Bright spots: seeds of a good Anthropocene

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The scale, rate, and intensity of humans' environmental impact has engendered broad discussion about how to find plausible pathways of development that hold the most promise for fostering a better future in the Anthropocene. However, the dominance of dystopian visions of irreversible environmental degradation and societal collapse, along with overly optimistic utopias and business-as-usual scenarios that lack insight and innovation, frustrate progress. Here, we present a novel approach to thinking about the future that builds on experiences drawn from a diversity of practices, worldviews, values, and regions that could accelerate the adoption of pathways to transformative change (change that goes beyond incremental improvements). Using an analysis of 100 initiatives, or "seeds of a good Anthropocene", we find that emphasizing hopeful elements of existing practice offers the opportunity to: (1) understand the values and features that constitute a good Anthropocene, (2) determine the processes that lead to the emergence and growth of initiatives that fundamentally change human–environmental relationships, and (3) generate creative, bottom-up scenarios that feature well-articulated pathways toward a more positive future.

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Unprecedented levels of anthropogenic change continue to raise concerns about the future of the biosphere (Ellis 2015) and have inadvertently driven the Earth into a new geological era – the Anthropocene (Crutzen 2002) – which carries novel risks and threatens the planetary conditions required for human societies to flourish (Steffen *et al.* 2015). Although both relatively utopian (eg the *Great Transitions* scenario [Raskin *et al.* 2002]) and dystopian (eg *Order from Strength* scenario [MA 2005]) scenarios of the future exist, discussions tend to be dominated by dystopian visions of irreversible environmental degradation and societal collapse that ultimately diminish human quality of life (Robbins and Moore 2013; Lovelock 2014). Whether or not one agrees with these characterizations, extrapolations of current, maladaptive trends into a bleak future run the risk of becoming self-fulfilling, because people base their actions on what they believe about society and their future (Ostrom *et al.* 2002). Moreover, "scare" scenarios can be counterproductive for policy and societal change, particularly when resources are insufficient or unavailable (Fischer *et al.* 2012).

The future does not have to be bleak. The continuing emergence of new thinking, innovative ways of living, and different means to connect people and nature are vital in overcoming critical local and global challenges that otherwise constrain sustainable Earth stewardship (Chapin *et al.* 2011). Indeed, some earlier dystopic forecasts have not been realized (eg mass starvation of humans due to overpopulation; Ehrlich 1968), numerous social trends including education and security are improving (Raudsepp-Hearne *et al.* 2010), and evidence from our recent past shows that major societal transitions generally emerge in the face of unprecedented social–environmental challenges (DeFries *et al.* 2012; Ellis 2015). Numerous individuals, organizations, and political leaders are becoming aware of the global threats that society faces, and many are increasingly engaging in new strategies for creating a more just, prosperous, and ecologically diverse world – a "good Anthropocene". This has

In a nutshell:

- Existing global scenarios of possible futures are often based on highly simplified worldviews dominated by just a few driving forces and are therefore less nuanced than the real world tends to be
- Such scenarios may be improved and diversified by incorporating current examples of good practice, innovations, and experiments
- These initiatives or "seeds of a good Anthropocene" can also help us to understand the different components of a better future that people want, and to recognize the processes that lead to the emergence and growth of initiatives that fundamentally change human–environmental relationships

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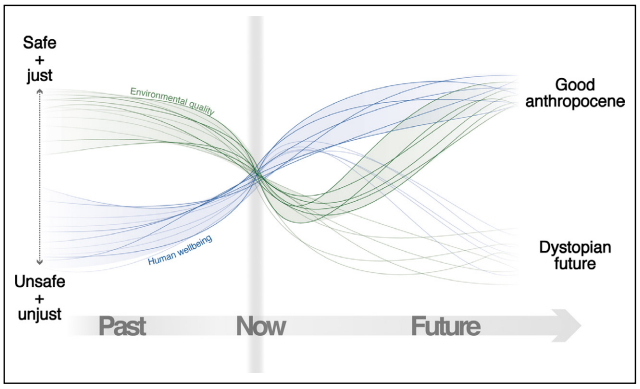

Figure 1. *We live at a time of opportunity for transition to a safe and just operating space for humanity (Steffen* et al. *2015; Raworth 2012). Recent and historical changes to multiple biophysical global indicators show a decline in environmental quality and ecosystem integrity. At the same time, social and health indicators show steady increases in human health and well-being, largely at the cost of ecosystem integrity. It will be important to document, describe, and innovate ways to navigate along development trajectories that avoid dystopian futures, where thresholds necessary for maintaining a good quality of life are not met.*

led to comprehensive intergovernmental negotiations and related consultative processes, such as the UN Sustainable Development Goals, that emphasize the linkages between economic, social, and environmental aspects of sustainable development and set specific targets to move human society toward desirable futures within the Anthropocene (Resolution 70/1, UN General Assembly 2015; http://bit.ly/29kJaEI).

Inspirational visions can be key components of transformations to sustainability (Wiek and Iwaniec 2014) and can help shape the very reality they forecast or explain. More positive, desirable trajectories and futures certainly appear to be possible – eg *Global Orchestration* and *Adapting Mosaic* scenarios (MA 2005), bright spots (observable community successes beyond the norm; de Vries 2005), and hope spots (special places that are critical to the health of the ocean; http://mission-blue.org/hope-spots) – but many efforts to imagine a positive global future have led to visions that either are poorly articulated pathways to utopian fantasies or overestimate the power of conventional strategies to create real change, resulting in scenarios that are very similar to the status quo. It is important to recognize from the outset, therefore, that a world that is socially, ecologically, and economically desirable is likely to differ radically from the world in which we presently live (Figure 1; Stierli *et al.* 2015). Building a better future will require an ability to anticipate how societies, economies, and ecosystems are linked across scales, and an understanding of how to shift these coupled systems toward more desirable states. Achieving such an outcome will likely require the fundamental alteration of human–environment relationships across a variety of settings (Westley *et al.* 2011; Olsson *et al.* 2014) and can be expected to involve fundamental changes in human values, assumptions, cultures, worldviews, and power relations (divisions of power among groups of people) that influence societal norms and institutions governing behavior (Fischer *et al.* 2012). Still, this future will have to build on the present and will be composed of many elements already in existence, albeit reconfigured and combined with new participants, ideas, infrastructure, and technologies; paradoxically, the Anthropocene itself provides an opportunity to guide attitudes, choices, and actions that increase the likelihood of realizing a desirable future (Bai *et al.* 2015).

We propose that focusing attention on these initiatives, or "seeds" (Figure 2) of a good Anthropocene, offers a novel way forward because, rather than concentrating on potential negative changes that have not yet occurred, it can help sustain and amplify efforts that already exist or desires people have for the future (eg Leach *et al.* 2012) and that are crucial to the achievement of large-scale transformations (Scott 1998). We also recognize that people can hold vastly different views on what a good quality of life entails and on which values are most important for human happiness and well-being, which sets an expectation that multiple pathways will be necessary to achieve a series of desirable alternative futures. Such information can be used to (1) understand the key characteristics and underlying values that people want from a good Anthropocene; (2) appreciate the processes and conditions that make some initiatives, rather than others, emerge, grow, spread, and have large-scale transformative impacts beyond localities and sectors; and (3) explore how seeds can inspire novel scenarios that are radical alternative visions of a positive future world.

Establishment of a seed database

Seeds are initiatives (social, technological, economic, or social–ecological ways of thinking or doing) that exist, at least in prototype form, and that represent a diversity of worldviews, values, and regions, but are not currently dominant or prominent in the world. We collected examples of seeds, as well as critical information about them, using an international participatory process (Bright Spots, http://goodanthropocenes.net) that identified social–ecological bright spots that could, given the correct conditions (eg acceptability, cost–benefit analysis, ease of implementation) benefit both environmental conditions and human well-being. Contributors were asked to describe key attributes of a seed based on categorical variables (WebTable 1) that were iteratively developed during several workshops, focus group discussions, and pilot web surveys. We circulated a solicitation form (WebPanel 1) within networks of sustainability science researchers and practitioners from the initial group of researchers involved in Future Earth (www.futureearth.org/projects), as well

as local networks known to the authors. The action of the seed is captured in several dimensions, including the challenges it addresses, its innovative aspects, the number and type of people involved, and the types of systems in which it is active. We also collected information about the key actors that are involved in initiating and sustaining the seed, the number of people implicated or involved beyond the key actors, and its pathway of impact (how the seed brings about change in the community) to understand how the underlying values and principles of the seed lead to wider uptake. While we do not presuppose that dispersal is necessary for seed viability, we are particularly interested in initiatives that have, or have the most potential, to shape aspects of the Anthropocene by affecting larger governance systems, including multi-level institutional structures. To this end, attributes related to seed spread – mechanisms for growth, replication, or inspiration), limiting and enhancing factors, globally relevant aspects of seeds (ie seeds may be inherently local but may have characteristics that could be relevant elsewhere), and state of implementation – were included.

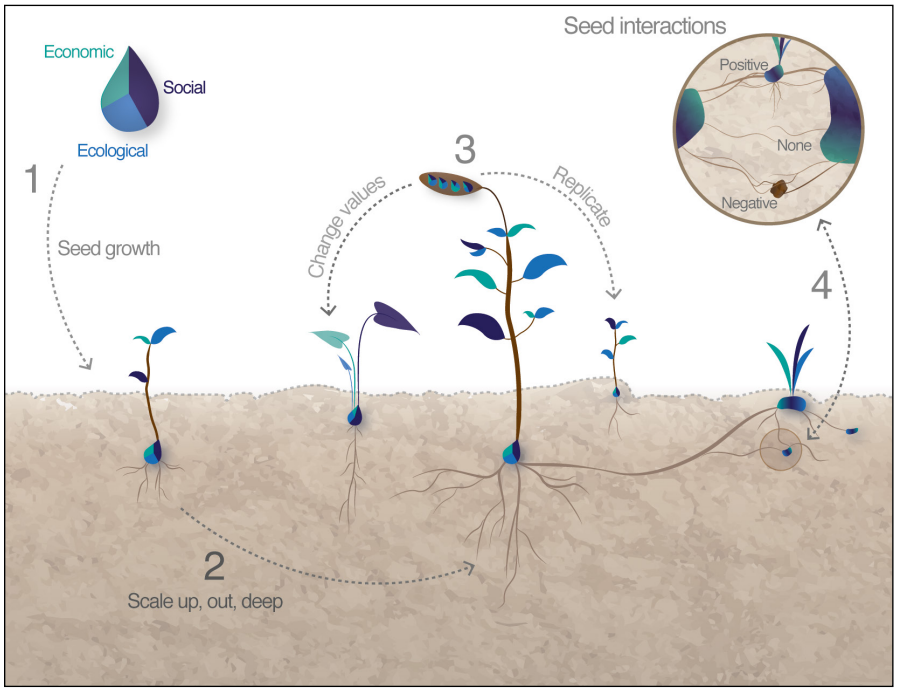

Figure 2. *Seeds of a good Anthropocene. (1) Initiatives, alone or in combination, that improve social, ecological, or economic dynamics within a particular setting arise and grow and (2) begin to have transformative impacts beyond initial localities and sectors as they spread. (3) Seeds may be replicated or otherwise influence existing values. (4) Importantly, the emergent attributes of those seeds, or interactions between seeds, influence the development of further innovations, spawning next-generation seeds that may have different characteristics than those of the original seed.*

The seed data (n = 100, all contributed seeds retained) are geographically concentrated in North America, Europe, and southern Africa, and most focus on terrestrial systems, primarily croplands and urban areas (Figure 3). Nevertheless, there is sufficient information to provide an indication of the type, frequency, and sphere of influence of these seeds. The majority of seeds are social–ecological in nature, meaning that they pertain to the relationship between people and nature, although we have collected several seeds that are more social or educational in nature (eg forms of governance that aim to enhance democracy or novel educational tools, methods, or programs). From these data, we derived a seed typology that aids in the understanding of what people want from a good Anthropocene, and we examined the conditions under which different types of initiatives develop. As noted in the rich literature on socio-technological transitions, social innovation, and social–ecological transformations (Gunderson and Holling 2002; Westley *et al.* 2006; Grin *et al.* 2010), larger system changes often emerge, at least initially, in settings outside of conventional decision-making circles. These informal settings are generally denoted as "shadow networks" (Olsson *et al.* 2006), "niches" (Kemp 1994), or "transition arenas" (Kemp and Loorbach 2006), and create important opportunities for transformative social–ecological change. However, in the absence of dispersal mechanisms, these innovations will not have wider impacts. Crises have proven to be opportunities for change, and the role of institutional entrepreneurs in connecting actors or innovations to the policy windows often opened by crisis can be critical under such circumstances (Olsson *et al.* 2006; Westley *et al.* 2011).

Seed characteristics

The emerging seed database reveals a diversity of initiatives, including: novel technology and design that could reduce ecological footprints; organizations working to improve resource management and biodiversity conservation; efforts to increase the sustainability of food production and improve equitable access to resources, education, and power; movements focused on sustainability and democracy; cutting-edge research or novel educational formats for transforming worldviews; and specific methods for addressing environmental, social, or economic sustainability issues (WebFigure 1). We have been able to analyze general characteristics of the seeds and what they do, as well as how they are affecting change. Indeed, a cluster

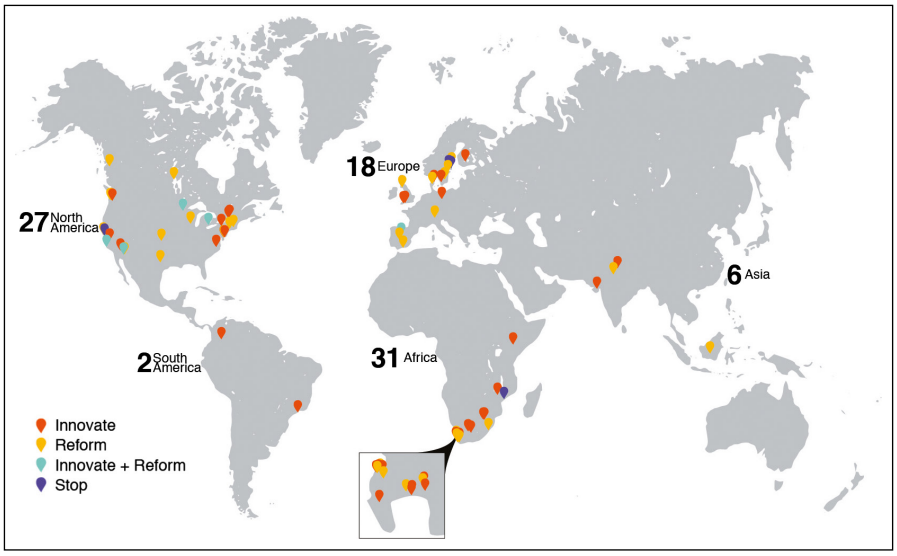

Figure 3. *The geographic location of the first 100 initiatives in the "seeds of a good Anthropocene" database and their pathways of impact (innovate, reform, innovate and reform, or stop bad practices). Not all 100 seeds are visible given that some overlap in location, whereas another 16 seeds were global and so did not have a specific regional location.*

analysis of the seed attributes identifies six distinct types of seeds:

(1) *Agroecology* seeds generally adopt social–ecological approaches to the enhancement of food producing landscapes. An example is the Satoyama Institute, which promotes Satoyama, a traditional mixed Japanese agricultural landscape recognized as a provider of biodiversity and bundles of ecosystem services valued by people (Panel 1; Figure 4). Likewise, a place-based example is GreenMatter, a network of partners aiming at developing graduate-level skills and leaders for biodiversity in South Africa (Panel 2; Figure 5);

(2) *Green Urbanism* seeds focus on improving the livability of urban areas. New York City's High Line Park has made native species, art, education, and recreation opportunities accessible to all citizens by reinvigorating abandoned urban infrastructure;

(3) *Future Knowledge* seeds are fostering new knowledge and education that can be used to transform societies. The Buckminster Fuller Challenge, for instance, addresses global threats with contemporary methodologies, such as the use of science fiction to imagine better futures;

(4) *Urban Transformation* seeds work to create new types of urban social–ecological space. The Sukhomajri experiment in India involves bottom-up (ie led by local people), sustainable solutions to prevent the silting of Sukhna Lake, the only water source for the city of Chandigarh;

(5) *Fair Futures* seeds are creating more equitable opportunities for decision making, such as the use of multi-actor dialogues that enable decision processes that are more thorough, open, and fair;

Panel 1. The Satoyama Initiative: connecting people to people and people to nature (Agroecology cluster)

The Satoyama (Japanese traditional agricultural landscape) has been increasingly recognized as a provider of biodiversity as well as of bundles of ecosystem services. Past management of Satoyama lands created sustainable landscapes that benefitted both humans and nature. Today, these landscapes are underused as rural areas have become depopulated, threatening ecological, agricultural, and cultural losses. One response to this has been to connect urban and rural areas to better manage Satoyama landscapes, creating benefits for rural and urban people. For example, terraced rice paddies are maintained with financial support and voluntary labor from urban citizens who enjoy visiting beautiful landscapes and learning about food production. Farm stay programs, in which urban residents spend time living on farms, often participating in daily farm life, are increasingly being implemented in depopulated rural areas (Figure 4). Visitors of all ages experience growing food, and learn about cultural traditions. The branding of sustainably grown agriproducts from Satoyama areas is another approach used to support these landscapes.

Figure 4. *Ancient thatched-roof farm house in Ogamachi, Japan. This landscape is typical of the traditional Japanese Satoyama agricultural landscapes that benefit both people and nature.*

Panel 2. GreenMatter: skills development around biodiversity conservation (Future Knowledge cluster)

GreenMatter is an initiative aimed at driving transformation in graduate-level skills associated with biodiversity conservation in South Africa. In 2010, the South African government's Economic Cluster convened the first Green Economy Summit, to map out a green growth pathway that creates jobs while reducing pollution and using South Africa's natural resources wisely (Figure 5). There was increasing recognition that economic growth cannot be attained at the expense of ecosystems. To deliver on policy imperatives, South Africa needed biodiversity skills; however, historically, skills development in this area excluded the majority of the population. Consequently, the Biodiversity Human Capital Development Strategy (BHCDS) was advanced to support the growth of a robust green economy. It has a strong focus on broad transformation in the sector through a network now referred to as GreenMatter. GreenMatter is the implementing program and puts the BHCDS into action. Through developing graduate-level skills and leaders, the GreenMatter network of partners aspires to unlock the environmental, social, and economic potential of South Africa. The project engages cross-sectorally, bringing together networks of organizations, institutions, and agencies to implement solutions that address the challenges around building relevant and quality biodiversity skills.

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Figure 5. *The GreenMatter program helps to train people to work in the fields and to be future leaders in biodiversity conservation.*

(6) *Sustainable Futures* seeds emphasize social movements to building more just and sustainable futures. The divestment movement, for example, actively attempts to morally stigmatize investment in fossil fuels by arguing that it is environmentally, socially, and financially irresponsible.

Seeds and scenarios

Seeds can also be used to generate creative, detailed scenarios about transformations toward a good Anthropocene. Scenarios are sets of narratives about the future; they have been employed by decision makers in the business community and elsewhere for several decades as an alternative to predictions, forecasts, and other single-future strategic planning processes (Bennett *et al.* 2005). Existing global narratives about change to a more sustainable society often identify three types of transition: technology-based transition, transition driven by local adaptation, and value changes (Hunt *et al.* 2012). Technology-based transition scenarios (eg *TechnoGarden* [MA 2005]) highlight technological innovation, and generally show trade, markets, and technology substantially increasing in environmental efficiency and producing more benefits to people with less environmental damage. Local adaptation-based scenarios (eg *Adapting Mosaic* [MA 2005]) focus on decentralized, small-scale solutions such as diverse local energy production, multi-functional agriculture, and adaptive local policies in which people are stewards of their local environment. Value change scenarios examine what happens when people pay attention to health, happiness, and social cohesion, and decreasing consumption (eg *Green Transition* [Raskin *et al.* 2002]). Although our *Sustainable Futures* and *Urban Transformation* clusters fit well with the narrative of technological innovation, they also add social and ecological connections. Other clusters bridge across these three types of scenarios in novel ways, emphasizing the importance of urban innovation (*Green Urbanism* and *Urban Transformation*), building new types of knowledge and institutions (*Future Knowledge* and *Fair Futures*), and, more explicitly, focusing on linking food production to the maintenance of biological diversity (*Agroecology*) (Figure 6; WebFigures 1 and 2). We contend that this alignment with existing global scenarios, while filling in missing ideas and making new connections across themes, suggests that identifying seeds of a good Anthropocene can enrich and challenge global scenarios.

By incorporating seeds into participatory scenario exercises, we hope to explore the potential of seeds, alone or in combination, to generate multidimensional and interacting transformative pathways to address different Anthropocene challenges. Participatory scenarios are powerful tools that can be used not only to explore, identify, and analyze alternative futures but also to address uncertainties by improving social capacity to shape the future and/or by identifying resilient policies (Oteros-Rozas *et al.* 2015). The ability of scenario planning to incorporate and engage with diverse knowledge systems, values, and views of how the world works also means that social–ecological dynamics can be accounted for (Bennett and Zurek 2006). Incorporating seeds into participatory scenario exercises

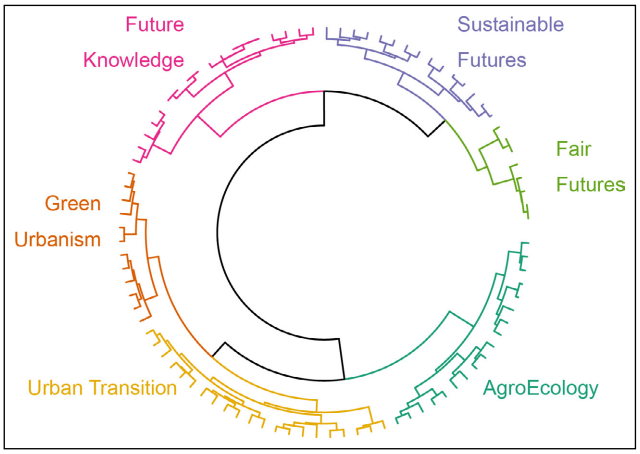

Figure 6. *The number of seed clusters that adopt different approaches. Clusters of seeds are presented based on traits that define social domain, anthrome, Anthropocene challenge, and social–ecological type.*

will effectively be a new way to conduct inductive (story-driven) participatory scenario development. Such scenarios might explore the ability of previously unimagined combinations of seeds to succeed in a world of diverse Anthropocene challenges, creating novelty from such combinations. Because the seeds are themselves diverse, the scenarios created from them can more easily represent diverse views of what a *good* Anthropocene might mean (Kok *et al.* 2016). One way to achieve this diversity is to develop a database of the expected performance of single seeds under various challenging Anthropocene situations. Another approach is to explore how a group of (initially disconnected) seeds could together provide new opportunities under a common set of Anthropocene challenges. These kinds of combinations can be developed into scenarios directly, or explored through interactive formats (eg role-playing games) that stimulate bottom-up scenario development.

Values in seeds

A transformation to a good Anthropocene will involve, at least in part, a transition to a different world, so information about which factors are common (or differ) across seeds, and which values and aspirations are most important for people to feel they are living in a good Anthropocene, will provide guidance on what people regard as a desirable future. Already, we can identify from the seed database that the general public wants more, better, and deeper connections to other people, as well as better connections between people and nature. A large number of the identified seeds involve building networks for sharing knowledge and building communities where people collaborate to address environmental challenges. Examples include the Stone Barns network of young farmers, which is engaged in sustainable agriculture in the US (www.stonebarnscenter.org), and Trees For Life, an initiative in Scotland that relies on volunteers to restore forests and learn how to recreate traditional landscapes (http://treesforlife.org.uk). We can also understand the role of location, culture, and other basic facts about a place in the emergence, growth, or spread of a seed, as well as understanding whether location affects people's preferences for different types of futures or different values in those futures.

Patterns in seeds

To achieve a good Anthropocene, it will be helpful to have a better understanding of how seeds can lead to novel social–ecological system configurations, for example by improving social connections among different groups of people. By applying novel analytical frameworks that have emerged from work by resilience scholars on sustainability transformations (eg Westley *et al.* 2011; Olsson and Galaz 2012), seeds can be used to understand the conditions under which fundamental changes of social–ecological system interactions and feedback are possible at local, regional, and global scales. Initiatives in the seed database that have started to explore such conditions include the global spread of marine spatial planning (Merrie and Olsson 2014), the adoption of community-based resource management in the Solomon Islands (Abernethy *et al.* 2014), and the emergence of new governance regimes for ecosystem-based management locally in Indonesia (von Heland *et al.* 2014), nationally in Chile (Gelcich *et al.* 2010), and internationally in the Coral Triangle (Rosen and Olsson 2013). Ultimately, seeds will help us understand how to better capture and analyze the transformative capacity of various projects that aim to change the world for the better.

Conclusions

Developing innovative and inspiring scenarios that remain grounded in reality remains a critical challenge for the global community, as many international programs – including the Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES; www.ipbes.net) – ponder how to create meaningful scenarios that generate important new insights for global ecosystem management. Thinking radically yet realistically about the future, however, is difficult. Identifying and combining seeds to develop a set of possible positive outcomes in the Anthropocene offers a viable means of understanding how our world could intentionally follow transformative pathways to improve human well-being, even in the face of unprecedented social and environmental challenges. Existing top-down global

scenarios, such as those developed by the Millennium Ecosystem Assessment (MA 2005) are useful in that they are coherent and help both their developers and users investigate contrasts among alternative sets of assumptions about how the world changes through time. However, they draw from a limited number of theories about the future, which tend to gravitate toward a choice between developing less radical or more implausible and vague scenarios. Furthermore, it is difficult to downscale this type of scenario to understand local realities. However, the type of bottom-up scenario development outlined here can be built from our sample of positive, sustainable, and scalable seeds. It is also well-suited to participatory approaches, including co-design and other novel tools for social learning. Although such bottom-up scenarios may be difficult to upscale coherently, the process of determining which seeds work together, and which could help to address different Anthropocene challenges, will provide useful insights about how to advance along a more positive pathway and lead to more positive visions of the future.

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