issue as well as a conservation issue and support government policy to protect regional fisheries as part of improved stewardship of population health. We envision a similar approach to the question of biomass burning in SE Asia. HEAL research has established the scientific connections between biomass burning and considerable downwind health impacts and this work has already contributed to Singapore's recent legislation to enable civil and criminal suits to be brought against companies registered in Singapore that are responsible for biomass burning upwind. The combination of convening senior officials through the Kennedy School and staging regional meetings based on relationships we have built in the region over many years could help provide a breakthrough in land management and biomass burning in the region. We propose hiring a full time staff person, based at WCS but working in close collaboration with colleagues at the Kennedy School to coordinate this two-pronged approach to translating PH science into policy and decision making.

## **FUNDING FOR PLANETARY HEALTH**

The development of a robust field at the intersection of global environmental change and human health has been hampered in part by a lack of funding to support research and teaching. Both government and non-governmental sources of funds for research and teaching tends to be

compartmentalized into either health or environmental science disciplines but rarely cuts across both. In addition, government health funding is often further silo'd to specific disease entities. Because most faculty positions at schools of public health are “soft money” positions which are funded by research grants, the absence of a reliable source of funding for PH research also prevents recruiting, developing, and promoting faculty capable of teaching PH material. A focused effort is required to alter this funding landscape in order to stimulate robust growth in the PH field. Specifically, PHA would support efforts to:

- Help U.S. government agencies such as NIH, NSF and USAID to understand the importance of creating a program focused on Planetary Health. Without such reliable funding sources, it will be very challenging for universities to develop and promote faculty working on these topics, and for civil society and other stakeholders to be able to take action based upon science and policy guidance generated
- Work with foundation partners to create a coalition of foundations committed to supporting Planetary Health

## RESEARCH

A robust research effort investigating and quantifying the human health impacts of global environmental change is the engine at the heart of building a discipline of Planetary Health and informing policy discussions. We see many of the activities delineated under the topic: Forging a Community of Practice as integral to creating such a robust research effort. Training in PH topics, support in using relevant datasets and research methodologies, announcements about relevant new research, convenings and job opportunities, an annual convening to share research results and opportunities are all necessary elements of building a cadre of young investigators with the capacity and motivation to break new ground in this field. In addition, the Planetary Health Fellows would be full time research positions, competitively awarded to post-doctoral candidates with outstanding track records within their disciplines and strong capacity to step out of their disciplinary experience to engage in trans-disciplinary PH research with PHA-associated faculty.

The Planetary Health Alliance would not be tasked with carrying out research itself, but would take place in the context of a rich research environment where numerous PH-related research activities are underway and will be ongoing over the term our grant request. In the same physical space at the Harvard University Center for the Environment where we hope to house the PHA, Dr. Myers' and Dr. Golden's research groups will have their primary office space. A full time research post-doctoral fellow working under a \$757,000 Bill & Melinda Gates Foundation grant will continue working on the global nutritional consequences of reductions in the nutrient content of food crops resulting from anthropogenic CO<sub>2</sub> emissions. A second post-doctoral fellow will be working under a new \$1 million grant from the Wellcome Trust on a project with

Drs. Golden and Myers to quantify the impacts of changes in the state of global fisheries on human nutrition and health. Office space in the same cluster will be used for a series of visiting post-doctoral fellows from London working with Dr. Myers on a second recent Wellcome Trust research grant exploring vulnerability of terrestrial food production to a suite of global environmental changes. Ongoing research supported through HEAL by the Rockefeller Foundation exploring impacts of biomass burning on human health in SE Asia and human health impacts of reduced access to terrestrial wildlife (bushmeat) in the diet in Madagascar will also continue among this group. Work being led by Dr. Golden in conjunction with Facebook exploring the mental health benefits of exposure to nature is also ongoing. While these research activities are not included in the budget for the PHA (because they are already funded), we see them as integrally connected to the efforts we outline and anticipate a very rich cross-fertilization between our research groups and PHA activities. Similar synergies will exist between ongoing research and PHA activities across other PHA faculty groups in membership institutions.

In choosing fellows, developing educational materials, providing digests of the literature, and bringing together a community of practice annually, the following will be priority areas of research that we seek to highlight:

1. Impacts of global environmental change on food and nutrition: Much of the global burden of disease is related to inadequate intake of calories, micronutrients, or certain food groups like fruits, vegetables, and nuts and seeds. Additional burden of disease is associated with excessive intake of the wrong foods. Never before has global food demand been increasing more rapidly and never before have the biophysical conditions that underpin our global food production system been changing more rapidly. As a result, humanity is enormously vulnerable to health impacts from environmental change mediated through nutrition. Research is needed to understand the impacts of multiple interacting types of environmental change including climate change, land degradation, water scarcity, pollinator declines, biodiversity loss, and natural hazards on the quantity and quality of food that will be available to different populations around the world and where the greatest vulnerabilities are likely to be found. A second priority is understanding how accelerating changes in the structure and function of the world's fisheries are likely to alter seafood consumption for different populations and the associated health consequences of these changes.
2. Disease Ecology: Vector-borne diseases like malaria, schistosomiasis, and dengue fever are still responsible for large burdens of disease globally and are highly sensitive to changes in environmental conditions including temperature, soil moisture and precipitation patterns, deforestation, dams and irrigation projects and others. More extensive understanding of how land management practices alter the risk of these diseases in different settings and what types of interventions can reduce exposure to these diseases is an urgent priority. Most emerging diseases globally are zoonotic diseases (with both human and animal hosts) and clearer understanding of anthropogenic

influences on the emergence of zoonotic diseases (like HIV and Ebola) is a second priority in PH research. Diseases (zoonotic or otherwise) of animals themselves (agricultural or wild) in the terrestrial and aquatic realms are also being influenced by global anthropogenic environmental change, often dramatically. Given the implications for food security and livelihoods, as well as for the state of global biodiversity, animal disease is also an important subtheme of disease ecology in the PH research context.

3. Global change and Displacement: A third important area is to generate a much better understanding of how a suite of environmental changes, most of which are accelerating, are likely to drive displacement of populations around the world. Little is currently understood about how the combination of climatic disruption, natural hazards (droughts, floods, fires, tropical storms), water scarcity, land degradation, and resulting crop and livestock failures will interact to make parts of the world which currently support large numbers of people uninhabitable. How many people in which regions are likely to be displaced? And when people are displaced (many of them with very few resources) into areas where they may not be welcome, will civil strife ensue? What are the best approaches to managing increasing requirements for population movement with the least conflict and health burden? These types of questions require much more focus.
4. Water borne and water-related disease: Water scarcity is an enormous challenge in many parts of the world with many of the world's most important aquifers being drained much faster than they can be replenished. Climate change promises to increase water scarcity in a variety of ways including wet areas becoming wetter, dry areas becoming drier, precipitation coming in more extreme forms, earlier spring runoff from winter snow pack, loss of glacial contributions to dry-season flow, sea level rise and inundation of coastal aquifers with salt water, and hotter temperatures leading to increased evapotranspiration. These complex changes in quantity and timing of water availability overlaid on significant existing water scarcity are likely to impact food production, water-borne disease exposure and water related diseases. Changes in land use (e.g., deforestation) also impact water quality and quantity and exposure to water-borne disease in ways that are inadequately understood. Research to better characterize these challenges and identify approaches to reducing vulnerability is required.
5. Mental Health: A final area of investigation that is beginning to gain traction is understanding the mental health dimensions of global environmental change. What are the mental/cognitive benefits of exposure to "intact" nature? What are the mental health costs of environmental degradation? Are there significant mental health benefits of managing natural systems in particular ways? Better understanding of these issues could meaningfully inform resource management decisions.
6. Complexity: Across all of these areas runs a recurring theme: complexity. One of the critical frontiers in PH research is developing new approaches and methodologies for exploring the impacts of multiple different types of environmental change on multiple different health outcomes for more than one population. Much PH research to date has

been limited to a single disease outcome or a single type of environmental change (e.g., warming or deforestation) when, in reality, much of the world is experiencing a suite of interacting environmental changes. And frequently that suite of environmental changes impacts different health outcomes differently and different populations in a region differently. Addressing this complexity is a further critical area for future work.

In addition to the research-related activities and priorities outlined above, a further opportunity could be the development of a research fund (perhaps pooling funds from several foundations or other donors) to provide competitively awarded research grants in these priority areas. We believe such a fund is needed and would help stimulate and support a new generation of PH investigation. The PHA, or some of its members, could play a technical advisory role in helping to award such grants.

## DISCUSSION

The Planetary Health Alliance will be a consortium of universities, NGOs and other partners with a shared mission—supporting the growth of a rigorous, policy-focused, transdisciplinary field of applied research aimed at understanding and addressing the human health implications of accelerating change in the structure and function of Earth’s natural systems. PHA will be hosted by Harvard University’s Center for the Environment and the Harvard T.H. Chan School of Public Health, but it will seek to draw together like-minded organizations and individuals from around the world in an effort that extends well beyond Harvard’s walls. The Alliance’s products will be publicly accessible; its faculty will be housed in numerous universities and other organizations; its reach will be global. The effort will be directed by Dr. Sam Myers, a Senior Research Scientist at the Harvard T.H. Chan School of Public Health, faculty affiliate at the Harvard University Center for the Environment, and Commissioner on the Rockefeller Foundation-Lancet Commission on Planetary Health. It will be overseen by a Steering Committee including senior faculty, other scientists, and policy makers from around the world.

The Harvard University Center for the Environment is well situated to be an ideal host to PHA. HUCE is directed by Daniel Schrag, Sturgis Hooper Professor of Geology at Harvard University. In addition to directing HUCE, Professor Schrag has recently been asked to become the Director of the Science and Technology Public Policy Program at the Harvard Kennedy School. He also serves as a member of President Obama’s Council of Advisors for Science and Technology (PCAST). Professor Schrag has expressed strong support for hosting PHA and feels that it dovetails well with the Center’s mission to foster transdisciplinary research and support Harvard’s core educational mission.

HUCE already has strong experience and capacity in many of the areas outlined above. For example, Professor Schrag led the development of a multimedia science course for high school teachers and adult learners called Habitable Planet for Annenberg Learner which was the most

popular course Annenberg has offered and which won Science Magazine's Science Prize for Online Resource Education (SPORE). The film producer responsible for producing this series is now employed full time at HUCE and would be a valuable resource in developing the web-based teaching materials we propose. A core research group including Dr. Myers, Dr. Chris Golden and several post-doctoral fellows will be physically located within HUCE. HUCE is undertaking an expansion this summer and has offered space not only for these research groups but also for PHA staff. Very nearby are colleagues from earth sciences, biology, ecology, and atmospheric sciences who already collaborate with this team and will be valuable resources in developing teaching materials. This will allow a close physical and conceptual connection between research groups actively engaged in pioneering Planetary Health research and the associated efforts outlined above. Finally, Professor Schrag's new position as Director of the Science and Technology Public Policy Program at the Harvard Kennedy School will assist PHA's efforts in the policy arena by facilitating the organization of policy fora on Planetary Health topics at the Kennedy School.

Both Dr. Myers' and Dr. Golden's academic appointments are at the Harvard T.H. Chan School of Public Health in the Department of Environmental Health. In addition, we anticipate involving several colleagues at the School of Public Health in the Departments of Nutrition, Global Health and Population, Epidemiology, and Environmental Health already engaged in Planetary Health research with members of our core team. Harvard is committed to a governance structure for the Alliance to ensure it develops into a robust consortium well beyond Harvard entities. Our goal is to have the Planetary Health Alliance serve as a unifying and integrating force that engages with other organizations, groups, and individuals around the world to help them come together in support of a more robust field of Planetary Health.