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Biosphere reserves from Seville, 1995, to building a new world for 2030:

A global network of sites of excellence to address regional and global imperatives

Meriem Bouamrane, Peter Dogsé, and Martin F. Price

Abstract

This chapter describes the philosophy characterizing the evolution of biosphere reserves since the 1995 International Conference on Biosphere Reserves in Seville, Spain and, more recently, the MAB Strategy (2015-25) and the Lima Action Plan (2016-25). It then explains the implementation and implications of the periodic review process introduced at the Seville conference. The chapter further describes how the WNBR connects to and supports international priorities and commitments related to the Sustainable Development Goals, biodiversity and climate change.

Introduction

Since it was first established, the development of UNESCO's Man and the Biosphere (MAB) Programme has been closely connected to international processes that relate to the functions of biosphere reserves (BRs): biodiversity conservation, (sustainable) development, scientific research, and education (e.g., Reed, this volume; Bridgewater, 2016; Ishwaran, 2012). These issues were all addressed by the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro in 1992, which had three main outcomes: the Convention on Biodiversity (CBD), the UN Framework Convention on Climate Change

(UNFCCC) and 'Agenda 21'. When it met a year later, the General Conference of UNESCO recognised the linkages across these global imperatives, and invited the Director-General to convene a conference on BRs. This chapter begins with a short overview of the resulting International Conference on Biosphere Reserves, which took place in Seville, Spain, in March 1995 (the 'Seville conference'), and is widely regarded as pivotal for the MAB Programme. The next sections consider: first, the development and implementation of global strategies and action plans after the Seville conference; and second, the implementation and implications of the periodic review process introduced at the Seville conference. These are followed by discussions on the roles of BRs with regard to global processes relating to the biodiversity and climate change in the context of sustainable development, and conclusions on the future directions of the MAB Programme and its WNBR.

The Seville conference and its outcomes: the Seville Strategy and the Statutory

Framework

One of the aims of the Seville conference was linked directly to UNCED: 1) to use the experience of BRs to "further define the concept of regional units of sustainable development" to seek solutions "to the new problems arising after [UNCED] concerning relations between environment and development". The other aims related more to the implementation of BRs: to examine the 1984 Action Plan for BRs and advise on future measures; to analyse and comment on a "draft statutory framework for the International Network of [BRs], and to contribute to its finalization"; and to give "the highest priority to the promotion and adequate functioning of the International Network of Biosphere Reserves" (UNESCO 1993: 34).

The Seville conference was attended by 421 participants from 102 countries and 14 organisations. It consequently provided a unique opportunity for people concerned with BRs from around the world to meet, exchange experience, and strategically look forward. The latter was done primarily through a number of panels which met during the conference to finalise the Seville Strategy for Biosphere Reserves. This set out a vision for BRs into the 21st century, and identified four goals and 92 recommendations, each with one or more implementation indicators, to be implemented at the international, national and BR levels. In addition, a small group worked on the Statutory Framework of the World Network of Biosphere Reserves (WNBR: this name emerged during the conference). This was almost completed in Seville, and finalised after debate in the International Coordinating Council of the MAB Programme (ICC) later that year. Both documents were adopted by the ICC and then the General Conference of UNESCO (UNESCO, 1996).

Thus, by the end of 1995, the MAB Programme and its WNBR had a forward-looking strategy and, in the Statutory Framework, a codified set of criteria and procedures for designating and reviewing BRs. Article 3 stated that BRs “should strive to be sites of excellence to explore and demonstrate approaches to conservation and sustainable development on a regional scale” (UNESCO, 1996: 16), combining the three functions of conservation, development, and logistic support, i.e., demonstration, education, training (all elements of capacity building) and research and monitoring. The criteria in Article 4 included requirements for BRs to have three zones and governance mechanisms. Article 9 specified a ten-yearly periodic review process – the focus of the strongest debate within the ICC that year (Price, 1996). The need for such a process had been recognised for some time

(e.g., Eidsvik, 1984), for two main reasons. The first was the size and diversity of the network which, by 1995, consisted of 328 sites in 82 countries, varying in area from 100 hectares to 70 million hectares (UNESCO, 1990, 1995). The second related to the challenges of implementing the BR concept, most recently recognised in the evaluation of the 1984 Action Plan (IUCN, 1995). Article 9 also gave Member States the option of withdrawing BRs that did not meet the criteria in Article 4.

Global strategies and action plans and their implementation

The MAB Programme – like other international programmes – regularly defines global strategies and action plans, within the context of both UNESCO strategies and global imperatives. The first strategic document was the 1984 action plan (Reed, this volume); the second was the Seville Strategy. Within the MAB Programme, oversight of strategies and action plans is the responsibility of the ICC, which met every two years until 2008, and thereafter annually. The reports of these sessions provide an ongoing record of implementation. In addition, from time to time, the MAB Programme organizes large international meetings to review implementation and develop and/or finalise policy documents. In 2000, such a meeting took place in Pamplona, titled ‘Seville +5’ as its aim was to take stock of the implementation of the Seville Strategy to date. Informed by a survey of the implementation of the strategy by BRs (which achieved a 30% response rate: UNESCO 2000), the working groups at the meeting made many recommendations, from which a number of high and medium priority tasks were identified “given the meagre resources available” to the MAB Secretariat (UNESCO, 2001: 15).

The next major meeting was the Third World Congress on BRs, held in Madrid, Spain, in February 2008. The main outcome was the Madrid Action Plan (MAP). This placed the WNBR in the global context of three major challenges – climate change, accelerated loss of biological and cultural diversity, and urbanization – and the Millennium Development Goals (MDGs), agreed to in 2000. The MAP identified progress since the Seville conference with regard to the “essence and identity” of BRs: multi-functionality and integration among the three functions; the use of the three-zone approach for planning and reconciling stakeholder interests; the presence of human settlements within BRs; and the commitment to regular review. Its vision statement stated that the WNBR “fosters harmonious integration of people and nature for sustainable development... contributing to the MDGs”, and is “one of the main tools to develop and implement sustainable development approaches” (UNESCO 2008: 8). The main part of the MAP was drafted during the congress by a small group, starting from elements provided by both the outgoing Chair of the ICC and the MAB Secretariat. Within four action areas – cooperation, management, and communication; zonation; science and capacity enhancement; partnerships – the MAP identified 31 targets with 67 actions, each with a timeframe, success indicator(s), and the stakeholders who would be responsible for action (UNESCO, 2008).

An internal mid-term evaluation of the implementation of the MAP was undertaken in 2010, and an external evaluation in 2013-14. A first key finding of the latter was that “A significant proportion of biosphere reserves and MAB national committees are ‘disconnected’ from the World Network of Biosphere Reserves” (Popelier and Vaessen, 2014: 63), as evidenced by the rather low response rates to the survey: 39% among BRs, and 55% among national committees, despite the long time for response and various measures taken to increase

response. This limited the value of the evaluation as a whole. With this caveat, other findings were that: in many BRs, there was no activity in one or more of the functions; many had no management structure, but most BRs systematically collaborated with different institutional actors; the most important activities focused on sustainable development, climate change and ecosystem services. Most BRs reported some or substantial progress in all four MAP action areas; and “cooperation, management and communication ... [and particularly] strengthening capacities and resources for managing and governing BRs”, was consistently rated as the highest priority action area (Popelier and Vaessen, 2014: 63-67). The evaluation made five recommendations: “strengthen the value of the WNBR for BRs and the active involvement of the latter in the network’s activities; strengthen the ‘clearing house’ function of the WNBR [to increase flows of information]; develop the WNBR’s global role as a laboratory of ideas; raise the profile of the WNBR; and strengthen the financial and human resource base of the WNBR.” (Popelier and Vaessen, 2014: i).

These recommendations were considered during the development of the current policy documents for the MAB Programme: the MAB Strategy (2015-2025) and the Lima Action Plan (2016-25) (LAP) (UNESCO, 2017c). In contrast to the Seville Strategy and the MAP, both of these were developed through participatory processes, each taking about a year and involving BR managers, national MAB committees, and other stakeholders. The Strategy was finalized and adopted by the ICC in 2015, and the LAP at the 4th World Congress of BRs, held in Lima, Peru, in March 2016. The vision and mission statements in both the MAB Strategy and the LAP clearly refer to recent global policy imperatives: the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs) (United Nations, 2015); and the Paris Agreement on Climate Change (UNFCCC, 2015). The elements of the

mission are to: develop and strengthen models for sustainable development in the WNBR; communicate the experiences and lessons learned; support evaluation and high-quality management, strategies and policies for sustainable development and planning, as well as accountable and resilient institutions; and help Member States and stakeholders to urgently meet the [SDGs] through experiences from the WNBR. The five strategic action areas of the LAP relate to: 1) BRs as “effectively functioning models of sustainable development” (19 actions); 2) collaboration and networking (10 actions); 3) partnerships and sustainable funding (14 actions); 4) communication, information and data sharing (6 actions); and 5) governance (7 actions, including a mid-term evaluation). For each action, outputs, responsibility, timeframe, and performance indicator(s) are specified. In summary, the MAB Strategy and the LAP provide the framework for the MAB Programme until 2025 and, as with previous global strategies and action plans, their implementation will be evaluated.

The roles of the periodic review process

As conceived in the Statutory Framework, periodic review for BRs may be regarded as a quality control process. Briefly, the aim of this process is to ensure that every BR meets the criteria specified in Article 4 of the Statutory Framework, highlight issues requiring resolution, update governance mechanisms, and improve legitimacy (Amer et al., 2015). By 2013, 18 years after the process had been approved by all UNESCO Member States, governments had submitted 349 periodic reviews, as recorded in the reports of ICC sessions. Beyond the value of these reports for the evaluation of quality control, two other outcomes were that 32 BRs had been extended – usually so that they included not only the original core area but also buffer zones and a transition area (Price, 2017) – and 12 had been

withdrawn (Coetzer et al., 2014). However, a large proportion of the remaining BRs designated before the Seville conference in 1995 did not meet one or more of the criteria in the Statutory Framework. In particular, some had no resident populations – and therefore there was no possibility to implement the ‘development’ function – and many did not have a participatory governance structure and/or did not include three zones (Coetzer et al., 2014). In addition, there were many BRs for which either no report had been received or there had been no response to recommendations – often repeated – from the ICC. Consequently, at its 25th session that year, the ICC instituted an ‘exit strategy’, requiring Member States to submit periodic review reports before its 2016 session, to demonstrate that their BRs conformed to the Article 4 criteria (UNESCO, 2013c). This strategy applied to 270 BRs in 75 countries (43% of the current members of the WNBR) for which periodic reviews either had not been submitted or, where this had been done, the ICC had concluded that the BRs did not meet the criteria (UNESCO, 2013; 2014; 2015c).

In 2015, the ICC decided that it would make its final decisions with regard to the exit strategy at its session in 2017. By the time this session took place, of the 270 BRs identified in 2013, periodic reviews for 126 BRs showed that they met the Article 4 criteria. More than 80% of these had been designated before 1995 (UNESCO, 2017d). In addition, a further 38 BRs had been withdrawn (Matar and Anthony, 2018). Nevertheless, 85 BRs still did not meet the Article 4 criteria. Consequently, after vigorous debate throughout the session, the ICC decided to complete the ‘exit strategy’ in 2020, and “to institute a ‘process of excellence and enhancement of the WNBR as well as quality improvement of all members of the World Network’ to ensure that they serve as models for the implementation of the 2030 Agenda and its SDGs” (UNESCO, 2017; 17). The ICC also agreed on specific procedures for different

categories of BRs, depending on their status (i.e., in conflict zones, transboundary) and whether a periodic review had been provided and evaluated or not. Further decisions referred to the possibility for a site to be withdrawn from the WNBR at the close of the ICC session in 2020 if no adequate information had been provided and evaluated, showing that it met the Article 4 criteria.

While the periodic review process and, particularly, the 'exit strategy' have been largely successful in ensuring that the majority of current BRs meet the criteria in the Statutory Framework, many of those completing the forms have commented that they regard the process as an administrative task with no perceived benefit (Matar and Anthony, 2018; Reed and Egunyu, 2013). One reason for this is that the process is often regarded primarily as a tool to monitor compliance. This is certainly one purpose of the process; another could be to regard it as a tool to evaluate other aspects of management effectiveness, such as learning, innovation, and adaptive management. Seen in this light, the process could be regarded as an opportunity for BR managers to document reality, reflect on and evaluate their activities, and generate creative ideas that could contribute to management practice (Bouamrane, 2007; Reed and Egunyu, 2013).

Beyond the level of individual BRs, the information embodied in periodic review reports represents a vast source of knowledge that could be used as a "collective learning experience between key stakeholders at both national and international levels" (Price, 2010: 555), as well as a resource for comparative academic research. Price (2002) called for an online system to allow easy access to the reports, allowing anyone to benefit from the great range of actions and experiences. Since 2013, UNESCO has had an open access policy, as

noted by the ICC (UNESCO 2014). However, the periodic review reports are not yet online, mainly because of limited human resources within the MAB Secretariat.

Finally, it should be noted that there have been calls for interim reporting, probably every five years, half way through the ten years mandated by the Statutory Framework (as discussed by the ICC in 2009: UNESCO, 2009), and for a simpler, shorter form which could become a “dynamic living document” for each BR (Matar and Anthony, 2018: 19). These suggestions have advantages – e.g., more current information that would be of greater value to all stakeholders, shorter processing time for the MAB Secretariat and the Advisory Committee on Biosphere Reserves – although more frequent reporting would also increase the workload. Given that the periodic review process was instigated at a time when there were only 328 BRs, a number which has since more than doubled, and that the number of people working in the MAB Secretariat has decreased over this period, there would appear to be a clear need for the working group on the ‘process of excellence and enhancement’ to consider how the process can be restructured to support BRs as both “sites of excellence” and “sites of learning” (Reed and Eguny, 2013: 116).

Responding to global imperatives

As described by Reed (this volume) and at the beginning of this chapter, the MAB Programme has always been closely linked to major global processes and initiatives in the context of sustainable development and the conservation of biodiversity. This section explores the connections between the Programme and its BRs with regard to four key issues: biodiversity, climate change and, more broadly, the SDGs and Indigenous peoples.

Biodiversity

BRs are social-ecological systems; ecosystems represent the living system and human societies are part of these living systems within which economic systems are embedded (Weber 2013). One goal of BRs is to reconcile the conservation and sustainable use of biodiversity within a given space where multiple stakeholders live and interact (Batisse, 1982; UNESCO, 1996). Since 1976, BRs have contributed to transforming relationships between people and the rest of biodiversity, by sharing values, solutions, and knowledge (Garnier, 2008; UNESCO, 2002, 2010).

‘UNESCO’s Commitment to Biodiversity’ recognizes that “[b]iodiversity is the living fabric of our planet. It underpins human wellbeing in the present and in the future, and its rapid decline threatens nature and people alike” (UNESCO, 2018: 5). Given the finding of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) that the main global drivers of biodiversity loss are climate change, invasive species, over-exploitation of natural resources, pollution and urbanization (Fischer et al. 2018; Karki et al. 2018), UNESCO’s Commitment also emphasizes that halting or reversing this loss requires the transformation of people’s roles, actions and relationships with biodiversity, and that BRs can play a number of roles in this context. More broadly, this transformation has already begun with the commitment of the international community to the SDGs – and part of the mission of the MAB Programme is to help Member States and other stakeholders meet the SDGs through experiences in the WNBR (UNESCO, 2017c). In the context of biodiversity, SDGs 14 and 15 are particularly relevant, although there are also many interconnections between biodiversity and other SDGs, especially 2, 3, 6, and 13.

Biodiversity and cultural diversity – which derives from different worldviews about the relationships between society and nature – are intricately linked. With a dual focus on biological diversity and human use, BRs are uniquely poised to deliver on an agenda to support biocultural diversity – particularly, but not exclusively, with Indigenous peoples (Garnett et al. 2018; Gavin et al., 2018).

The designation and management of protected areas is the cornerstone of biodiversity conservation. However, despite an increase in the number of protected areas in the world, biodiversity continues to decline (IPBES, 2018). In this context, BRs – which include protected areas as their core areas, and sometimes within buffer zones – implement an integrated landscape approach to conservation planning, playing a key role in ensuring suitable habitats for species. Progress has been achieved in connecting protected areas within the landscapes in which they are located (Brondizio et al., 2009; Cormier-Salem, 2006). While BRs provide some successful examples in implementing such connections, further efforts are needed (Bouamrane et al.; 2016, 2017). These may become even more important given the need to consider realigning protected area networks in response to climate change (Heller and Zavaleta, 2009).

Conservation in a BR should be open, interacting with the larger landscape and region with which it is connected. As BRs are more than protected areas, one of their aims is to put this connectivity into practice, creating support and engagement of inhabitants and local stakeholders (Bouamrane et al., 2016). Measures to improve environmental status within conservation areas, combined with seascape- and landscape-scale approaches, are urgently needed if their efficiency is to be improved. Growth in protected areas in many countries is

helping to maintain options for the future, but sustainable use and management of land and, in some cases, sea outside these areas remains a priority for experimentation within the WNBR. In this context, connectivity in BRs promotes and explores social and ecological interdependencies collectively. Shifting from the concept of interdependence to ecological solidarity reveals the community of fate between people, their societies and the rest of nature (Mathevet et al., 2010). This implies a shift of paradigm where people no longer control and dominate nature but consider themselves as part of it. This ecological solidarity leads to affirming the plurality of these interdependencies (Mathevet et al., 2015). By rethinking the role of humans vis à vis other living species, and highlighting our interdependencies, ecological solidarity can represent the cornerstone of a socio-ecological stewardship (Mathevet and Bousquet, 2014), acknowledging the values of solidarity among human beings and between them and other species. Many BRs provide opportunities for reconsidering the relationships of people with nature. As described in many chapters of this volume, work conducted by BR practitioners with Indigenous and local peoples is key to gaining this perspective.

Climate Change

Climate change has been defined by the UN Secretary-General as “the defining issue of our time” (Guterres, 2018) and the sense of urgency is underlined by the Special Report on Global Warming of 1.5°C from the Intergovernmental Panel on Climate Change (IPCC, 2018). For the MAB Programme, climate change is far from a new issue, as it featured prominently in the MAP, as well as in several past projects and declarations related to MAB and the WNBR (e.g., Gurung, 2005; UNESCO 2008; German Commission for UNESCO, 2011a).

Nevertheless, the adoption of the Paris Agreement and the 2030 Agenda for Sustainable Development have resulted in increased expectations that BRs will help to address climate change in a holistic and integrated manner that contributes positive synergies with other SDGs, notably SDG 15.

It is therefore no surprise that climate change features prominently in the current MAB Strategy and LAP (UNESCO, 2017c), including in MAB's mission statement, as well as in the UNESCO Strategy for Action on Climate Change (2018-2021) (UNESCO, 2017e). Under the motto "*Changing Minds, Not the Climate*", the objective of the Strategy is to enable Member States to take urgent action to combat climate change and its impacts through education, sciences, culture and information and communication, in line with their respective Nationally Determined Contributions (NDCs) under the Paris Agreement, and in the overall context of the 2030 Agenda for Sustainable Development and its SDG 13.

Reflecting the multifaceted nature of climate challenges and associated mitigation and adaptation solutions, the Strategy emphasizes actions that provide UNESCO's Member States with climate-related knowledge, data and information services, and policy advice to enable a shift in mindsets towards enhanced sustainability. In recognition of the ethical dimensions of climate change, UNESCO has also developed a Declaration of Ethical Principles in Relation to Climate Change (UNESCO, 2017e).

Biosphere reserves, together with World Heritage Sites and UNESCO Global Geoparks, play an important role in the implementation of the UNESCO Strategy. Climate change is already being felt in many UNESCO-designated sites around the world. As these sites tend to have strong iconic value, the climate challenges they are, and increasingly will be, facing are often

highlighted in the scientific literature and in the public press and in social media (UNESCO, 2004; German Commission for UNESCO, 2011a, 2011b; UNESCO, 2015b, 2015c, 2015d; Markham et al, 2016; Osipova et al., 2017; Egan and Price, 2017).

Member States, National Authorities, MAB National Committees, National Commissions for UNESCO and BRs are invited under the LAP (action A1.4) to use BRs as priority sites and as observatories for climate change research, monitoring, mitigation and adaptation, including in support of the Paris Agreement. In terms of observing climate change, in a special survey undertaken by the MAB Secretariat in 2015 on climate change and BRs, 79% of the responding sites indicated that they had observed changes that could be attributed to climate change, such as modifications in rainfall patterns and seasonal changes in animals and plants. According to this survey, nearly 60% considered these changes as rather worrying or very worrying (UNESCO, 2015d)

Around the world, BRs are not only contributing to climate change observation, monitoring and research, but also to mitigation and adaptation actions and public awareness of climate change impacts on human societies, cultural diversity, biodiversity and ecosystem services. This includes promoting international cooperation and networking facilitated by MAB National Committees and by the thematic and regional MAB and BR networks. In short, as climate change observatories, BRs help us to better understand and project climate change and its impacts, and to find and share solutions to mitigate and adapt to climate change in an overall context of sustainable development.

Over the years, there have been many case studies and good practices have originated from BRs as climate change observatories (Dogsé, 2015; German Commission for UNESCO, 2011b; UNESCO 2013a; 2015a). The MAB Programme has, for decades, championed ecosystem approaches as a foundation for its activities and international BR networking and collaboration projects. In terms of climate change, this has included a specific focus on mountain ecosystems (UNESCO, 2004; Gurung, 2005; Egan and Price, 2017), small islands (UNESCO, 2015b; 2015d); drylands (Richard et al 2014) and forests (Dallmeier, 1998). MAB often also collaborates with other UNESCO Programmes, such as the International Hydrological Programme (IHP) and the UNESCO World Heritage Convention Secretariat. Examples of collaboration with IHP include a report on mountain ecosystem services and climate change (Egan and Price, 2017) and an exhibition featuring satellite images of mountain regions, including many BRs and World Heritage sites (UNESCO, 2013b). This was showcased at various events including the 20th Conference of Parties to the UN Framework Convention on Climate Change (COP 20: Lima, Peru) and COP21 (Paris, France). In addition, through the African Arab Biosphere Reserves Initiative (AABRI), MAB and IHP are promoting BRs as climate change observatories and sustainable development laboratories. Launched at COP24 (Bonn, Germany), AABRI focuses on the impacts of climate change on water resources in biosphere reserves, including in dryland areas. The World Network of Island and Coastal Biosphere Reserves is pursuing strategies to respond to climate change impacting island and coastal BRs (UNESCO, 2017b, 2015d).

Several BRs are engaged in project efforts to reduce emissions from deforestation and forest degradation (REDD), and foster conservation, sustainable management of forests, and enhancement of forest carbon stocks (REDD+); examples include Maya BR (Guatemala)

(Verra, 2018) and Sierra Gorda BR (Mexico) (Bosque Sustentable, 2011). If not well-designed and executed, REDD+ and many other types of climate and biodiversity projects can infringe on the interests and rights of Indigenous peoples and local communities. MAB and UNESCO at large is therefore a strong advocate for ensuring that their interests are safeguarded and promoted in all its relevant activities. Beyond safeguarding their interests, UNESCO also recognizes the value of Indigenous knowledge in the pursuit of climate change assessments and adaptation (Nakashima et al., 2018).

The decision at COP 24 (Katowice, Poland) to launch the work of the Local Communities and Indigenous Peoples Platform Facilitative Working Group (UNFCCC, 2018) is important in this context. Truly effective solutions to address climate change and biodiversity loss must be based on local community engagement, traditions and innovation. In line with LAP Strategic Action Area D on comprehensive, modern, open, and transparent communication, information and data sharing, the MAB Programme and its WNBR are engaging in exchanges with local communities, indigenous peoples and the public at large, including through social media (MAB on facebook: <https://www.facebook.com/manandbiosphere/>, UNESCO climate change facebook page: <https://www.facebook.com/ClimateUNESCO/>).

In view of the importance of energy production and consumption for sustainable development and the climate, renewable energy has received a special attention in the MAB Programme. Through the Renewable Energy Futures for UNESCO Sites initiative (Renforus), MAB seeks to provide the international community with an observatory focusing on the sustainable use of environmentally sound renewable energy sources in BRs and World Heritage Sites. In parallel with rapidly growing investments in renewable energy, there have been calls for increased attention to the trade-offs in terms of negative impacts on

biodiversity, food and water resources and cultural landscapes. Consequently, the need for sustainable applications of renewable energy in BRs has been the subject of international MAB workshops (Biosphärenreservat Bliesgau, 2017), and some MAB National Committees have issued position papers on renewable energy applications in BRs in their countries (German MAB National Committee, 2012; Austrian MAB Committee, 2017).

The scale and scope of renewable energy investments and innovation in BRs is impressive. Examples include the Noor Ourzazate Solar Complex, one of the world's largest solar power installations in the Oasis du Sud Marocain BR (Morocco); the El Hierro BR (Canary Islands, Spain) 100% Renewable Project, with the Gorona del Viento wind-hydro power plant producing all the energy that the island needs; and the ElectriVillage Mariestad in the Lake Vänern Archipelago BR (Sweden). MAB is also collaborating with the Energy Observer, a hydrogen-powered boat that will document and promote renewable energy solutions in BRs during its six-year journey to 50 countries (<http://www.energy-observer.org/>), as well as with the World Alliance for Efficient Solutions. Here BRs are engaged in helping to develop, assess, share and promote clean, profitable and efficient solutions related to the SDGs (<https://solarimpulse.com/world-alliance>). According to the LAP, the number of climate change-related projects implemented in BRs, and the number of national climate change strategies acknowledging the role of BRs, will be assessed in 2020.

Conclusions

A year after the Seville conference, a workshop at the World Conservation Congress in Montreal was titled 'Biosphere reserves: myth or reality'. The participants concluded that

“Biosphere reserves are a concept whose time has come” (IUCN, 1998: 47). More than two decades later, BRs are not only increasingly embedded in global initiatives, but also play important roles as models of sustainable development at regional and national scales. The need to link regional and global is identified in the LAP and exemplified by actions to implement the SDGs in BRs, as discussed by Heinrup and Schultz (2017) – as well as through national and regional networks and the WNBR as a whole. While challenges to implementation on the ground remain for many BRs, and the human resources at the MAB Secretariat are limited, the growing attention to BRs by many governments, supported by the periodic review process, mean that BRs are increasingly recognized as ‘sites of excellence’ in a rapidly-changing world.

BRs remind us that we live in a highly interconnected world, and that human beings are part of the biosphere. People living and working in BRs inspire us to think beyond borders, to revisit our values, to cooperate with other life-forms. They propose that humans make choices based on solidarity, including with future generations, for an inspiring future.

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