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From a research vision to a state-of-the-art research strategy: UNESCO experts' meeting in the Karst and River Reka Basin Biosphere Reserve

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Abstract

UNESCO´s Lima Action Plan (LAP) explicitly calls on biosphere reserves (BRs) to build partnerships with universities and other research institutions to establish research, training and practical learning opportunities. For a BR, a research strategy is an essential framework that provides insights into the work carried out in the area, available data and needs for future research studies. It is the roadmap for adaptive management in a BR. It was therefore a major concern of the Karst and River Reka Basin BR (Škocjan, Slovenia) to develop a research strategy for the greater integration of science and research in the BR in a highly participatory process and with the support of international experts.
Scientists, researchers and BR managers from eight countries shared their knowledge and experiences during a 3-day meeting in Škocjan (Slovenia), 23 to 25 October 2019. The importance of research in BRs, proper data management, involvement of local communities for monitoring and research, partnership and education were presented in case studies.

Profile

Protected area

Karst and River Reka Basin Biosphere Reserve

Mountain range

Dinaric Alps, Slovenia

Figure 1 – Underground canyon in the Škocjan Cave. © Borut Loze, archive of Škocjan Caves Park, Slovenia

Introduction

The Škocjan Caves were declared a UNESCO World Heritage Site in 1986, and in 1999 they were included as the world's first underground wetland biotope in the list of internationally important wetlands of the Ramsar Convention. In order to preserve and study its outstanding geomorphological, geological and hydrological formations, rare and threatened plant and animal species, palaeontological and archaeological sites, ethnological and architectural characteristics and the cultural landscape, and to ensure conditions for appropriate development, the region of the Škocjan Caves was declared the Škocjan *Caves Regional Park* by the Parliament of the Republic of Slovenia in 1996 (Debevec & Kranjc 2019). Since 2004, the area has also been recognized as a UNESCO biosphere reserve, the *Karst and River Reka Basin Biosphere Reserve* (KBR).

Currently, KBR is developing a research strategy that uses a highly participatory process involving high-level BR experts, scientists and local stakeholders. The KBR management prepared a draft research vision for the BR to be discussed and further developed in a UNESCO-MAB Experts Meeting on the occasion of the 15th anniversary of the KBR in Škocjan (Slovenia) in October 2019. Leading experts from Austria, Czech Republic, Italy, the Republic of Korea, Spain, Ghana, the USA and Slovenia were invited to this top-level meeting.

Under the conference theme *Linkage between academic institutions and biosphere reserves: application of traditional knowledge and aiming for sustainable coexistence of people and nature in modern times* participants discussed opportunities and measures for intensifying scientific research in BRs and strengthening cooperation between BR administrations and research institutions. A declared goal of the conference organisers was to create not simply a modern research strategy using a state-of-the-art process for their own BR, but a strategy that could also be used as reference for other members of UNESCO's World Network of Biosphere Reserves (WNBR).

Research strategy for linking Biosphere Reserves and Universities: three steps

The development of the research strategy was in response to the *MAB Strategy 2015–2025* and the *LAP*

2016—2025 (UNESCO 2017). For example, the MAB Strategy states that *"Each BR has an active research programme, based on the principles of sustainability science, which provides the basis of participatory decision-making and management in the BR"* (Strategic Objective 3.3) and *"BRs and national MAB Committees have partnerships with universities and research institutes, to undertake applied research and provide practical learning and training opportunities that support the management and sustainable development of BRs"* (Strategic Lines of Action A.3). Furthermore, Action A.4.1 of the LAP stipulates that BRs should *"Establish partnerships with universities / research institutions to undertake research, especially UNESCO Chairs and Centres"*.

First step: Drafting a research vision

The draft of the KBR's research vision, developed jointly by V. Debevec and D. Kranjc, presented the common vision of cooperation among BR managers, research institutions and a network of Universities. It drew upon:

- the emphasis in the *Seville Strategy* (UNESCO 1996) that BRs will also contribute to the needs of society as a whole, by showing a way to a more sustainable future;
- the statement in the *MAB Strategy 2015–2025* that BRs are models to test and apply interdisciplinary approaches to understanding and managing changes in social and ecological systems, and their interaction, including conflict prevention and the conservation of biodiversity;
- the BRs' characteristic of focusing on a multi-stakeholder approach with particular emphasis on the involvement of local communities in management, and often highly innovative and participative governance systems;
- the conviction that the research strategy of a BR should ultimately help the BR's management to carry out concrete targeted activities towards conservation of biodiversity through its sustainable use, and to foster efficient measures for the protection of cultural and natural heritage.

The authors of the draft research vision aimed to combine two different approaches: the so-called *action-oriented research approach* and the *case study method.*

An *action-oriented research approach* is understood as a participatory process that brings together theory and practice, action and reflection. It is carried out as a research project, which is directed towards a change of common practices or at least entails recommendations for a change in the practices used. In order to obtain results regarding sustainable development and the use of traditional knowledge that will be readily understood, implemented and adopted, local people should be involved in the process from the outset. In this way, the changes will be pursued with greater efficiency (Priola 2016).

In a *case study research approach*, information is sought from various sources. The data gathered takes different forms, such as observations, surveys, interviews and analysis of documents. A *case study research approach* allows a composite, multifaceted investigation of what has proved to be efficient in other contexts (Priola 2016).

In order to follow the action-oriented and case study research approaches, the authors drew up an ambitious draft research vision based on their cooperation with research institutions and their network of universities, in consultation with the KBR's management.

Experts representing a broad spectrum of knowledge and experience in protected areas research and management were invited to help develop the draft research vision further. Researchers were asked to explain individually why it would be important to link / integrate KBR with their individual research fields, while BR managers or related experts were asked to explain why it would be important to link / integrate KBR with science and research in general. During the discussion, the draft was revised and the research vision was finalized:

With effective application-oriented research work of the highest level that helps us protect our natural and cultural heritage, we advance the integration of science and management practices of our BR in order to make it fully functioning and relevant to society. While developing solutions, we integrate novel ideas into the management of our BR, and together create future sustainable ways of living. By exchanging good and bad practices and expertise with our fellow research partners and BR managers, by transmitting knowledge to younger generations and by fostering good mutual relationships, we enable the development of careers. Through our commitment, we wish to become an example of best practice with benefits for all.

Second step: From research opportunities to projects and actions

Following a pre-meeting request by the organisers, participants presented the situation in their own countries/BRs and shared information on international connections between BRs and universities. Their presentations covered:

- educational, public awareness and research projects, expert studies for management activities;
- integration of sustainable development and traditional knowledge, special training courses;
- international cooperation, study programmes.

During the meeting, the experts presented connections between BRs and universities that had resulted in successful projects at national and international levels (Table 1). In the discussions, all experts stated their belief that science, research and monitoring are essential instruments to integrate effectively the three functions of BRs – conservation, logistics and development. Consequently, it is important to link the scientific community with the BR and the local people. To achieve this important aim, participants identified a number of essential activities:

Table 1 – Connections between BRs and Universities in various countries (Agostini 2019, Andrič 2019, Appah-Sampong & Ashong 2019, Bledsoe 2019, Cho 2019, Cupa 2019, Debevec 2019, Fakin Bajec 2019, Köck 2019, Lazar 2019, Roser 2019).

Cooperation Partners	Type of cooperation; actions	Benefits, outcomes (selected)
BR Lower Morava Mendel University Brno (Czech Republic)	- University included in the board of managers and advisory board - practical education of students	- supports the work of the BR by providing scientific data for sound management decisions - University is a perfect Ambassador of the MAB philosophy - several projects carried out
Carinthian part of the BR Salzburger Lungau and Kärntner Nockberge Alpen-Adria University of Klagenfurt (Austria)	- long-term and contractual grounded collaboration, aimed at bridge-building between international research and living reality in the BR region - *research exchange platform* offering a catalogue of more than 50 research questions formulated by the BR - contact point for master / doctoral theses to be carried out in the BR - thematic courses at the University	- practical education of students - the „research exchange platform" supports the BR management to find solutions for its work - Open Access Online Database with more than 360 publications about the region - more than 20 theses finished
BR Großes Walsertal University of Innsbruck (Austria)	- formal cooperation agreement for a strategic partnership aimed at supporting the BR's research and development mandate	- several research projects (e.g. on regional development) carried out
Korean BRs Catholic University of Korea National Institute of Ecology of Korea (Republic of Korea)	- long-term ecological monitoring	- provides data series for assessing trends and mitigating changes - implementation of three core research sites: these so-called "supersites" serve as hubs for integrative multidisciplinary research related to sustainability
BR Karst and River Reka Basin Research Centre of the Slovenian Academy of Sciences and Arts University of Primorska University of Ljubljana University of Nova Gorica (Slovenia)	- network of universities of Škocjan Caves Park established in 2014 - practical education of students - research on paleoecology (long-term changes of vegetation / past environment), and on the cultural heritage and its development potential - supporting collaboration between universities and the corporate sector	- several projects carried out - results useful for planning the protection and management of natural and cultural heritage - integration of research and practical work - involvement of the local community in capacity-building activities
Ghanaian BRs Environmental Protection Agency University of Ghana University of Cape Coast University for Development Studies Kwame Nkrumah University of Science and Technology (Ghana)	- optimization of stakeholder collaboration for BR research in line with the Ghana Action Plan 2018 – 2025, coordinated by EPA, aimed at including local communities and traditional knowledge	- several research projects carried out - training courses for students and tourism sector, - school education
BR Mammoth Cave Area Western Kentucky University (USA)	- Karst field studies in BR - practical education of students	- summer classes for students and industry professionals - natural Resource Condition Assessment for the core area, delivering science-based information for BR managers - programmes for public awareness, education and research of traditional knowledge
Italian BRs Punto 3 srl. Various Universites (Italy)	- collaboration between universities, educational institutions and UNESCO-designated sites	- several projects carried out (e.g. aiming at evaluating natural and cultural values, guidance for sustainable tourism and education activities, biodiversity conservation)
BRs in Spain and the Mediterranean International UNESCO Centre for Mediterranean Biosphere Reserves Barcelona (Spain)	- facilitating linkages between academic institutions and BRs in the Mediterranean - communication, training and environmental education	- several research projects carried out (e.g. on global change, capacity building) - practical education of students; training of researchers

1. It is important to demonstrate and promote that BRs
- are valuable research sites from environmental, cultural-heritage and social perspectives;
- can contribute to research and education at university level;
- are ideal places for transdisciplinary research;
- can play an important role as pioneers and model / test regions, e.g. for state-of-the-art technologies aimed at energy-saving and the production of renewable energies, or adaptations to agricultural strategies that respond to climate change.

2. It is important to explain to people why
- research is important for the BR;
- their cooperation with scientists is most welcome,
- BR science is important for their well-being.

Furthermore, it was stated that it would be helpful if the BR could provide adequate research infrastructure in situ (e.g. accommodation for students, working facilities).

Following the discussion, the experts were asked to highlight their individual research fields or the ones covered in their respective BRs. In order to define actual research topics for BRs or the KBR specifically, individual SWOT analyses of the proposed research

Table 2 – Summary of individual SWOT analyses of integrating individual research fields and science with the BR's roles (in brackets: perspective of the discussion participant – BRM = BR manager; S = scientist, academic institution).

STRENGTHS	WEAKNESSES
- Participatory approach (BRM) - Transdisciplinarity (S) - Interdisciplinarity (S) - Living labs for applied research (S) - A BR is ideal for long-term monitoring (S) - Research infrastructure for national and international collaboration (S) - The objectivity of science can play an important role in resolving disputes (BRM)	- Frequent conflicts of interest between BR/local people and researchers (BRM, S) - Lack of experience of how to integrate different kinds of knowledge (scientific and traditional) (S) - Lack of specialized personnel (S) - Lack of funding (BRM, S) - When the research is interdisciplinary, different approaches and timelines occur, which are difficult to coordinate (S). The integration of common research fields in BRs means having to get out of your own comfort zone (BRM, S) - Lack of historical data and knowledge as a lost opportunity for monitoring and evaluating trends (S) - Transfer of scientific results to plain language and finding a practical outcome (BRM)
OPPORTUNITIES	**THREATS**
- Problem-orientated research supports the BR management, reduces costs and promotes efficiency (BRM) - Dissemination of results to the public (BRM, S) - Opportunity to use traditional knowledge (BRM, S) - Outdoor classes for different audiences (BRM, S) - Transfer of information from parents to children (BRM) - Developing data management plans for BRs (BRM, S) - BR can be a base for initiating dialogues between researchers and BR stakeholders (BRM, S) - Involving local community for long-term monitoring ("Citizen science"; BRM, S)	- Problem-orientated research supports the BR management, reduces costs and promotes efficiency (BRM) - Dissemination of results to the public (BRM, S) - Opportunity to use traditional knowledge (BRM, S) - Outdoor classes for different audiences (BRM, S) - Transfer of information from parents to children (BRM) - Developing data management plans for BRs (BRM, S) - BR can be a base for initiating dialogues between researchers and BR stakeholders (BRM, S) - Involving local community for long-term monitoring ("Citizen science"; BRM, S) - Human-nature conflicts (BRM, S) - Limited finances (S) - Lack of awareness of possibilities in a top-down approach (S) - Lack of capacity (BRM, S) - Lack of coordination between different institutions (BRM, S)

fields and science in general in relation to the BR's roles were then carried out (Table 2).

At the end of the working session, the experts presented a list (based on their individual SWOT analyses) of proposed research topics that it would be interesting for them to carry out with or in the KBR.

Third step: Research priorities for future action plan

A supplementary list of interested research institutions, fields and potential research topics was drawn up at this meeting, complementing the KBR managements' preliminary draft list that included interested members of Škocjan Caves Park University Network.

The next step of the research strategy roadmap will be to define the *research priorities* for the KBR on the basis of the experts' proposed research topics. The research priorities should be defined according to various criteria such as current research needs or knowledge deficits in the BR, the interest of the research institutions / scientists in the submission of a research proposal, and the requirements of international designations, conventions and strategies.

On the basis of the defined research priorities, and using straightforward questions, the BR management will then draw up a research activity plan for each individual research area during individual meetings with interested researchers:

- *What* is the aim of the project?
- What are the *benefits* for the BR management?
- *Who* will do the research?
- *How* will the research be done?
- What is the *timeframe*?
- What are the *costs*?

After the overall research plan has been drawn up, a Call for Research Projects will be issued. Project proposals must be prepared in a standardized form:

- Detailed description of the research topic / problem / subject;
- Review of the literature on the research topic;
- Definition of the research problem;
- Description of the research methodology;
- Detailed elaboration of the research question(s) related to timelines and available funding;
- Outline of the deliverables (e.g. benefits for the BR management and local communities, publications, public awareness).

An agreement concluded between the BR management and the research institutions / scientists will ensure that the institutions / scientists recognise the BR as a project partner and align their research plans so that the research work is carried out in the BR. For example, for research proposals to the Austrian MAB Committee, a Letter of Endorsement signed by the relevant BR management is obligatory for funding (Köck, personal communication). This procedure ensures that the BR management is informed about the research work done in the BR and can make use of the data and results of the project. An appropriate means to establish cooperation between BRs, related stake-

holders and scientists could be to establish scientific councils for BRs (Arpin et al. 2016a, b).

A final step of the research strategy roadmap will be to define a monitoring and evaluation process for the publication of scientific data, implementation of solutions and acceptance by the local community.

Conclusions

With this initiative, the Škocjan Cave Park and KBR started to activate a network of University institutes, communities, technicians and experts who will work together in the near future to develop cooperation with the aim of ensuring increasingly effective links between the scientific sphere and the local communities in the huge worldwide network of UNESCO-recognised sites.

Representatives from BRs, universities and other research institutions expressed the need to encourage dialogue between research institutions and BRs also at international level.

The process of preparing the research strategy gives the BRs and academic institutions a good insight into local needs and possibilities which could be managed effectively thanks to researchers' innovative approaches.

The research vision developed in a highly participatory process will help the KBR to protect its natural and cultural heritage and to create sustainable ways of living. KBR is committed to becoming an example of best-practice with benefits for all.

Furthermore, the process in KBR perfectly supports the development of possible research topics for the UNESCO Chair in *Interpretation and Education for Enhancing Integrated Heritage Approaches*, the establishment of which is planned in cooperation with the Škocjan Caves Park at the Faculty for Humanities of the University of Primorska (Koper).

It is the interlinkages among people, culture and nature that act as triggers for future research studies which will provide scientifically justified actions, data and evaluation of the sustainable development process. BRs as sites of excellence play an important role in the implementation of sustainability science, and thus UNESCO's WNBR will benefit from individual BRs' experiences.

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