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Published in:
UNESCO Biosphere Reserves

Publication date:
2019

The Document Version you have downloaded here is:
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Citation for published version (APA):
reed, M., & Price, M. F. (2019). Unfinished Business: The Present and Future Contributions of Biosphere Reserves to Sustainability Science . In M. Reed, & M. Price (Eds.), *UNESCO Biosphere Reserves: Supporting Biocultural Diversity, Sustainability, and Society* Routledge.

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25. Unfinished Business: The Present and Future Contributions of Biosphere Reserves to Sustainability Science

Maureen G. Reed and Martin F. Price

Abstract

This chapter draws on the insights from the contributors to reinforce the relevance of UNESCO biosphere reserves (BRs) for the practice and science of sustainability. The chapter discusses the commitments of scientists and practitioners to the ideals of biodiversity conservation and sustainability development with justice and equality, offers on-going lessons for practice and research, identifies persistent challenges and emerging opportunities of the World Network of Biosphere Reserves, and provides key messages to inform future practice. The value of BRs lies not only in site-specific innovations, but in the coherence derived from belonging to a network. For example, BRs support both national and international priorities associated with pressing problems such as biodiversity loss and climate change, and can share lessons across the network. Although the network was established almost 50 years ago, developing meaningful and effective collaborations among researchers and practitioners takes time, and good practices continue to evolve. Given the geographic and cultural diversity of sites, what defines good practice is likely to always remain context-specific. Nevertheless, as participants in the network continue to engage and support diverse knowledge holders and knowledge systems, in

its commitments to build peace among people and between people and 'nature', BRs remain unique and vital to sustaining home among the planet's inhabitants.

Introduction

The practitioners, scientists and governmental representatives responsible for managing, and working in, 686 biosphere reserves (BRs) in 122 countries around the world, seek to demonstrate how to pursue biodiversity conservation and sustainable development with justice and equality. As part of an intergovernmental scientific programme, but without reference to a convention or other legal authority, they work collaboratively with local and Indigenous peoples and with regional and national governing authorities to better understand how to reconcile human use of the natural environment with conservation and to apply the lessons they learn to activities on the ground. The environmental and social scientists who first imagined BRs strove to create a global network for interdisciplinary, longitudinal, applied, and comparative research to inform scientific and citizen understanding of human–environment relations at multiple scales. These early efforts pre-dated a movement for transdisciplinary research with a mission – to learn about and reconcile human-environment relations — so that BRs in effect became a test-bed for applying sustainability science on the ground. Situated within the UNESCO family of programmes, BRs also seek to exemplify UNESCO's motto, to “make peace in the minds of men and women” by their conduct – facilitating reconciliation among peoples and between people and nature. The aspirations are high and the challenges are large. The contributors to this book have demonstrated these commitments, offered on-

going lessons, identified persistent challenges and emerging opportunities, and provide key messages to inform future practice.

The Commitments

Two key commitments arise from this volume: to conservation and sustainability practices and to the practices of sustainability science. The commitment to sustainability practices has emerged from the steadfast insistence that, although all BRs contain protected areas, as both spatial entities and governance structures, they are not conventional protected areas. Rather, they are places where people – often volunteers – commit to experimenting with and demonstrating strategies for sustainability on the ground. They seek out ways to collaborate for mutual benefit working across scales of influence and sectors to learn lessons collaboratively and spur action at higher levels, often using soft law approaches.

Particularly since 1996, two broad priorities – maintaining cultural diversity and local livelihoods, and protecting key ecosystem services to meet environmental *and* human needs – have informed the designation of BRs, directed the work conducted by local practitioners and researchers, and formed the criteria for assessing a fully functional BR (Price 2002; Price et al. 2010). These priorities are evident both globally, through a range of guiding documents including the Statutory Framework (UNESCO 1996), successive strategies and action plans (UNESCO 1996; 2008; 2017), and a range of supporting UNESCO documents (e.g., UNESCO 2000; Bouamrane 2006; 2007), and regionally, for instance in the ‘Management manual for

UNESCO BRs in Africa' (Amer et al., 2015). Through the Lima Action Plan (UNESCO 2017), the MAB Programme is also committed to addressing international, multilateral agreements and initiatives as described in Chapters 2 and 3.

The commitment to sustainability science is most clearly articulated in the MAB Strategy (2015-2025) which states: "BRs, particularly through their coordinators, managers and scientists, have key roles to play in operationalizing and mainstreaming sustainability science" (UNESCO 2017: 19). However, the commitment to the tenets of what is now coined sustainability science has been evident in the careful construction of the MAB Programme and the role that BRs have played within it since they first were designated in the 1970s. From the outset, research in the MAB Programme and its BRs was intended to promote interdisciplinary scholarship across the natural and social sciences with "the aim of achieving a dynamic balance with the environment, satisfying physical, economic, social, and spiritual needs" (UNESCO 1970, p. 193-4). Although the formative years of the MAB Programme pre-dated what is now known as sustainability science, the Programme sought to be use-inspired (Kates et al., 2011), with academic researchers from diverse disciplines and a range of external partners tackling complex real-world human-environment problems and seeking to create knowledge that could immediately be put into action. Research within the MAB Programme and its BRs was to be accomplished through partnerships among researchers, local people, agencies and organizations – although these aspirations are only now being realized. Today, terms such as community-engaged scholarship, community-based research participation research, action research, and transdisciplinarity imply such partnerships to one degree or another. Advocates of sustainability

science use the term transdisciplinarity to describe an approach whereby people and organizations outside of academia become involved with academic researchers in defining and addressing research questions (e.g., Lang et al. 2012; Steelman et al. 2018). Interestingly, documents outlining research protocols for the MAB Programme and for BRs refer to transdisciplinarity as early as the 1970s (e.g., Whyte 1982). It is not difficult to show that the philosophy and practice of BRs and of sustainability science have much in common. Indeed, BRs may be characterized as an early (if imperfect) embodiment of sustainability science (Reed 2018), and, as noted throughout this volume, BRs continue to provide insights into sustainability science today.

On-going Lessons

1. New forms of research are emerging and continuing to be refined

As a vibrant network, BRs are locations where inhabitants and stakeholders continue to learn lessons that can be applied locally and shared globally. The MAB Programme was founded on a premise that local people should be involved in and derive benefit from local action research projects. When the Biosphere Conference was held in 1968, the research and action field of “environmental education” was just emerging (Palmer 1998). Post-secondary interdisciplinary programs related to conservation and development did not exist. In the early period, therefore, “environmental education” was to be undertaken through new centres of training and

research, and disseminating relevant information to the general public to aid in the public understanding of ecology (UNESCO 1970).

Today, however, environmental education includes a social learning agenda that emphasizes local and participatory research in which academic researchers and local people from multiple sectors and ways of knowing *co-produce* knowledge together. This newer approach is evident in chapters by Hockings et al.; Onaindia et al.; Salem and King; Vasseur; and Walk et al. (this volume), among others. This kind of collaborative learning also provides examples of new ways of doing research. For example, in this book, authors employed textual analysis, historical review, workshops, Delphi-inspired methods, ethnographic research, interviews, case studies and action research approaches. Nevertheless, we are reminded that there is great potential for researchers and practitioners to work together more effectively. The review of knowledge used by Swedish practitioners to nominate new sites for BRs suggests that academic researchers and practitioners still do not collaborate on key questions (Kjellqvist et al.; this volume). Other authors also indicated that there is still considerable research conducted in BRs using conventional scientific methods that do not include local people (Chu et al.; Gole et al.; Moreira-Muñoz et al.; Guevara Sada; this volume). While vital for understanding ecosystem change over time, there is still a need to marry research *in* BRs with research *with* and *by* BRs to ensure that local priorities and concerns are addressed (for examples of collaborative research see Moreira-Muñoz et al.; Torralba et al.; Moreno and Müller; Onaindia et al.; this volume).

2. Practices are dynamic and variable

Notwithstanding this qualification, the WNBR is dynamic and continues to evolve – as evidenced in the ever-increasing number of BRs, introduction of the Statutory Framework and its periodic review process, regular renewal of global action plans, and stronger connections to international agreements and priorities. Governance and collaboration among practitioners, other non-governmental organizations, researchers, governing authorities, and the private sector are key to undertaking the functions of BRs (Bridgewater; Stanvliet and Coetzer-Hanack; Tesitel and Kusova, this volume). UNESCO is not prescriptive in how BRs should be governed. Hence, significant variation in the implementation of BRs occurs both within and across countries (Bouamrane 2006; 2007b), as discussed throughout this book. This variation is explained by Walk et al. (this volume) who state that “This promising approach, however, cannot provide a “one-size-fits-all” solution to every problem because specific combinations of actors, power relationships and cultures of cooperation may differ considerably”.

The authors of some chapters were critical of this variation because in countries where governance structures are weak, BRs may be designated without sufficient logistical support to effectively carry out their functions (e.g., Chu et al.; Moreira-Muñoz et al.; this volume). However, in other countries, such flexibility has provided space and opportunity to rejuvenate dormant sites and strengthen national networks, following the introduction of specific criteria for BRs in the Statutory Framework and the requirement for periodic review. In Japan, for example, Matsuda et al. (this volume) demonstrated how the national network became reactivated through a broader set of actors after years of quiescence. Bridgewater (this volume)

explained that in Australia, some BRs also had to reconfigure their structures to address local political situations. While politically challenging, the national network was strengthened as a consequence. Similarly, Price (this volume) documented how the formalisation of criteria for BRs created incentives for a national-level review of BRs: a process that resulted in changes in the configuration and number of sites, and ultimately generated a more robust national network. Hence, flexibility and variation across the network can be beneficial – adding to the corpus of lessons from which to learn. The case studies provided in this book provide an initial offering, whose value could be greatly enhanced by a more systematic evaluation of the many different types of governance structures that have evolved, and are evolving, across the WNBR.

Persistent Challenges and Emerging Opportunities

A persistent challenge has been the lack of understanding at different levels of government – local, regional, and national – of the objectives and potential of BRs. In some countries, the lack of understanding and legal bases have meant that BRs are still not fully operational, lacking capacity at the local level to undertake BR functions (Moreira-Muñoz et al., this volume) and with limited participation by local inhabitants (Chu et al., Gole et al., this volume). As a consequence, this has meant that BRs in these countries operate more like conventional protected areas rather than collaborations to support conservation and sustainability (e.g., Heatherington 2012; Coetzer et al. 2014).

The lack of understanding is also often fueled by the continued misunderstanding or mistrust of the term “reserve”. In many countries, this term brings up the spectre of “fortress conservation” (Doolittle 2007) whereby people living in the reserve are subject to restrictions against the environmental resources in a protected area. While this is contrary to the intention of BRs, when early BRs were designated, local people had little or no say in their establishment or operation, and those responsible for the BRs failed to demonstrate specific benefits to local people (UNESCO 1993; Mathevet and Cibien; Moreno and Müller; Price; this volume). Hence, in many places, BRs have inherited the criticisms leveled at protected and conserved areas more generally and have had to make specific efforts to address this legacy (Reed and Massie 2013). The word “reserve” has particularly negative connotations in countries where Indigenous peoples have historically been (re)located onto “lands reserved for Indians”, “reserves” or “reservations” (e.g., Canada, Australia: Shaw et al.; Bridgewater,; this volume). Despite many international debates in the MAB Programme related to the term, it has been remarkably difficult to change. Hence, in some countries, BRs have taken the initiative to drop the word reserve (UK) and/or replace it with “region” (Germany, Canada, Australia), “area” (Norway, Sweden), “park” (Austria) or “eco-park” (Japan: Matsuda et al., this volume). Language and cultural diversity across the network means that words do not always translate well into all languages. The fact that the International Coordinating Council of the MAB Programme has accepted that local naming protocols is a recognition that language is important and that individual countries or sites may select names to ensure that the Programme doesn’t inadvertently reinforce exclusionary practices.

Related to the issue of applying the full suite of BR functions, the development function has been slow to take root in BRs. When BRs were first established, “development” was considered part of the agenda. However, application of this priority was weak, particularly in the first 20 years of the MAB Programme (Batisse [1986](#); SCOPE [1992](#)). Indeed, Michel Batisse, who may be regarded as the prime architect of the programme, stated that in the early years, “the conservation role was kept prominent and the logistic and development roles were largely forgotten” (Batisse 1990, p. 112). Nevertheless, the introduction of sustainable development as a specific function of BRs in the 1995 Statutory Framework and the corresponding requirement for periodic review underlined the importance of “development”. Many authors in this volume explained how BRs tackle this issue by explicitly discussing local efforts to address sustainable development (e.g., Ding et al., Kjellqvist et al.; Matar and Anthony, this volume) and/or the UN Sustainable Development Goals (SDGs) (Boaumrane et al.; Onaindia et al.; Vasseur, this volume). The increased importance of development was also evident in countries that reconfigured their BRs to ensure that all functions were represented. Nevertheless, contributors to this book suggest that development scholars and practitioners have still not effectively been brought together in the science or practices of sustainability in the context of BRs (Hockings et al.; Walk et al. this volume; Coetzer et al., 2014). The human well-being agenda has also been continuously under-represented in sustainability science research (Kates [2011](#); Rokaya et al. [2017](#)). This gap is also implied in the suggestion by Kajikawa et al. ([2017](#)) to connect sustainability science research more explicitly with global goals such as the SDGs. The longstanding nature of this challenge begs the need for a more serious examination of why

development scholars and practitioners have not been brought together in the work of BRs and in sustainability science more generally.

Throughout the chapters, we have also seen the emergence of discussion of biocultural diversity rather than simply biological diversity. Biocultural diversity refers to “...the diversity of life in all its manifestations – biological, cultural and linguistic – which are interrelated (and likely co-evolved) within a complex socio-ecological adaptive system” (Maffi 2010:5). This concept is first introduced by Reed (this volume) in Chapter 2 and is raised in chapters from Lebanon, Czech Republic, Latin America and Canada (Matar and Anthony; Tesitel and Kusova; Moreno and Muller; Shaw et al.; this volume). This dual emphasis on supporting biological and cultural diversity together is also inherent in the regenerative development concept (Moreno and Müller; Moreira-Muñoz et al., this volume) and in governance approaches such as ecosystem governance (Vasseur, this volume) and participatory governance (Onanindia et al.; this volume). These chapters share common commitments to cultural and biological diversity along with new forms of economic development and a re-establishment of longstanding dimensions of human well-being, such as spiritual well-being (Müller and Moreno; this volume). Indeed, meeting spiritual needs was raised during the Biosphere Conference in 1968 (UNESCO 1970). Reflecting on these dimensions may help us come closer to thinking about “human development” as described by the United Nations Development Programme, as creating conditions for expansion and employment of human capabilities (UNDP 2018) rather than for economic and environmental exploitation.

There are also opportunities for using BRs as models for how to conduct transdisciplinary research *with* local and Indigenous peoples. Hockings et al. provided very practical examples of how they brought Indigenous and local knowledge together across an array of cultural contexts. Similarly, Vasseur described past challenges and present lessons from the Americas to address past harms and establish respectful, responsible, and shared governance structures that place Indigenous peoples as meaningful partners into the work of BRs. Shaw et al. (this volume) documented the painstaking efforts of BRs directed at reconciliation of settler and Indigenous peoples working in Canadian BRs; and Hockings et al., Matar and Anthony, Moreira-Muñoz et al., Moreno and Müller (this volume) described strategies for integrating Indigenous and local knowledge into the practices and governance of conservation and sustainability across diverse geographic and cultural contexts – including those torn apart by civil war. These cases underscore one of Vasseur’s key lessons – to slow down the pace of research and action to (re)build relationships, establish mutually-beneficial opportunities, and share in the structuring and operation of governance institutions. Embedded in these cases are also important lessons for how sustainability science itself will be conceived, executed, and evaluated. Addressing these challenges within scientific research may require fundamental changes in how scientists organize and govern their research practice. Hence, the experiences documented here with BRs may produce important lessons for transdisciplinary science.

Finally, we should recognise that “urbanization [is] a principal driver for ecosystem-wide pressures” and was identified as one of three key challenges in the Madrid Action Plan (UNESCO 2008: 4, 7-8). Most of the 250 million people currently living in BRs (UNESCO 2018)

reside in the transition areas. There has been a long discussion about the application of the BR concept in urban contexts (e.g., Bouamrane 2007a; Dogse 2004; de la Vega-Leinert et al, 2012; Stoll-Kleemann and O’Riordan, 2017). A few chapters in this volume noted the potential role of BRs in urban contexts (e.g., Moreno and Müller; Guevara Sada, this volume). Around the globe, cities have become key players in advancing sustainable development and climate action (Bulkeley 2010). Nevertheless, to date, BRs have focused greatest attention on the needs and concerns of those living in rural regions. In an increasingly urban world, there are very strong reasons for BRs to explore innovative approaches that support the livelihoods of people within both the urban and rural parts of BRs, and contribute more directly to SDGs 11 and 12 (Stoll-Kleemann and O’Riordan, 2017).

Key Messages

The chapters in this book have pointed to a large agenda for BRs – from being local demonstration sites for the SDGs to showing the world how to address planetary boundaries. The Lima Action Plan has articulated this approach for the WNBR; success may rely on its widespread application and ability to meet its targets for broadening engagement and outreach.

The value of BRs lies not only in site-specific innovations, but in their coherence and value as a network. In 2007, Liu et al. (2007: 1516) suggested that “future research on coupled systems must include not only separate site-specific studies but also coordinated, long-term

comparative projects across multiple sites to capture a full spectrum of variations.” They went on to say, “it is critical to move beyond the existing approaches for studying coupled [social-ecological] systems, to develop more comprehensive portfolios, and to build an international network for interdisciplinary research spanning local, regional, national, and global levels.” (Liu et al. 2007: 1516). Yet, the WNBR – which encompasses regional, thematic and national networks – is built and has more than 40 years of experience to share. Recognising that the Lima Action Plan articulates an objective to strengthen “international network of scientists/knowledge holders active in and with BRs” (UNESCO 2017: 42), we seek to promote the value of the WNBR to the international community of sustainability practitioners and scientists through two key messages:

1. Demonstrate the value of BRs for national and international priorities

BRs must continue to demonstrate their value to conservation and sustainability among researchers, citizens, private sector interests, Indigenous peoples, and public agencies. This may require BRs to reconnect more effectively with global concerns and initiatives, such as long-term monitoring of climate change, the CBD, and the SDGs. As Bouamrane et al. (this volume) document, these are on-going efforts. A strengthened emphasis on biocultural diversity will shift the erroneous assumption that BRs are traditional protected areas, and will demonstrate the value of BRs in fostering partnerships with local and Indigenous peoples around the world to support these global imperatives. Such shifts will require renewed national and local leadership to translate international objectives into national targets and local action. These

connections can then be used as a platform to raise the profile of the program both within and beyond the scientific community.

2. Engage with and support diverse knowledge holders and knowledge systems

Contributors to this volume have demonstrated positive outcomes from collaborations among diverse stakeholders and rightsholders. Some have described how knowledge-holders with specialized western scientific knowledge and those with local experiential and Indigenous knowledge have been brought into productive conversation to identify and achieve mutually desirable conservation and sustainability goals. Others have described ways to bring together proponents of sustainable economic development, government officials, communications specialists and social entrepreneurs. This diverse array of potential partners suggests that BR practitioners will likely have diverse backgrounds, be skilled at bringing diverse people and knowledge systems together, and must learn address power imbalances, and become adaptive and reflective in their practice. These demands pose significant logistical, strategic, governance, and epistemological challenges, but point to the value of people who are willing to experiment to advance desirable and sustainable outcomes (Reed 2018; Hockings et al.; Vasseur; this volume). Frances Westley (2011: 769) describes these kinds of individuals as “institutional entrepreneurs”, suggesting that BRs can be places “to experiment with previous forms of integrated approaches to managing and governing natural resources and ecosystem services...[to] help prepare for a transformation by ‘beta testing’ alternative policy options.”

By addressing these challenges, BRs can shift once again from a “nice to know” program into a “need to have” model for understanding socioecological systems (Liu et al. 2007), demonstrating effective and just *biocultural* conservation, and connecting sustainability science and sustainability practice.

Looking Back to Look Ahead

The ideals of the MAB Programme as articulated as early as 1968 – an interdisciplinary scientific programme, implemented through local, national and international partnerships, and dedicated to learning – are foundational to sustainability science today (Reed, this volume). Our examination of BRs in this volume explores how these ideas evolved, as well as the opportunities and challenges that have characterized their translation into action at national and international levels. In 1987, Dr. J. Ronald Engel addressed the 4th World Wilderness Congress, suggesting that BRs could be conceived as:

...a mosaic of co-evolving, self-governing communities consistent of diverse forms of life, with intricately balanced, interdependent parts and processes. The human species, while dominant, is only one part of this mosaic, a part which, if it is to survive and flourish, must grow in practical wisdom about how to overcome its alienation and belong again to its environment (Engel 1989: 25-26).

Before dismissing this opinion as overly idealistic, it is worth remembering that Dr. Engel served the civil rights movement and community development in the United States, initiated the Ethics

Working Group of IUCN, and participated as a member of the international drafting committee for The Earth Charter. In 2003, he served as co-chair of the Ethics Specialists Group of the IUCN Commission on Environmental Law.

Engel's message resonates with local efforts and strategies, and is as relevant today as when he proposed it over 30 years ago. While both BRs and sustainability science run the risk of becoming utilitarian in outlook and practice (see Gavin et al. 2018; Reed 2018; Engel 1989), UNESCO's commitment to "building peace" makes the WNBR unique. Nevertheless, this network shares with sustainability science calls for practices of collaboration, mindfulness, and altruism (Lang et al. 2017). Hence, by conscious design, the MAB Programme can serve as a model for integrating altruistic motivations into the ambit of sustainability science and continue to press for the inclusion of moral values into research questions and methods. For those living in BRs, whether one calls these places "living laboratories" or "learning sites", "amazing places" or "sites of excellence" they are, for many people, quite simply, "home". Making peace, by reconciling relationships with one another with the natural world, remains a worthy – if, as yet, an unfulfilled – ambition for the more than 250 million people who inhabit the global network of biosphere reserves.

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