Earthscan Studies in Natural Resource Management

UNESCO Biosphere Reserves

Supporting Biocultural Diversity, Sustainability and Society

Edited by
Maureen G. Reed and Martin F. Price

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"A much-needed publication about the relevance of Biosphere Reserves as nature-based solutions that implement emerging and key concepts for our planetary challenges – such as governance and cultural practices for ecosystem management – in a continuous search for ecosystem resilience."

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UNESCO Biosphere Reserves

UNESCO Biosphere Reserves (BRs) are designated areas in geographical regions of global socio-ecological significance. This definitive book shows their global relevance and contribution to environmental protection, biocultural diversity and education.

Initiated in the 1970s as part of UNESCO's Man and Biosphere (MAB) Programme, BRs share a set of common objectives, to support and demonstrate a balance between biodiversity conservation, sustainable development and research. The world's 701 BRs form an international, intergovernmental network to support the aims of sustainability science, but this purpose has not always been widely understood. In three distinct sections, the book starts by outlining the origins of BRs and the MAB Programme, showing how they contribute to advancing sustainable development. The second section documents the evolution of BRs around the world, including case studies from each of the five UNESCO world regions. Each case study demonstrates how conservation, sustainable development and the role of scientific research have been interpreted locally. The book concludes by discussing thematic lessons to help understand the challenges and opportunities associated with sustainability science, providing a unique platform from which lessons can be learned. This includes how concepts become actions on the ground and how ideas can be taken up across sites at differing scales.

This book will be of great interest to professionals engaged in conservation and sustainable development, NGOs, policy-makers and advanced students in environmental management, ecology, sustainability science, environmental anthropology and geography.

Maureen G. Reed is Professor and Assistant Director of the School of Environment and Sustainability, University of Saskatchewan, Canada. She is UNESCO (co)-Chair in Biocultural Diversity, Sustainability, Reconciliation and Renewal.

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We dedicate this collection to the pioneers and to the next generation who seek to build peace with one another and with the 'natural world'.

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1 Introducing UNESCO biosphere reserves

Maureen G. Reed and Martin F. Price

- a world network of 701 sites across 124 countries (UNESCO 2019);
- living laboratories for sustainable development (Starger 2019);
- learning sites for sustainable development (Schultz et al. 2018);
- model regions for sustainability transitions (Kratzer 2018);
- vehicles for "operationalizing and mainstreaming sustainability science" (UNESCO 2015: 9–10).

These are a few of the multiple ways that biosphere reserves (BRs) designated by the United Nations Educational, Scientific and Cultural Organization (UNESCO) have been described by academics, practitioners, and governing authorities. And yet, surprisingly, despite being part of an active, longstanding and growing global network of sites for research and action dedicated to biological and cultural conservation, and sustainable development (from 24 sites in 1974 to 701 sites in 2019), BRs are still relatively unknown or misunderstood. It is 35 years since the publication of the last books that featured the life and work of BRs globally (di Castri et al. 1984a; 1984b). Since then, a few UNESCO reports document the purpose of BRs and provide some case studies (e.g., UNESCO 2000; Garnier 2008); while some popular books have been published about BRs at a national level (e.g., Anon, 2006; German MAB National Committee 2005; Moreira-Muñoz and Borsdorf 2014; Reed et al. 2016). Hence, there is much scope to learn from an international network that provides platforms for interdisciplinary, longitudinal, and comparative research to better understand human-environment relations at multiple scales (Liu et al. 2007; Schultz et al. 2011).

Additionally, while sustainability scientists claim to have a strong focus on "transdisciplinarity" (e.g., Lang et al. 2012; Steelman et al. 2019) – where research questions and research strategies are developed in collaboration with communities outside of academia – these scientists give most attention to large modeling exercises or individual case studies (Rokaya et al. 2017). There has been no effort by sustainability scientists to establish a global network of research platforms from which lessons can be learned, although there have been some initiatives for specific types of environment, such as

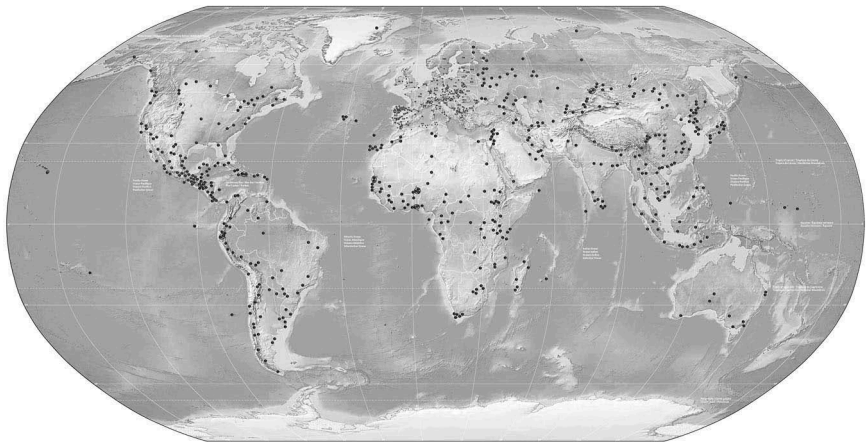

Figure 1.1 World Network of Biosphere Reserves (2019)

mountains (e.g., https://mountainsentinels.org/mountain-research/). These gaps suggest that there is much to be gained from documenting the successes and challenges within the World Network of BRs (WNBR). Such documentation can explain how practical lessons learned about conservation and sustainability can be shared and taken up across sites and scales, and may raise key questions about how best to translate sustainability science concepts into actions on the ground. To date, no compilation offers a global perspective through a common conceptual lens or an international platform of practice.

BRs share a set of common objectives: to be "sites of excellence" that support biodiversity conservation, sustainable development, and capacity building for research, education, and learning at regional scales. They are designated by UNESCO in geographic regions of global social-ecological significance. Local organizations in each region offer opportunities to "translate" high-level goals and multi-lateral environmental agreements (e.g., United Nations Sustainable Development Goals, United Nations Declaration on the Rights of Indigenous Peoples, Convention on Biological Diversity, the United Nations Framework Convention on Climate Change) into concrete strategies for application. BRs represent the most longstanding, organized, international, and intergovernmental network to support the aims of sustainability science, pursuing these aims using different approaches to implementation. It is important to underline that, unlike the worldwide collections of sites designated under the Ramsar and World Heritage Conventions, BRs are designated under "soft" legislation and are explicitly considered as a global network of sites (the WNBR). This global network is further organized by themes (e.g., mountains, islands and coasts) and by global regions. However, the concept, and implementation, of BRs have not

always been well understood by scientists, governments, or even local residents where BRs have been established.

Objectives and structure of the book

This book has three objectives. The first is to document the evolution of BRs in countries in different parts of the world, demonstrating the great variety in how conservation, sustainable development, and scientific research and capacity building have been interpreted "on the ground" as the concept of BRs has itself evolved. Second, we aim to shed light on how UNESCO's Man and Biosphere (MAB) Programme and its key tool for implementation – the WNBR – have sought to make operational the foundational concepts of sustainability science. Third, we describe key themes related to sustainability science (e.g., transdisciplinarity, governance, learning) and provide lessons from BR practices that describe opportunities for, and barriers to, translating sustainability science into sustainability in practice.

To meet these objectives, we have structured the book in three parts:

I Conceptual and practical foundations of the MAB Programme;
II Translation and transitions: the changing practices of biosphere reserves; and
III Lessons for sustainability science and sustainability in practice.

In Part I, two chapters set the stage for the examples that follow. Maureen G. Reed examines the antecedents of BRs and explains how they informed the "first generation" of BRs, those designated between 1974 and 1995. Meriem Bouamrane, Peter Dogsé, and Martin F. Price pick up the story, describing on-going efforts to strengthen the global network and to ensure that BRs become strategic players in addressing pressing global issues – biodiversity loss, climate change, and sustainable development.

In Part II, 15 short chapters articulate the experiences of implementation in countries across the WNBR. These chapters highlight how transitions in the global programme were interpreted and implemented in their national contexts. Contributors to this section include academics and practitioners, addressing questions such as: Within your national context, how has the understanding of BRs and their application changed over time?; How have BRs in your country connected with international MAB priorities, global action plans for BRs, and other BRs in the global network?; and What challenges continue to face BRs in your country as they seek to fulfil UNESCO criteria?

UNESCO divides the world into five regions: Latin America and the Caribbean; Europe and North America; Arab States; Africa; and Asia and the Pacific. This section includes at least two chapters from each region, with more emphasis placed in regions where there are more BRs. Among the contributions are

chapters that describe experiences where BRs have been established since the 1970s (e.g., Ding and Qunli – China; Guevara Sada – Mexico; Mathevet and Cibien – France; Shaw et al. – Canada; Těšitel and Kušová – Czech Republic) and where they were established more recently (e.g., Chu et al. – Vietnam; Matar and Anthony – Lebanon; Gole et al. – Ethiopia; Pool-Stanvliet and Coetzer – South Africa). In some cases, countries with a longstanding involvement in the MAB Programme have reconfigured their national network as the requirements of the programme evolved (e.g., Price – UK; Bridgewater – Australia). Experiences documented in the national chapters demonstrate diverse strategies by which individual countries have contributed to this evolving global concept and tailored the concept according to the realities of their national contexts. Many chapters are co-authored by academic researchers and BR practitioners, providing both conceptual and practical insights into the application of the MAB Programme around the world.

To present this diversity, we circumnavigate the globe, beginning with BRs from Latin America and the Caribbean region, where some of the first biosphere reserves were established. Sergio Guevara Sada from Mexico explains how governments, communities, scientists and non-governmental organizations have worked together to support biological and cultural diversity and the wellbeing of local people. Next, Andrés Moreira-Muñoz, Francisca Carvajal, Sergio Elórtegui and Ricardo Rozzi describe the challenges to creating a national network of BRs in Chile, indicating that, if strong partnerships can be forged with government and non-governmental organizations, the ideals for BRs set out by UNESCO may come closer to reality.

Moving north, and into the Europe and North America region, we turn to experiences in Canada where Pamela Shaw, Monica Shore, Eleanor Haine-Bennett and Maureen G. Reed describe the history of local and governmental initiatives in relation to BRs. In particular, they highlight Canada's recent efforts to meaningfully include Indigenous peoples in the governance of the program and in initiatives undertaken at the local level. Martin F. Price then explains how the United Kingdom's BRs evolved, pointing out that the transition from "first generation" to "second generation" expectations for BRs provided an opportunity for serious reflection, withdrawal, and reconfiguration of BRs in the UK. As we move across Europe, we learn from Tomas Kjellqvist, Romina Rodela and Kari Lehtilä how different forms of knowledge have been used to justify the creation of new BRs in Sweden. From France, Raphaël Mathevet and Catherine Cibien write from the perspective of a country where national and local public authorities have had a strong role to play in establishing and implementing BRs. They trace this history, suggesting that more work can be done by using a participatory approach that brings together public action and local collective actions. The situation is different in the Czech Republic, where Jan Těšitel and Drahomira Kušová explain how different governance models emerged over different time periods, posing challenges as BRs compete in a multi-jurisdisctional landscape of competing designations.

Moving to the Arab States, Diane Matar and Brandon Anthony describe the challenges and contributions of BRs in war-torn Lebanon, emphasizing the importance of establishing partnerships beyond the Arab states and reviving traditional land management practices. From Egypt, we learn from Boshra Salem and Caroline King-Okumu the value of transdisciplinary research, as they explain how scientific research has been combined with participatory planning to advance the aims of BRs in Egypt. From the vantage point of Ethiopia, Tadesse Woldemariam Gole, Svane Bender, Rolf D. Sprung, Solomon Kebede, Teowdroes Kassahun, Alemayehu Negussie, Kerya Yasin, and Motuma Tafa explain the value of external donors and agencies for BRs located in a country without large means. Despite having very high conservation values, the external support of NGOs and development partners is still required because BRs are not part of the structure of government institutions. From South Africa, Ruida Pool-Stanvliet and Kaera Coetzer tell us how BRs have been introduced in the last 20 years. Although there is strong national support for the MAB Programme, they describe uneven implementation across BRs. Yet, despite the limitations, BRs continue to support sustainable land management in South Africa.

Turning to Asia and the Pacific, we learn from Japan, Vietnam, and China. Hiroyuki Matsuda, Shinsuke Nakamura, and Tetsu Sato write about the ebb and flow of the MAB Programme in Japan and describe the conditions that helped revitalize its BRs in the past decade. For Vietnam, Van Cuong Chu, Peter Dart, Nguyen Manh Ha, Vo Thi Minh Le, and Marc Hockings explain the challenges in introducing BRs in a country where top-down state management of protected areas has limited opportunities for cross-sectoral and local participation. China's contribution to the WNBR has been longstanding. As described by Wang Ding and Han Qunli, China has been part of the MAB Programme since 1978, and one of its BRs was recognized by UNESCO in 2016 for its contributions to conservation and working with local communities for sustainable development. The last contribution in this section, by Peter Bridgewater, describes the Australian experience in four stages. As in the UK, new requirements introduced by the Statutory Framework in 1995 were viewed as an opportunity for renewal, resulting in withdrawals, reconfigurations and new BRs.

In Part III, six chapters focus on thematic lessons from practices in BRs for understanding the challenges and opportunities associated with sustainability science. Sustainability science has coalesced as a distinct field of inter- and transdisciplinary scholarship since the early 2000s (Kates 2011; Bettencourt and Kaur 2011). Indeed, the MAB Strategy 2015–25 sets out facilitation of sustainability science as a key element of one of its four strategic objectives. Defining sustainability science as "an integrated, problem-solving approach that draws on the full range of scientific, traditional and [I]ndigenous knowledge in a transdisciplinary way to identify, understand and address present and future economic, environmental, ethical and societal challenges related to sustainable development", the Strategy declares

that "BRs, particularly through their coordinators, managers and scientists, have key roles to play in operationalizing and mainstreaming sustainability science" (UNESCO 2017: 19).

Contributors to Part III reflect themes arising from this definition. Knowledge co-production and respectful "integration" from different cultural traditions is a key feature of these reflections. Marc Hockings and Ian Lilley, Diane Matar, Nigel Dudley, and Rob Markham consider processes of knowledge co-creation and cultural respect, describing strategies used in BRs to bring western scientific knowledge and local and Indigenous knowledge together to advance sustainability objectives in Lebanon, Croatia, Vietnam, and Australia. Tania Moreno-Ramos and Eduard Müller turn to similar issues from the experiences of their work in Latin America. They encourage us to think beyond "sustainable development" and to consider how BRs might support regenerative development in regions where ecological and cultural integrity have been challenging to maintain. Miren Onaindia, Cristina Herero, Alberto Hernández, José Vicente de Lucio, Antonio Pou, Juana Barber, Tomás Rueda, Bernardo Varela, Benedicta Rodríguez, and Aquilino Miguélez discuss how similar processes of knowledge co-creation have been established with local communities across Spanish BRs. The transfer of knowledge into action is explained in relation to diverse BRs in the Mediterranean Basin by Mario Torralba, María García-Martín, Cristina Quintas-Soriano, Franziska Wolpert, and Tobias Plieninger. Heike Walk, Vera Luthardt, and Benjamin Noelting discuss the critical roles that universities can play as partners with BRs, not just in research programs, but in creating curricula that offer students real-world opportunities to make a difference through learning-by-doing. In the last thematic contribution, Liette Vasseur reminds us that such efforts require time and on-going commitment. Under the umbrella of "ecosystem governance", she encourages participants from local and Indigenous communities, universities, governments, and private and civil society sectors to "slow down the pace" to ensure meaningful, respectful and mutually-beneficial partnerships for sustainability. Finally, we close by offering some synthesis of the issues and themes raised by the book.

Basic principles of biosphere reserves

For those unfamiliar with BRs, we offer the following introduction. As described in Chapter 2, the MAB Programme was established in 1971, and soon came to include 14 thematic "project areas". BRs were to be designated to support several of these, but came to be most clearly identified with project area 8, "Conservation of natural areas and of the genetic material they contain". This identification would forever "brand" BRs as being tools for biodiversity conservation, despite the efforts to support sustainable use from the outset and the explicit function to support sustainable development that was introduced with the Statutory Framework. The first 24 BRs, in five countries, were designated in 1974.

BRs established up to 1995 are considered "first generation" BRs, as they were created without a Statutory Framework and were charged to support biodiversity conservation and applied scientific research (Chapter 2). BRs established from 1996 onwards are often described as "second generation" as they have been required to address the criteria of the 1996 Statutory Framework and implement Action Plans published in 1996, 2008 and 2017 (Chapter 3). Today, BRs are UNESCO-designated regions, with their associated institutions, which operate at the landscape level to carry out three functions: conserve biological and cultural diversity; advance sustainability; and support scientific research, learning, and public education (UNESCO 1996). An important distinction between first and second-generation BRs is that, in the latter, sustainable development has been a primary function since their designation, in addition to the conservation of biodiversity and logistics (i.e., scientific research and more broadly, local capacity building). As described in Chapter 3, a decennial periodic review process is implemented to ensure that all BRs implement the functions set out in the Statutory Framework; this has required the spatial expansion of, and introduction of participatory management for, most "first generation" BRs.

The Statutory Framework requires that all BRs contain three types of zones: one or more core areas, protected by legislation; one or more buffer zones where research and uses compatible with ecological protection are allowed; and a transition area where sustainable resource use is practiced (UNESCO, 1996). In some countries, this transition area is called a zone of cooperation. Once a BR has been designated by UNESCO, "organizational arrangements" must be instituted so that "a suitable range of *inter alia* public authorities, local communities and private interests" implement the functions of a BR (UNESCO, 1996: 17). In some countries (e.g., France; Germany), core funds are provided by government authorities, whether regional or national, and may be leveraged through projects or social enterprises. In other cases, the regional institutions for BRs have to obtain funds to implement local or regional conservation or sustainability initiatives, partner with educational institutions to deliver training programs, undertake educational and demonstration projects, and provide logistical support for scientific research. Designation of a BR does not confer any new level of jurisdiction. Hence, the regional institutions do not have regulatory authority or direct management and decision-making powers, but must operate within national and subnational legislative frameworks. In this context, management may take a number of forms, including implementing regulations introduced by a government authority and/or working with relevant government agencies in cooperative decision-making forums. There is a great diversity of applications, as explored in the chapters in Part II.

Importantly, since 1994, BRs have not been considered protected areas under IUCN's classification (Dudley, 2008; Stolton et al., 2013). Core areas and, sometimes, buffer zones match some IUCN categories, but transition areas do not. Hence, BRs adopt some of the privileges and criticisms of

protected areas. The term 'biosphere reserve' has likely contributed to this confusion. As several chapters describe, the word "reserve" often has a negative connotation, harkening back to the creation of protected areas that excluded local and Indigenous peoples from use. In some countries (e.g., Australia, Austria, Canada, France, Germany, Norway, Sweden), the word reserve is being replaced by more general terms such as "region", "area", or "park" or simply, informally, referring to the designations as "biospheres" (e.g., the UK). In other countries, new terms are used nationally (e.g., "eco-park" in Japan).

Last, it may be significant that BRs have been established within UNESCO – an organization that was established to build peace internationally through education, science and culture following World War II. BRs support peace-keeping in their efforts to provide for the co-flourishing of nature and of people. These efforts are evident in chapters where BRs operate in countries damaged by war (e.g., Lebanon, Vietnam) and where BRs can demonstrate restoration, regeneration, and reconciliation in relations with the natural environment and with local and Indigenous peoples who have been subject to longstanding social exclusion and cultural marginalization (e.g., Australia, Canada, Costa Rica). In this context, it is worth noting that there are currently 21 transboundary BRs shared between two or more countries, often in parts of the world characterized by past conflict, for instance along the former "Iron curtain" and in Latin America (Fall 2005). Building peace makes BRs unique model regions in a world with multiple types of protected areas and sustainability initiatives and demonstrates their contribution to "just" conservation and sustainability.

We offer this compilation to a broad readership. We anticipate that scholars, government and policy representatives, professionals within the UN family or cognate organizations, practitioners, local and Indigenous communities, and the general public may find lessons for translating broad concepts into grounded strategies for advancing biocultural diversity and sustainability in BRs and beyond. The value of this compilation lies in its explanation of the shared vision that characterizes this global network and in the varied mechanisms by which such vision has been adapted to local contexts. We invite you to learn from these experiences.

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Part I

Conceptual and practical foundations of the international Man and the Biosphere Programme


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2 Conceptual origins and first-generation biosphere reserves

Maureen G. Reed

Introduction

Sustainability science has emerged since the 1980s as a distinct field of study that addresses complex problems at the nexus of human–environment relations (Bettencourt and Kaur 2011; Kates 2011a, b and c; Takeuchi et al. 2017). It has been described as a use-inspired, problem-solving "interdiscipline" that relies on engagement of multiple users and knowledge holders (Kates 2011c). More specifically, UNESCO (2015: 9) defined sustainability science as "an integrated, problem-solving approach that draws on the full range of scientific, traditional and [I]ndigenous knowledge in a transdisciplinary way to identify, understand and address present and future economic, environmental, ethical and societal challenges related to sustainable development". Significantly, sustainability science is a normative science, concerned to understand *and to improve* human–environment relations (Miller 2015). For UNESCO biosphere reserves (BRs) and the Man and the Biosphere (MAB) Programme within which they have been designated, these ideas are not new. Rather, they have evolved from a longstanding effort by the original architects of the MAB Programme to create an international, intergovernmental action–research program. In designing this, environmental and social scientists strove to create a global network for interdisciplinary, longitudinal, and comparative research to inform scientific and citizen understanding of human–environment relations at multiple scales – in effect becoming a test-bed for applying sustainability science on the ground.

In this chapter, I briefly review key conceptual and practical antecedents to the MAB Programme in the early-mid twentieth century and then examine how BRs were conceived and implemented from the 1970s to the mid-1990s. During this period, four key themes emerged that foreshadow those in research and practices of sustainability science and sustainability-in-practice in the twenty-first century. These themes are: having a normative orientation; undertaking interdisciplinary scholarship; conducting use-inspired research through partnerships; and engaging in learning. I discuss each in turn and consider their implications for sustainability science.

Conceptual origins

Perhaps it is not surprising that both BRs and sustainability science have been built on ecosystem perspectives in the life sciences (Rokaya et al. 2017; Reed 2018). Foundational ideas about ecosystems in the United States and Europe in the early-mid twentieth century were rooted in integration, conservation, and faith in scientific expertise combined with an overt love of nature, pragmatism and sense of moral duty (Worster 2014; Keller and Golley 2000). From the late nineteenth century, sites set aside for the conservation of nature were considered the best locations for scientists to improve their understanding of ecological patterns, processes, mechanisms, and relationships. Outdoor laboratories, with controlled types of experiments, could both maintain desirable characteristics of nature and help ecologists measure the effects of human activities (Bocking 2012).

Academic researchers and public servants also believed scientific experts were the legitimate advisors to inform management practice. The twentieth century marked the rise of formalized bureaucracies to "manage" nature and translate the principles of scientific management into appropriate conservation practice (Bavington 2002). Scientists also openly expressed their appreciation for the beauty of nature (e.g., Tansley 1945), derived moral lessons for humanity in ecological concepts such as "communalism" and "interdependence" (e.g., Whitehead 1925; Wheeler as described by Alice and Evans 1970), and sought to mobilize humanity to action, stating that nature would retaliate for losses associated with soil erosion and resource overexploitation (Osborn 1948; Vogt 1948). The creation of the MAB Programme, and particularly, BRs, can be understood as both a logical outgrowth, and an adaptation, of both the "scientific" and "sensible" motivations of European and North American environmental scientists of the early-mid twentieth century.

Scientific deliberation of conservation and development issues internationally followed the establishment of the United Nations (UN) after World War II. Scientists were growing increasingly aware of environmental and social conditions internationally and the role that science might play in broadening global prosperity. Patrick Petitjean (2006: 29) remarked: "Scientists had played an essential role in the war effort; now many hoped to do the same for keeping the peace". International conferences in 1949 and 1955 sought to better understand human effects on the natural environment and to promote understanding of development projects in so-called "lesser-developed countries" (McCormick 1995). The immediate post-World War II era was also characterized by exponential growth in the number of professional ecologists internationally (Golley 1984) and the establishment of "big science" – large scientific consortia that spanned great geographic range and conceptual distance (Blair 1977). In 1964, the non-governmental International Biological Programme (IBP) was established to better understand and compare processes that affected the functioning of natural ecosystems (Worthington 1975). The adoption of bilateral treaties and multilateral agreements such as the

Convention on International Trade in Endangered Species of Wild Fauna and Flora (1975) and the Convention on Wetlands of International Importance (the "Ramsar Convention") (1975) reinforced the rising influence of ecology both as a scientific enterprise and as a public mission (Meine et al. 2006).

The MAB Programme grew out of these international antecedents. Formally, this intergovernmental program was sparked at the "Biosphere Conference" (officially entitled, "The Intergovernmental Conference of Experts on the Scientific Basis for Rational Use and Conservation of the Resources of the Biosphere") held in Paris in 1968. This conference was arguably the first to articulate key principles that now characterize sustainability science. Scientific delegates from 63 nation states of the global north and south with expertise from "biological, physical and social sciences, technology and economics" (UNESCO 1970b: 227) met to address growing concerns about humanity's impact on the natural world.

The Biosphere Conference sowed seeds for the concept of sustainable development by promoting a dual strategy of rational use and nature conservation. Although easily criticized today for its anthropocentric and instrumental bias, the dual focus on rational use and conservation was considered radical and novel for its day, particularly for an international research and education program. Furthermore, interdisciplinarity across the natural and social sciences was considered key (UNESCO 1970b), as scientists sought to create an action research program that would help humanity achieve "a dynamic balance with the environment, satisfying physical and economic, social and spiritual needs" (UNESCO 1970b: 45). The conference also gestured to the role of Indigenous peoples in protecting biological and cultural diversity by noting that "disappearance of traditions and customary rights, as well as changes in the mode of life, bring about very important disturbances in developing countries" (UNESCO 1970b: 234).

The conference laid the foundation for the MAB Programme and the designation of BRs. The MAB Programme was designed as an umbrella for multiple, interdisciplinary "project areas", of which there were soon to be 14. Some project areas focused on the interrelationships between "man" and ecosystems; most focused on major physiographical units such as tropical forests, arid zones, mountain regions or urban areas; while a few focused on particular impacts or processes deemed to be of global significance, such as human perceptions and attitudes to the environment, and the use of pesticides. Although formally included under Project 8, "Conservation of natural resources and of the genetic material they contain", BRs were mentioned throughout formative documents as sites for scientific research, monitoring, education and training across all project areas (UNESCO 1970a, 1971). The first report of the International Coordinating Council (ICC) of the MAB Programme recommended that each country participating in the program designate BRs, and "stressed the particular role of BRs as essential components for the study of many projects under the Programme" (UNESCO 1971: 27).

In 1974, a special task force convened jointly by UNESCO and the UN Environment Programme (UNEP) conceptualized BRs as an international network of sites designed to:

1 conserve for present and future human use the diversity and integrity of biotic communities … and to safeguard the genetic diversity of species on which their continuing evolution depends;
2 provide areas for ecological and environmental research … consistent with objective (1) above; and
3 provide facilities for education and training. (UNESCO 1974: 11–12)

The first two objectives – protection of biodiversity and promotion of research – mirrored conservation strategies of earlier times. But the network had a twist; it was not to be solely a new set of protected areas. In developing the BR concept, scientists sought to promote "conservation, restoration and the acquisition of knowledge for improving man's stewardship of *the domesticated and wild* countryside" (UNESCO 1974: 11; my italics). To acquire such knowledge, they sought a range of ecosystems – "pristine sites" that could be used as benchmarks, regions characterized by human use, and even "degraded" sites. Selected sites were to be *representative* ecosystems aimed at understanding and redressing widespread environmental challenges rather than considering biological exceptions (Batisse 1982).

Early designations were created with guidance from the global system of "biogeographical provinces" established by Hungarian biologist and biogeographer, Miklos Udvardy (1975). In time, it was expected that worldwide network of BRs would cover all major representative natural and semi-natural ecosystems, allowing for lessons learned in one site to be transferred to others (di Castri et al. 1980).

Within this global network, each BR was to contain a core protected area, with other zones allowing for research and/or more intensive use. Multiple configurations were proposed (UNESCO 1974). However, by the mid-1980s, a "fried egg" model emerged as the most popular template, characterized by: a core protected area (core area); a buffer zone with uses (such as recreation and research) that were compatible with maintaining the biological values of the core area; and a transition area (or zone of cooperation) that allowed for more intensive human activities (Batisse 1986). This zonation system would then allow for explicit experimentation and learning about how humans affected biodiversity (Figure 2.1). The variety of sites would offer opportunities for comparative research on a global scale.

First generation biosphere reserves: translating ideals into action

The BR network grew rapidly – in 1974, 24 BRs were designated; by 1981, another 169 had been added; and by 1995, there were 320. As this global network grew rapidly, the MAB Programme as a whole quickly became unwieldy