

RE-New (Opinion) ARTICLE

Time for a paradigm shift toward a restorative culture

Adam T. Cross^{1,2} , Paul G. Nevill¹ , Kingsley W. Dixon¹, James Aronson³

The United Nations' recent declaration of a Decade on Ecosystem Restoration (2021–2030) conveys the immense scales of degradation we face and the urgency of ecological recovery. Yet it speaks predominantly to productivity-based approaches that may poorly balance conservation and development goals. As a result, it overlooks or distorts the very real potential for the holistic restoration of natural and cultural ecosystems to achieve lasting social and human health and well-being benefits, and help stem the grotesque loss of biodiversity and ecosystem health in these times. There is need for a profound paradigm shift to address the prevailing economic and political climate that is keeping our world and biosphere on their current ominous trajectory. Such a paradigm shift could be based on the idea of a “restorative culture.” Practically, this could proceed by coupling the foundational philosophies and modus operandi of restoration ecology with public health medicine. The outcome would be an era of more healthy and more science- and knowledge-driven sustainable restoration and local redevelopment. A restorative culture would recognize the fundamental linkages between ecosystems and human health, and consider biodiversity as fundamental to personal, community, and cultural well-being and resilience. This requires public–private and community and individual partnerships at city, township, and watershed scales, as well as progressive industry champions working in collaboration with governments and the United Nations.

Key words: ecological economics, ecological restoration, ecosystem health, human health, restoration ecology, sustainability

Implications for Practice

- A socio-ecological approach to public health incorporating environmental sustainability and ecological restoration is needed.
- Stronger links are required among education, culture, and policy related to nature–culture interactions.
- Customs, laws, and social standards underpinned by sustainable development and environmental recovery principles should be developed, placing emphasis upon biodiversity and resilient ecosystems as a fundamental requirement of public health and well-being.
- Incentivization of policy and regulatory frameworks designed to create a culture of continuing improvement in land and resource management is required. Public–private partnerships are crucial, with oversight to prevent further income and wealth inequities.
- Green business models reflecting the extended time frames required to mature restoration outcomes and maximize social and ecological benefits are needed.

Introduction

On March 1, 2019, the United Nations (U.N.) General Assembly declared 2021–2030 the U.N. Decade on Ecosystem Restoration. The Declaration reflects and embodies the fertile interface among the U.N. sustainable development goals and the overlapping ambitions of the three “Rio Conventions” (Convention on Biological Diversity, Convention on Combatting Desertification, and United Nations Framework Convention

on Climate Change), and proposes a target of 350 million hectares to be restored over the next decade. For example, it emphasizes the restoration of healthy, sustainable ecosystems as a “proven measure to fight the climate crisis and enhance food security, water supply and biodiversity.”

The U.N. define “ecosystem restoration” as “assisting the recovery of degraded, damaged, and destroyed ecosystems to regain ecological functionality and provide the goods and services that people value” (MARN 2019). Though similar to “ecological restoration” as defined by the Society for Ecological Restoration (McDonald et al. 2016), by introducing “goods and services that people value” as a caveat to improving ecological functionality, the U.N. definition portrays restoration as a predominantly anthropocentric tool to achieve productivity-based models of environmental recovery. As a result, it fails to change the anthropocentric focus and unbridled neoliberalism of the prevailing economic models that so clearly need to be better informed by the biological and ecological limits to economic growth at global scale (Daly & Farley 2004; Spash 2012; Daly 2019).

Although the new U.N. Declaration conveys the immense scales and urgency of ecological recovery that are increasingly

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¹ARC Centre for Mine Site Restoration, School of Molecular and Life Science, Curtin University, GPO Box U1987, Bentley, Perth WA 6102, Australia

²Address correspondence to A. T. Cross, email adam.cross@curtin.edu.au

³Center for Conservation and Sustainable Development, Missouri Botanical Garden, 4344 Shaw Blvd, St Louis, MO 63166-0299, U.S.A.

recognized, does it balance conservation and development goals in ways that offer real hope of achieving long-term goals? It is a very welcome policy move indeed. However, we fear it will fall short of its objectives for lack of a clear and broad vision of what is needed at the conceptual, socio-political, economic, and cultural assessment phase, long before engineers and technicians are asked to take over field operations with focus on plants, soils and biophysical aspects of the work at hand.

Building on previous work (e.g. Blignaut et al. 2007; Milton et al. 2007; Aronson et al. 2007b), to define, support, and mainstream *holistic* ecological restoration (Clewell & Aronson 2013) with strong economic as well as ecological “legs,” we express concern that the Declaration does not adequately balance conservation and development goals. We refer to ecological restoration and allied activities that deliver benefits to human health and welfare through the maintenance and enhancements of critical natural capital, including native biodiversity linked to restoration of social capital, and the explicit linkage of ecosystem “health” and human health (Aronson et al. 2016b, 2017; Goodwin 2019) through action and policy aiming at profound and lasting changes in policy and the mindsets driving it (de Groot et al. 2010; Neßhöver et al. 2011; de Groot et al. 2013; Blignaut et al. 2014). We note that calls for a similar paradigm shift in the sister discipline of ecological economics date to the mid-1990s (Norgaard 1995; Daly 2019; Rees 2019), and are being revived by the current generation of ecological economists (Blignaut & Aronson 2019).

The Environmental–Human Health Nexus

Rio conventions have great merit but are silent on the environmental–human health nexus, despite compelling evidence of public health benefits. Empirical support for these benefits is growing rapidly; e.g. urbanization has been linked with human dietary shifts leading to reduced environmental health outcomes (the diet–environment–health trilemma; Tilman & Clark 2014), and to increasing human immune dysregulation (Mills et al. 2017). In addition to providing economic services in the form of material goods and food diversity, above- and belowground biodiversity increases personal, community, and cultural resilience through mechanisms such as buffering against the spread of infectious diseases, and improves physical and mental health, quality of life, and well-being across many indicators (Bratman et al. 2012; Sandifer et al. 2015; Liddicoat et al. 2016). Even a minor role of biodiversity in improving mental health outcomes will result in significant economic benefits, with mental health predicted to become the leading global cause of disease burden by 2030 (Clark et al. 2014; Nesse 2019).

Indigenous communities, whose socio-economic lives are among the most intrinsically linked with nature (Sangha et al. 2015), provide strong examples of the environmental–human health nexus. For example, the Nyoongar people of Western Australia, who have practiced a rich culture intrinsically tied to the region’s exceptional biodiversity and landscape for over 45,000 years, are the most disadvantaged community based on key socio-economic and health indicators (Cooke et al. 2007).

Levels of Nyoongar community disadvantage are correlated with environmental degradation rates in Western Australia, and have not improved in recent decades despite numerous policies aimed at addressing Indigenous social well-being (Mitrou et al. 2014). Policy inadequacy has been strongly attributed to a failure to consider the role of biodiversity in Indigenous well-being (Sangha et al. 2015). The inclusion of traditional ecological knowledge in the environmental–human health nexus, and the participation of Indigenous peoples and communities in landscape-scale ecological recovery projects (e.g. Bradby et al. 2016; Long et al. 2016), is vital. A major drive is required to increase the study and mainstreaming of research, development, and the application of work in this area.

Ecological recovery should facilitate the development of stronger positive human relationships with ecosystems, and increasingly address social justice within the restoration framework. In semi-natural systems particularly, defined as “landscapes that have developed under the joint influence of natural processes and human organization and resource use” (Aronson et al. 2017), durable ecological recovery requires synergy between science, culture, and policy (Higgs 2005). Martinez (2019) suggests that “ecocultural restoration,” a term first coined by Rogers-Martinez (1992), should be an essential part of effective ecological restoration from reference site selection to project completion. Ecocultural restoration involves the recovery of key historic precontact or preindustrial ecosystem structure, composition, processes, and function, recognizing the traditional, time-tested, ecologically appropriate, and sustainable Indigenous cultural practices that helped shape ecosystems, while simultaneously building in resilience to future rapid climate disruptions and other environmental changes in order to maintain ecological integrity in a way that ensures the survival of both Indigenous ecosystems and culture (Martinez 2019). A thorough literature search to help inform and orient the incorporation of these foundational considerations into the mainstream restoration equation is underway at this time, in the context of the newly formed EcoHealth Network (<http://www.ecohealthglobal.org>). This is an interdisciplinary organization that will help advance the science and practice of ecohealth, in our sense of the term, that is *the process of linking ecological restoration and allied activities* (i.e. “restorative activities”) *to public health interventions and related activities in a practical and resilient way*.

A Missed Opportunity to Champion Profound Change Instead of Business as Usual

Productivity-based approaches to environmental ill-health and disrepair are insufficient and, indeed, wrong-headed, if the next decade—and the coming century—are to be defined by ecological repair and a paradigm shift at the multinational and global scales. They constitute more of the same thinking only at bigger scales, a procedure often referred to as “technofix.” Overt focus on productivity-based outcomes overlooks potential for achieving lasting social and human health benefits associated with the restoration of natural ecosystems (Aronson et al. 2007a, 2016a), and risks misuse of the

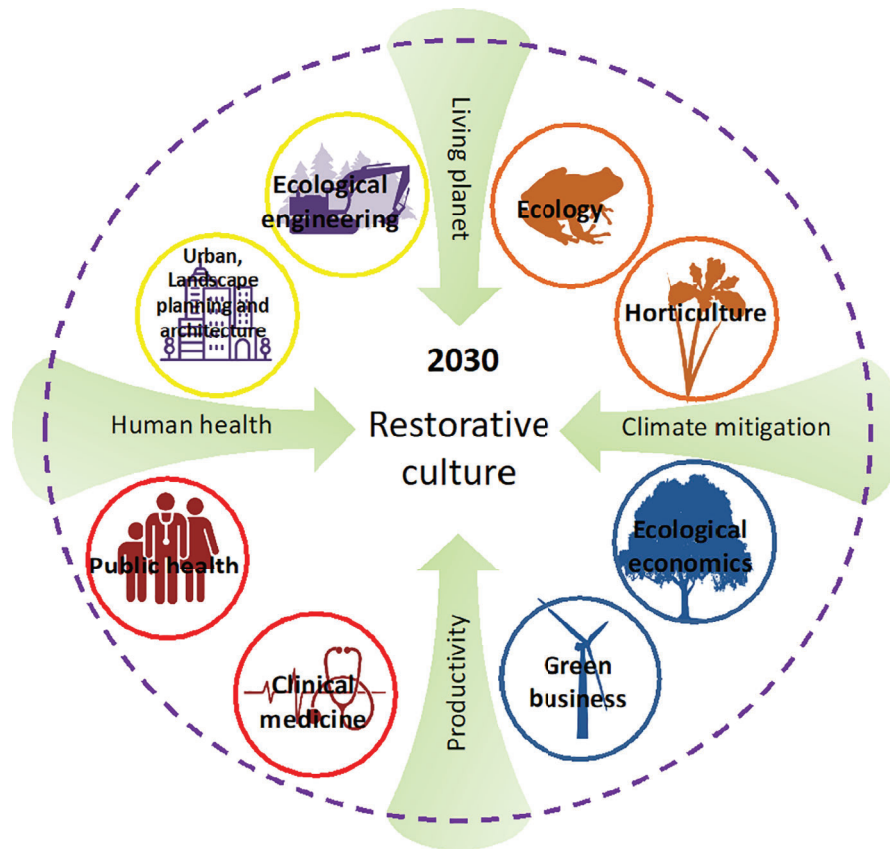


Figure 1. Components and approximate contours of a restorative culture that, for the sake of sanity and sustainability, “should” be set in place by 2030. Note that the philosophical and ethical foundations and practical principles of holistic ecological restoration depicted here increasingly embrace and are embraced by other key sustainability disciplines at all levels of society. This progressive incorporation of holistic restoration into the social fabric, and its union with key sister disciplines in areas such as social development (yellow), human health and well-being (red), ecologically sound economics and business practice (blue), and ecological science (brown), will yield significant improvement in key human and environmental indicators and should become a fundamental tenet of human society. Vast and “wicked” problems remain to be addressed as well, such as social injustice in the form of the growing chasm between the very rich and poor.

Declaration (e.g. the misrepresentation of commercial silviculture or single-ecosystem, service-focused activities such as carbon storage as bona fide ecological or ecosystem restorative activities).

We, and the EcoHealth Network (see above), propose a new direction for the future of global society during the Decade on Ecosystem Restoration. By coupling the foundational philosophies of restoration ecology, ecological economics, and associated disciplines including medical science and public health (Aronson et al. 2016a), we can move toward an era of globally connected and science-driven sustainable development that has a dual focus—ecosystem health and human health. This requires a new mind set or paradigm shift toward what we term a “restorative culture.”

What Would a Restorative Culture Look Like, and How Would It Work?

A restorative culture will exist when the principles, ethics, and standards of holistic ecological restoration are embedded in all aspects of human existence and endeavor (Fig. 1).

“Restoration ecology” has evolved from an academic field at the intersection of ecology and conservation biology in the late 1980s to a modern transdisciplinary science focused upon multiple outcomes of *biodiversity maintenance, ecosystem functionality and resilience, and the delivery of ecosystem services at local to global scales* (Clewett & Aronson 2013; Blignaut et al. 2014; McDonald et al. 2016). It has matured concomitantly with historically discrete sister disciplines “ecological engineering” and “ecological economics,” and newer fields including “sustainability science,” “ecosystem services science,” and, last but not least, “Ecohealth science” (Aronson et al. 2016b, 2017).

The vitality of any science depends upon adaptive capacity and responsiveness to internal feedbacks, particularly in responding to new unions stemming from the development of trans-disciplinary relationships. Restoration ecology is at this juncture. We propose that rather than the current paradigm of discrete disciplines forging complementary but separate paths to the goal of a sustainable future, global society must strive toward the development of a culture of integrated restoration-driven adjustment and improvement. This restorative culture emphasizes that restoration is a process of perpetual self-organization,

adaptation, and renewal, in contrast to the flagrant and unsustainable ecological overshoot likely to result from the influence of current economic models.

Sustainability and flexibility underpin the “success” of ecological restoration (i.e. its effectiveness and longevity), and there is increasingly wide social acceptance that the responsibility to address ecological degradation should be borne by all elements of society (McDonald et al. 2016). A paradigm shift to a restorative culture therefore requires:

1. A socio-ecological approach to public health incorporating environmental sustainability built from collaboration among restoration researchers and practitioners, as along with primary health, social services, urban design and planning, and environmental management sectors (*sensu* Maller et al. 2006).
2. Stronger links among education, culture, and policy, ensuring that nature is an intrinsic component of culture as reflected in daily lives. The value of biodiversity and the value of ecological restoration must be introduced in the earliest stages of education, and traditional and local ecological knowledge should be incorporated into environmental education to support and conserve Indigenous cultural heritage.
3. Development of customs, laws, and social standards underpinned by principles of sustainable development and environmental recovery that place primary emphasis upon biodiversity and resilient ecosystems as a fundamental requirement of public health and well-being.
4. Nurturing cross-disciplinary links among and beyond the environmental sciences toward transdisciplinary science-and-ethics-driven sustainable development outcomes.
5. Incentivization of policy and regulatory frameworks to create a culture of continuing improvement in land and resource management, facilitating a global process focused upon a net gain in natural environmental and social-ecological values and processes (see Goodwin 2019; Rees 2019).
6. Green business models reflecting the extended time frames required to mature restoration outcomes and maximize social and ecological benefits (e.g. Nevill et al. 2018), where industry champions are willing to step up and achieve ambitious goals and aim for lofty targets without immediacy of economic return. This is a context in which public–private partnerships can truly work for the good of all—something which is not always the case.

Concluding Remarks

Transitioning to a restorative culture requires that society embrace the growing sophistication and increasingly impressive development and outcomes of the intertwined science and technology of ecological restoration and the corresponding practice and policy in terrestrial, coastal, and marine ecosystems. This also requires support for due diligence and—as appropriate—rapid acceptance of the outcomes from ongoing research in areas such as soil microbiome studies and the importance of contact with “nature” for human health. Restoration will be a central part of the needed paradigm

shift in the approach to global ecosystems and human health, in urban and rural areas alike. Achievement of this shift will require cross-disciplinary links beyond the life sciences, social sciences, medicine, and economics, to facilitate science- and ethics-driven sustainable development, recognizing biodiversity and resilient ecosystems as fundamental requirements of public health and well-being. Global land and resource management should focus on achieving net gains in natural environmental and social-ecological values and processes. This requires regulatory and industry champions willing to achieve ambitious goals without immediate economic return, as has been pioneered in the United Kingdom (Adams et al. 2004) and elsewhere. A restorative culture revitalizes the nature and culture union that is then embedded into the social, political, and educational fabric, developing stronger links between education, environment, culture, and policy. Although biodiversity conservation is frequently characterized by complex and intrinsically challenging trade-offs (McShane et al. 2011), a restorative culture recognizing the fundamental linkages between environmental, cultural, and human health may represent the only future in which both our biosphere and species can co-prosper.

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