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The Second Issue of the International Journal of UNESCO Biosphere Reserves

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Editorial

This second volume of the journal builds on the momentum of our first issue, and if traffic to the website is any indicator, our outreach continues to expand. To date, we have had almost 2000 visitors to the website over an eight month period, with more traffic each month, and more visitors clicking on more than one article. We will continue to monitor the website and will provide a full analysis of our traffic in the next issue, as we will have a year of data to review.

On that, our third issue will focus on the work of UNESCO's 170 University Chairs affiliated with the World Network of Biosphere Reserves. These Chairs promote "international inter-university cooperation and networking to enhance institutional capacities through knowledge sharing and collaborative work" and we have issued a special call to highlight their work to our international and interdisciplinary readership. If you are a UNESCO Chair and are interested in publication, please consider publishing your work as a research article, note, case study, video, photo essay, or in any digital format. We look forward to your submissions.

The journal remains, in perpetuity, an interdisciplinary, digital, Open Access, subscription-free publication. This makes for more cost-effective publication, reduces the ecological footprint of the journal, and allows for full-colour/full-spectrum production across a range of digital formats. This new format is part of a wave of journals that are abandoning the confines of paper publications and embracing a digital future that includes video, audio, full-colour mapping, and interactive formats that are not limited by the challenges of publication costs and hard copy dissemination. This format also allows for a much shorter delay between submission and publication.

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We look forward to working with UNESCO Biosphere Reserve Chairs on the next issue and the global biosphere reserve community on future volumes. The deadline for submission of materials for the next issue is January 5th, 2018, for publication on January 31st, 2018.

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The Establishment of a Database on Current Research in UNESCO Biosphere Reserves: Limitations and Opportunities

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ABSTRACT: The investigation into current research on biosphere reserves is complex and multi-faceted. Numerous factors, including the widespread interests of those publishing on biosphere reserves, publication methods, author languages, and the peculiarity of various search engines makes the determination of gaps, patterns, and opportunities in research a convoluted task. To respond to the question “what is the current state of research on biosphere reserves?” a major university-led research project was developed as a partnership between the University of the Highlands and Islands and Vancouver Island University. Over a two-year period, a database of more than 5000 articles, studies, and research documents was compiled, covering the majority of the EuroMAB biosphere reserves. It is hoped that future research will seek to catalogue similar works across the World Network of Biosphere Reserves. It is hoped that the publication of this article will prompt involvement by the biosphere reserve scientific community in building a complete and detailed database that accurately represents the state of current research across the World Network.

Keywords: EuroMAB, scientific research, database development, publications.

Introduction

The publication of research in journals is the primary means of disseminating scholarly ideas, concepts, theories, and findings. For researchers interested in issues relating to biosphere reserves, designated under the Man and the Biosphere (MAB) Programme of the United Nations Education, Scientific, and Cultural Organization (UNESCO), the search for existing research is complicated by a number of issues: 1) while a biosphere reserve may be the region of interest for the research, topics vary widely, across every possible discipline; 2) biosphere reserves have been designated in 120 countries world-wide, so that research results are published in many languages; 3) various terminologies are used to define similar topics or research areas; 4) published information is not always widely available across different nations and through different search engines; 5) some biosphere reserves are named after a urban area or region, and an article about an area may reference that it is in or proximate to a biosphere reserve

without the research necessarily relating in any way to the biosphere reserve; 6) many biosphere reserves include and/or overlap with a protected area (e.g., a national park) which may or may not have the same name, and publications may mention the name of the protected area but not that of the biosphere reserves, 7) little research in biosphere reserves is published in accessible formats.

In 2015, a research project was initiated at the Centre for Mountain Studies at the University of the Highlands and Islands, to better understand the current state of research on biosphere reserves. Focusing first on the three common objectives of all biosphere reserves (sustainable development, education & outreach, and conservation of biodiversity), this project attempted to catalogue the full range of published information on research conducted within the 302 biosphere reserves of the EuroMAB network, which currently includes 36 countries in Europe and North America. Following the meeting of the Scientific Sub-Committee at the 2015 EuroMAB Conference in Estonia, the work was taken on by Vancouver Island University (viu.ca) through the Mount Arrowsmith Biosphere Region Research Institute and further progress was made through the application of extensive student resources.

After approximately two years and hundreds of hours applied to the project, a database (biospherejournal.org/database) has been produced. As it focuses only on the biosphere reserves in the EuroMAB network, it is hoped that scientific researchers in other regional MAB networks will become contributors in adding to the database with information concerning biosphere reserves in their region, and that would be of interest to the global biosphere reserve scientific community. That is, this database should be considered the first phase of a much larger and ongoing project: it is intended that this database will remain a “living document” and will be continually updated as existing information is added from all corners of the globe and new material is published by biosphere reserve researchers. Currently, there are considerations for the database to be editable on the website by visitors, similar to Wikipedia pages.

Methods

This study began with a literature review and the development of a multi-factoral database platform intended to investigate all biosphere reserves within the EuroMAB network. The database includes country, name of the biosphere reserve, title of the article, author(s), year of publication, type of literature, and keywords. The keywords were examined as an indicator of the content available from each article. First, the three common objectives of all biosphere reserves were investigated (sustainable, development, education, and conservation) then the search was expanded to seek out articles that contained keywords related to the United Nations’ 17 Sustainable Development Goals (UN SDGs), such as poverty, hunger, health, protection, climate, and inequality. Governance and biodiversity were added as keywords. The search was limited to database content of academic and grey literature (produced by government, academics, business, and industry) published since the year 2000 and referring to existing biosphere reserves.

An examination of keywords from approximately 5000 academic books, reports, articles, conference proceedings, and thesis papers revealed some conclusions on the academic information published on biosphere reserves, as outlined below.

Findings

Figure 1 below illustrates the results of the keyword search and the respective number of content “hits” found through the search. Out of the original three common objectives, “conservation” was most frequently found. When the UN SDGs keywords were examined, “climate” occurred most frequently. There was much variation in the number of articles referencing individual biosphere reserves. For example, for the North-east Greenland Biosphere Reserve only two academic articles could be located, while Serbia’s Golija-Studenica Biosphere Reserve yielded more than 60 potential sources.

As to limitations, the results are, in many respects, self-defining. The search for a defined set of terms will yield the results expected of that list. That is, by creating a list of defined search terms, the results

became self-limiting. However, these limitations were required to enable students to make progress with the project and build this initial research database. It is recognized that a more robust research method would have been to search out “biosphere reserve” as the only search term, then catalogue the abstract of each article. The database user could then enter in their own selected keyword and search through the database for the abstract of any article that contained that word, then follow a link to the full article (or to the saved .pdf where possible). A second issue is the limited opportunity presented by only searching keywords. For the SDGs, for example, results more directly tied to each SDG may have been better revealed if a phrase or grouping of terms was searched instead on individual words. That is, the results may have been more directly linked to the SDGs if terms such as “extreme poverty”, “maternal health”, and “universal primary education” were investigated. It was presumed that the search for individual words would lead to articles containing phrases relating to the SDGs, so the method was not changed to address this issue.

Beyond this, due to the limitations of languages spoken commonly by the research team, the search was limited to articles published in English. No attempt was made to translate articles produced in any other language to permit the keyword search. It was presumed that the literature referring to biosphere reserves within the EuroMAB network would have been either originally produced in English or translated to English by the authors; therefore, the results should be largely representative of the entire body of available literature. It is recognized, however, that this may become less accurate as the search for academic articles extends to other biosphere reserve networks where English may not always be the language of publication. The involvement of the world-wide biosphere reserve scientific community is needed to address this shortcoming, as ideally individuals with local and regional knowledge and language skills will be best suited to locate relevant literature.

Terminology may also be a factor. The keyword search required that the term “Biosphere” or “Biosphere Reserve” be mentioned at least once in an article. It is possible that some articles did not use these key terms, even if the topics under discussion could be highly relevant to the biosphere reserve scientific community. For example, an article on the governance of a watershed region, or a protected area within a biosphere reserve, could be of great interest to researchers investigating potential options for biosphere reserve management, but this article would not be included in the database as it did not specifically reference the required search terms. These terms were necessary; however, to put some limitations on the database, specificity was required to ensure the usefulness and applicability of the database to the biosphere community.

Additionally, for approximately 15 percent, there were no keywords; others only included the name of their respective biosphere reserve as a keyword. This resulted in a partial misrepresentation of the overall findings, topic, content, and conclusions. However, with analysis of abstracts or summaries, this problem will be diminished.

A final factor is the availability of published data through available search engines. Google Scholar was the primary search engine used by the research team, along with the secondary use of Web of Science, Academic Search, and Science.gov. There was some discussion on accessing only articles that were free and universally available through open access platforms, but this was not pursued as it was presumed that accessibility would be similar for all nations within the EuroMAB region. Again, as the database search extends across other regional MAB networks, the accessibility of information to individuals may become a factor. Further research into the search limitations will be required as the project advances.

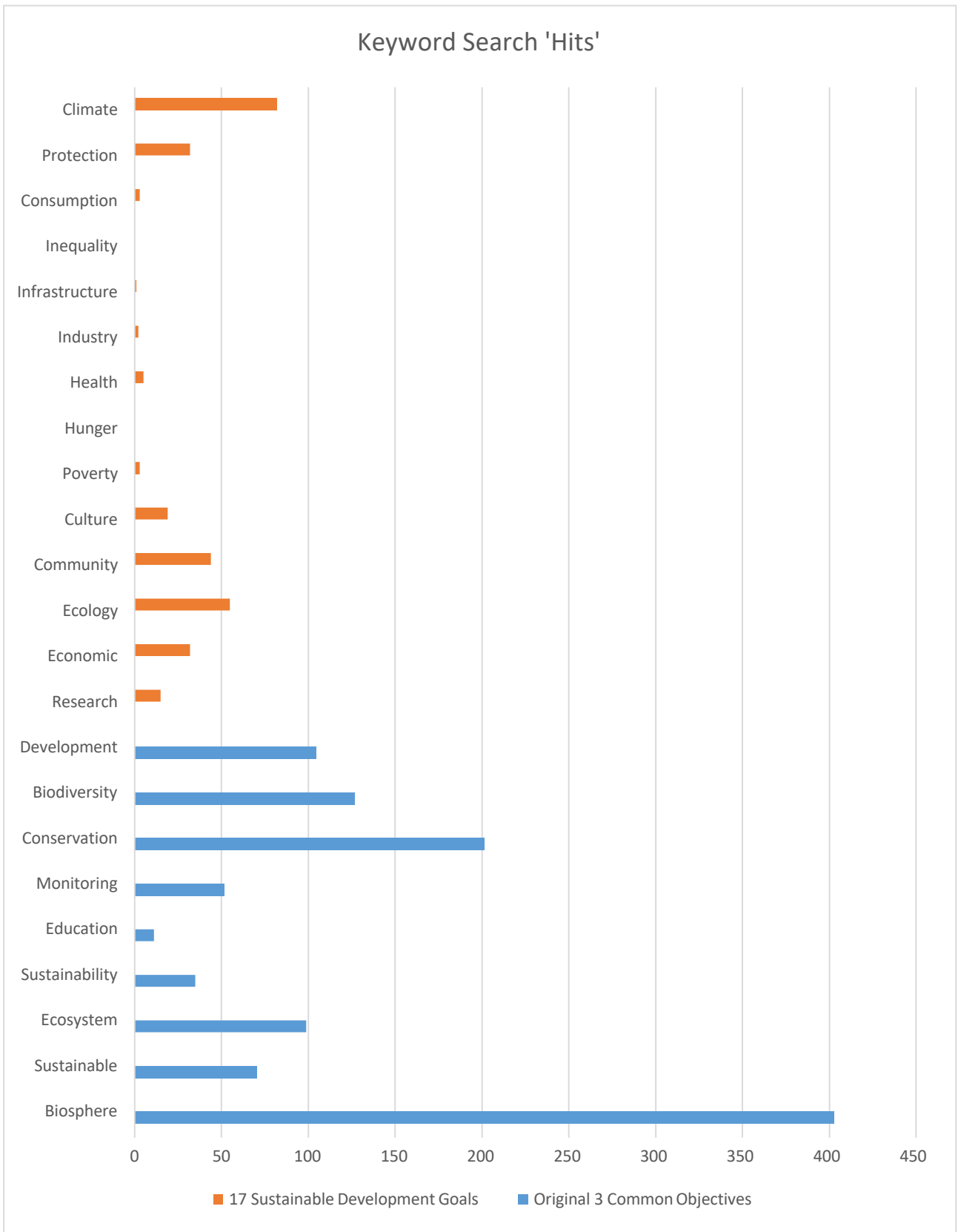


Figure 1. Graph illustrating the keywords searched and the number of results found

Future Research

The future of this project is best defined as “the search continues...” The two initial partners in this research will continue to commit resources to improving the quality of the database. Over the next year, the database will be improved by adding abstracts (when available) to each of the existing articles. It is also anticipated that other members of the World Network of Biosphere Reserves and the scientific community will engage in this project and expand the research to other networks: this in no way requires links to student resources or university research institutes. Any individual interested in contributing to the database is encouraged to pursue this opportunity: the first page of the database lists the search protocols, and all contributors are asked to consider these as they add items to the database. As new items are added, the database will be updated, and as always will remain free and open access to anyone interested in the current state of biosphere reserve research.

For Action

The database is available from the website of the International Journal of UNESCO Biosphere Reserves

(www.biospherejournal.org/database).

If you are interested in updating any section of the database, please contact Pam Shaw at pam.shaw@viu.ca in advance of initiating your work, to ensure we are not duplicating efforts across the world network of Biosphere Reserves.



Click here to watch -> [Sharing the Range](http://www.sharingtherange.com)

Exact running time of video: 14 minutes, 43 seconds

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Abstract:

Southwestern Alberta is where the mountains meet the prairies. Strong winds shape the landscape, and the Rocky Mountains transition rapidly to agricultural lands. The area is part of the Crown of the Continent, home to the Waterton Biosphere Reserve, and arguably one of the most beautiful places in Alberta, Canada. Unlike other regions of the province, however, there is little public land and the home ranges of large carnivores including grizzly bears (*Ursus arctos*), black bears (*Ursus americanus*), wolves (*Canis lupus*), and cougars (*Puma concolor*) overlap substantially with agricultural land uses. This high degree of overlap means that there is the propensity for conflict. *Sharing the Range* is a short film about the challenges that can arise when people and large carnivores share the landscape. In the film, we attempt to tell a small part of the story about people and large carnivores in the Waterton Biosphere Reserve, and detail some of the work that is currently underway through our Carnivores and Communities Program. Waterton Biosphere Reserve's Carnivores and Communities Program works with landowners and producers to help mitigate large carnivore-agricultural conflicts. Some of our initiatives include electric fencing projects, grain bin retrofits, a deadstock removal program, and bear safety workshops. Through the efforts of many dedicated farmers, ranchers, biologists, and land managers, we are working to find ways to maintain both sustainable populations of carnivores and economically viable rural communities. The film, *Sharing the Range*, is a small piece of that story.

For further information on the film, please visit: www.sharingtherange.com

For further information on Waterton Biosphere's Carnivores and Communities Program, please visit: <http://www.watertonbiosphere.com/projects/carnivores-communities/>

The Periodic Review Reports of the Biosphere Reserves of the MaB Programme. Case study: Biosphere Reserve Sierras de Cazorla, Segura and las Villas.

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ABSTRACT: Biosphere Reserves are areas of territory recognized for their environmental and social particularities which belong to UNESCO's "Man and Biosphere" Programme. Every 10 years, the responsible agency for the management of the Reserve must prepare a Periodic Review Report for the International Coordination Council of the Programme to evaluate the level of fulfilment of designation criteria, determining, where appropriate, its permanence in the World Network of Biosphere Reserves. This article describes the process that gives rise to these reports, by means of the analyses of a type case, the preparation for the third Periodic Review Report of the Biosphere Reserve Sierras de Cazorla, Segura and las Villas, Spain: design, application, and identification of the key aspects of its elaboration process, sources, and tools used for the collection, analysis, and validation of the information and data included in the report. In addition, the factors that could contribute to improve the evaluation's capacity of these reports are highlighted.

Keywords: Biosphere Reserve, MaB Program, Periodic Review Report.

Introduction

Every 10 years, all Biosphere Reserves (BRs) that form the World Network of Biosphere Reserves (WNBR) must review the fulfilment not only of their three functions of conservation, development, and logistical support, but also the criteria by which they were designated (UNESCO, 1996). Although some authors do not consider the process of periodic review of a Biosphere Reserve (BR) an effective quality control mechanism (Price et al., 2010), they do conclude that the evaluation can help the Managing Institutions (MI) in contributing to the consolidation of the WNBR (Price, 2002).

At the conclusion of the 10-year periodic review, the public agency responsible for the BR must prepare a report with the results of such evaluation. The purpose of the Report is to explain whether the management process of each BR meets the guidelines of the UNESCO's "Man and Biosphere" Programme (MaB) and if this management is oriented to properly fulfil the functions and criteria defined in Articles 3 and 4 of the WNBR Statutory Framework. In the Report, it should be clearly indicated whether the reserve has been established as a place where sustainable development methods are tested and demonstrated at a regional level (Price, 2002; UNESCO, 1996).

In order to guide the MI of the BRs in the preparation of this report, UNESCO has developed the Periodic Review Form (UNESCO, 2013), a document that is structured in several parts with a large number of questions and sections that is complex to fill in. The answers given to the questionnaire should contain useful quantitative and qualitative data and information to support: i) the elaboration of a summary of main changes occurred during the reviewing period; ii) a detailed description of the human, physical, and biological characteristics as well as institutional aspects; iii) the updating of contact details of the BR; iv) the collection of promotional and communication material of the reserve; v) a description of the process by which the periodic review has been developed.

The International Coordination Council (ICC) of the MaB Programme assesses the situation of each BR based on its Periodic Review Report (PRR). The ICC acts to verify that the reserves maintain the environmental and social values for which they were designated. In the case that the ICC considers that a BR no longer meets the criteria to maintain its name as such, the responsible body for the adoption of measures receive recommendations in order to keep in compliance; if the BR does not meet the terms with the proposed criteria and recommendations after a reasonable period, the area could be excluded from the WNBR.

In order to guide and perform the reviewing and evaluation of the management and the fulfilment of the BRs functions and designation criteria that are part of the Spanish Network of Biosphere Reserves (SNBR), the following documents and instruments have been produced by the Spanish Committee of the MAB Program (SCMABP): i) the System of Indicators for the evaluation of each BR (Tragsatec et al., 2011); ii) recommendations and joint considerations for the interpretation of terms and concepts in the Indicators System (Comité MaB España, 2014); iii) guide to terms and concepts (Comité MaB España, 2013); iv) proposal to improve the monitoring of the evaluation in the SNBR (Secretaría del Comité Español del Programa MaB, 2014); and v) the computer software for collecting information and preparation of the PRR.

The preparation of a PRR is a complex activity that requires a well-structured methodological process;

however, there are no guiding principles that provide methodological elements or orientations on how to elaborate them, in order to provide useful content following the BR Periodic Review Form.

The objective of this work is to describe the process applied in the elaboration of the Third Periodic Review Report of Biosphere Reserve Sierras de Cazorla, Segura and las Villas (BRSCSV) and to present results of the evaluation of the followed phases in that process. We have pursued the identification of methodological elements that could improve or facilitate the realization of future PRRs in other BRs, as well as to optimize their evaluation capacity.

Materials and methods

Study site

The BRSCSV is located at the Province of Jaén (Spain) (Figure 1) and includes either a partial or entire territory of 23 municipalities within. It was declared as such in April 1983, covering an area of 190 000 ha in Natural Park Sierras de Cazorla, Segura and Las Villas (NPSCSV). The Ministry of Environment and Territorial Planning of the Regional Government of Andalusia, Spain is the administrative entity responsible for the planning and management of the BRSCSV. The *in situ* implementation of management activities is delegated to the manager of the BR, which in this case is the Direction of Conservation of the Natural Park.

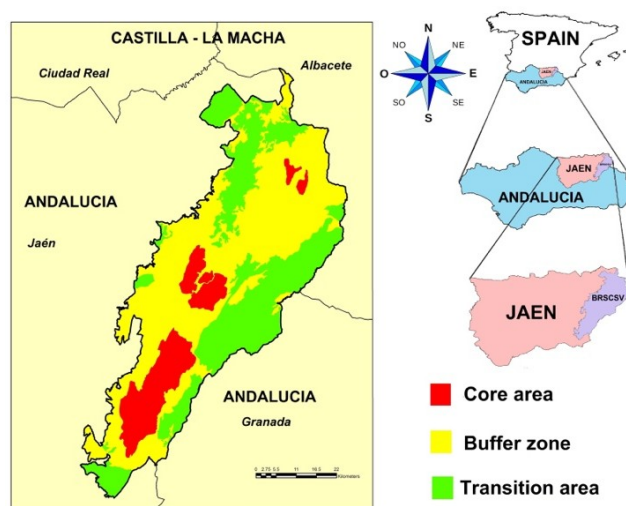


Figure 1: Location of the Biosphere Reserve Sierras de Cazorla, Segura and las Villas. Source: Own elaboration.

The territorial zone of the Natural Park completely overlaps with the surface of the BRSCSV. The executive and management entity assumes that the bodies and mechanisms of planning and administration of this Natural Park are the same tools of the BRSCSV (Domínguez-Vilches et al., 2014): the Natural Resources Management Plan (NRMP), the Master Plan for Use and Management (MPUM) and the Sustainable Development Plan (SDP).

The BRSCSV constitutes one of the main hydrographic nodes of the Spanish territory. There are rivers like Guadalquivir and Segura that originate within the reserve and their streams are feed into the Atlantic and Mediterranean

respectively. It also has forests in good ecological quality, which have abundant biodiversity. The reserve integrates the supply services of local and regional interest by means of the benefits of socioeconomic resources such as hunting, fishing, agriculture, livestock, and wildlife. Moreover, the BRSCSV has a significant representation of the sustainable management of olive cultivation. The production systems of ecological and integrated type associated with olive oil have allowed to acquire two denominations of Origin of Extra Virgin Olive Oil within the reserve. In addition to these designations of origin, the collection of the Protected Geographical Indication for the Lamb of Segura, are examples of the good quality of the products owned by the BRSCSV.

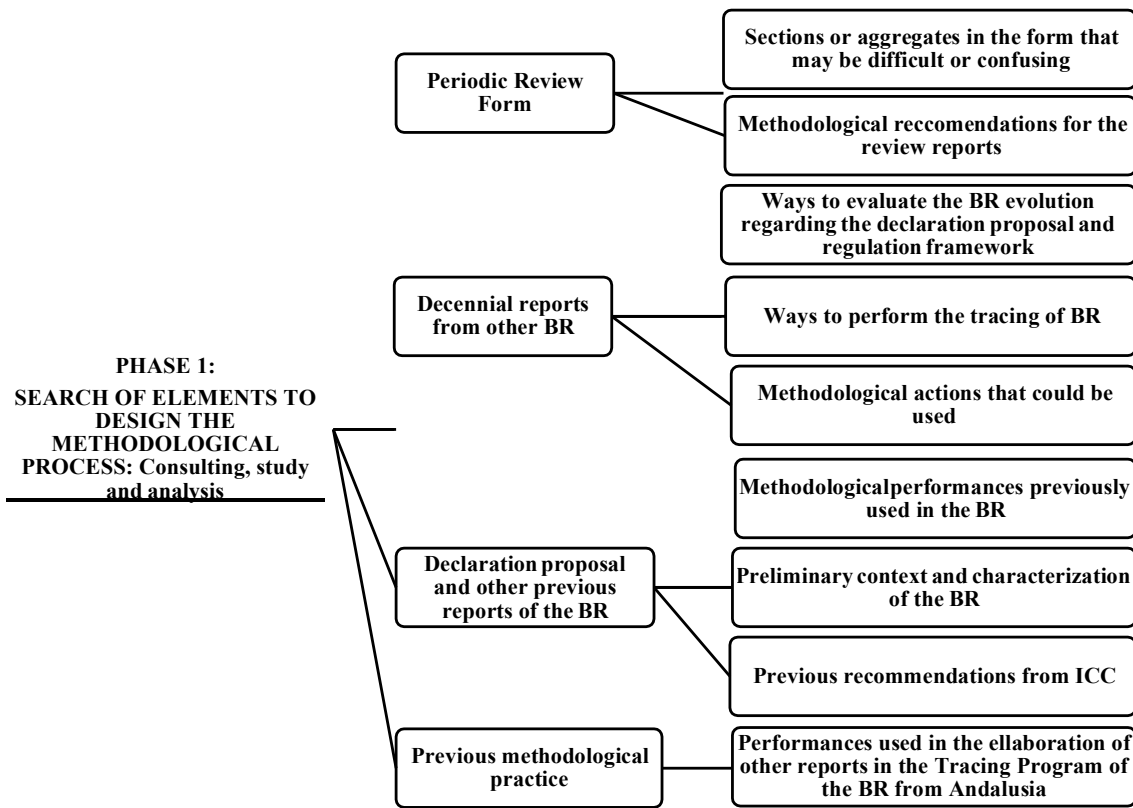


Figure 2. First phase of the methodological process (Castaño-Quintero et.al, 2016)

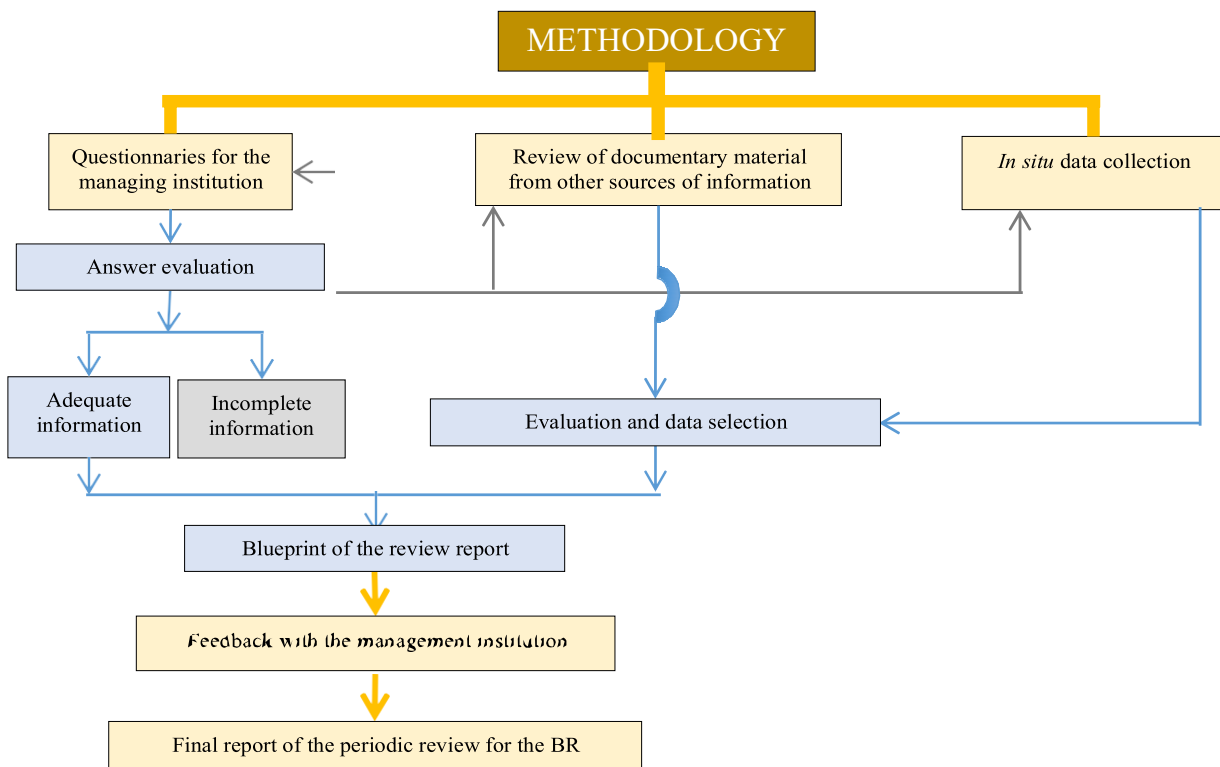


Figure 3. Second phase of the methodological process (Castaño-Quintero, et.al, 2016)

The MI of the BRSCSV is responsible for providing the main data and information for the preparation of the PRR. For this reason, three meetings were held including the MI in order to elaborate and develop a strategy for gathering information. The strategy included several questionnaires that had been previously prepared by the team that recruited the report. The questionnaires were planned to simplify data exposure for this MI. The MI informed about the different instruments prepared by the SCMABP to support the preparation of the PRRs. However, their process of being implemented was currently underway, and no information could be obtained from them.

By means of the revision of documented material from other sources of information, scientific material, regulations, and legislation were consulted, as well as reports and documents of public and private institutions present in the area or with competence in the zone (Castaño-Quintero, 2015). On the other hand, during the preparation and drafting of the report, a continuous evaluation was carried out that analysed the usefulness and effectiveness for each of the actions and elements

applied throughout the process of data collection, assessment, and drafting of the ten-year report. The intention of this evaluation was to corroborate the credibility (internal validity) of the data considered and the results obtained (Mertens, 2005). The evaluation of the procedure used is presented in the discussion section of this article.

Results and discussion of the process

Compilation and analysis of data and records

Questionnaires for the MI. The questionnaires that the editing team prepared for the Third PRR so as to be processed by the MI contributed to: i) guide the MI in the selection of appropriate data and records to be included in the report; ii) to distinguish between information, which, although it is important for the Natural Park that integrates the BR, was not useful or representative to describe the management process, iii) to incorporate the diverse reports, management documents, and the evaluation that the MI provided, and iv) to identify key information provided by the MI.

Review of documentary material from other sources of information. The main difficulty observed in the review of complementary material was the selection of information that could be considered useful to be part of the contents of the PRR. The main criterion for selecting the information was that they should enlighten the evolution and trends in conservation, development, and logistic support functions of the BR. However, the large amount of information obtained, limited the constant and efficient application of this criterion. The review provided specific information, which in some cases made it possible to complement the information provided by the MI. Including, the fact that local authorities offer supplementary information on social and socio-economic practices and customs, especially those related to traditional uses and cultural aspects of the resident population of the areas (tourism, local festivals, handicrafts, and agro-food products).

In-situ data collection: visits to the BR. Visits to the BRSCSV allowed the collection of information, photographic, and documentary material regarding two fundamental aspects: i) main conflicts in the BR within the last 10 years, how they had influenced on reserve management, which had been the tools to manage these conflicts, how were these solved; and ii) knowledge, perception, and participation on the existence and management of the BR, in which the population performs.

Sections of the periodic review form identified special relevance to obtain information on:

Ecosystem Services (ES). At the time of the preparation for the third PRR, a characterization or specific assessment of ES in the BRSCSV had not been carried out in its territorial context. The documents consulted aided as technical guidance to research, structure, and present general information related to the ES present in the BR. As a result, a qualitative assessment was obtained, as an initial approach to the regulatory, supply, and cultural ES provided by the BRSCSV. Components identified (basic characteristics), beneficiaries, and main sources from which more detailed information could be obtained for further study and evaluation were analysed for each service.

Biodiversity involved in the provision of these services was also mentioned. In the PRR the convenience of carrying out a specific study of the ES provided by the BRSCSV was recognized.

Development function. In order to demonstrate the level of willingness with this function, information was collected from local or regional institutions that promote actions for the socioeconomic development of the municipalities from the reserve. This task added a difficulty to the preparation of the report, since in many cases, studies are not available to compile different actions that have had an impact on the development function of the evaluated reserve or its contribution to the sustainable development of these municipalities.

The SDP of the NPSCSV was enforced from 2003 to 2009. The report of this SDP provided the main information used to complete the section of the development function of the periodic review form. However, a documentary review had to be carried out in order to reconstruct information from data provided by the BRSCSV MI, since: i) the period of the SDP report did not cover the entire decade under review (2003-2013); ii) the information provided in the SDP report did not address all aspects required to describe the BRSCSV development function; iii) the responses given by the MI, both in the questionnaire designed by the team that produced the PRR and also, within the periodic review form, required reliable quantitative data to be sustained.

With the data and information available, it was possible to determine the trends in the evolution of the socio-economic parameters from the main sectors of the reserve, which represent the achievements and approaches to the current situation of the impact on the development actions for this area.

Logistic support function. Through the review of the sources it was found that a vast number of research, education, and training activities were carried out, and developed by national and international universities, public institutions from national to local level, and local private organizations. It was possible to enrich descriptions, objectives, and

results of those programs and actions that were encountered in the logistics function that a BR must develop. However, it was concluded that the initiatives did not start from a programme with an integrative and systemic vision of all the activities carried out in this area, which made it difficult to select the sample information that would be provided in the PRR.

Governance, management, and coordination. The BRSCSV does not have a participation body specifically created, although this requirement is specified in the MaB Spanish Programme (Comité Español del Programa MaB, 2013). The managing institution informed the editing team of the PRR that the participative activity of the local population in the planning and implementation of the functions of the BRSCSV is made possible through the participation mechanism of the PNSCSV. However, the Ministry of Environment and Territorial Planning, which is the managing body of the BRs of Andalusia, did not have any document that had formalized that the body of participation of the PNSCSV assumed the dual role of participation body of the BRSCSV.

As a result of the evaluation of the previous PRR of the BRSCSV (the second PRR was in 2003), the ICC of the MaB Programme recommended that a specific Action Plan and management should be developed for the BRSCSV. In this regard, the managing institution reported that the corresponding management and action plan was pending approval by the Andalusian government. Not having a specific action and management plan could lead to the possible implementation of the WNBR Exit Strategy (Secretaría del Comité Español del Programa MaB, 2015). To avoid this, the team that prepared the Third PRR decided to look for a number of elements, by which it could be demonstrated that during the period under review, the BRSCSV did have mechanisms that allowed an adequate management of the BR, and therefore, could be considered as a management plan with its corresponding programmes as a whole.

In order to justify the existence of a research plan, the following are highlighted: i) the research objectives in the NRMP; ii) priority subjects for

research exposed in the MPUM; and iii) training of human resources and promotion of research and development endorsed by the SDP. The existence of a monitoring plan was argued by presenting the monitoring indicators of the research of the mentioned planning instruments. The sustainability education plan was argued by the objectives and activities that were stipulated in the NRMP.

Evaluation of the process

Contributions of the process. The process presented for the elaboration of this PRR of BR has served to: i) adjust to the guidelines of the Form of Ten-Year Review that UNESCO requires for such a task, avoiding the duplication of data and records provided, even when the content of the questionnaire itself is reiterative in some chapters and sections; ii) facilitate the collection and interpretation of the most appropriate data for the preparation and drafting of the Report; iii) enable the identification of the most relevant aspects to be taken into account for the ten-year management evaluation of the BR; iv) highlight the successful experiences that MI has carried out to fulfil the functions for which it was designated; v) to highlight those issues which UNESCO (final evaluator of the Review Report, approves it, with modifications or rejects) could recommend to be modified, improved or introduced in the coming years to optimize the management process of the same, and vi) to provide a protocol that can help the MI to organize, pre-select and archive in advance the information and data that must be provided for the preparation of the following Monitoring Reports or Review of the BR.

Main difficulties highlighted and opportunities for improvement. The main difficulties encountered in the preparation of the PRR were related to two fundamental aspects: i) dispersion of the records and data needed to evaluate the accomplishment of the functions and designation criteria of the BR; and ii) the different criteria that both the BR management institution and the team that produced the PRR had available to select the

information that should be incorporated into the content of the Report.

It is understood that the whole process described can be carried out in a simpler way if: i) a unified instrument of planning, management, and participation of the set of protection figures that integrate the BR, approved and recognized as such by the MI, in which the objectives and actions that facilitate the accomplishment of its functions and criteria of designation as a BR were explicitly highlighted; ii) a proper monitoring and evaluation system of the management plan with the corresponding indicators in the right place had been available, it would have enabled an objective assessment of the degree of fulfilment of the functions and criteria for which it was designated; iii) the use of the guides, recommendations, indicators, and tools developed by the SCMABP for the preparation of the PRR would have been optimized.

Conclusions

During the preparation of the Third PRR of the BRSCSV, the management of information and data has been one of the main difficulties evidenced. Consequently, resulted in being dispersed, fragmented, or did not cover the period evaluated, and rarely explicitly referred to this BR. In this sense, the methodological process used for the preparation of the report has proved to be effective in restoring the collection and selection of information and for improving its structuring.

In turn, the process has shown the need for the Reserve to have a plan as a specific instrument for its management and for the evaluation of the fulfilment of its functions and the criteria for designation. Several mechanisms of other protection figures that have been used for their management are no longer in operation or are still being updated. The optimization of the use of the different instruments, guides, and recommendations provided by the SCMABP - besides guiding the elaboration of such plan and instrument - contributed to diminish the difference

of criteria that were presented between the editing team of the Third PRR of the BRSCSV and its MI.

The process studied has also proven to be effective in generating a trusting environment with the MI. The communication, relationships, and work dynamics established with this institution were fundamental elements for the preparation of the report on time, which showed the evolution of the BR during the last 10 years. The report also noted the compliance with the standards established by UNESCO for the PRRs of BRs, which indeed led to its approval by the organization in September 2015.

Finally, it is important to note that the preparation of the Third PRR of the BRSCSV, showed that the Review Reports are specifically intended to expose in a descriptive way if the BRs meet, the functions of conservation, development, and logistic support to fulfil its criteria of designation. In order to assess the real impact of the MaB Programme and to guide the management of the BR, it would be advisable to develop methodologies to verify the level of compliance with these requirements, their quality and the results of the actions carried out in the ground of the BR while allowing them to assess the level of sustainable development achieved in their territory.

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The Relationship Between Tourism and the Biosphere Reserve Status: The Danube Delta – If the Danube is “the sustainable highway’ of Europe, then the Danube Delta should be the sustainable gate to the Black Sea

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ABSTRACT: The main aim of this article is to find out whether the Danube Delta Biosphere Reserve (DDBR) demonstrates the characteristics of a biosphere reserve, and if its functions contribute to the sustainable socio-economic development, particularly tourism, without causing negative impacts on the ecological integrity. The study is based on mixed methods, including primary data collected through structured and semi-structured face-to-face interviews with representatives of the Danube Delta Biosphere Reserve Authority (DDBRA), the National Centre for Promotion of Tourism in Tulcea (CNIPT), Romania, and 15 tourists; personal observation during first-hand experience in the Danube Delta; and analysis of secondary data and related previous research. Overall, the research found that the DDBRA undertakes all measures to fulfil the criteria of the biosphere reserve designation: it has the three zones and management plan, it focuses on nature conservation and maintaining cultural heritage, it supports opportunities for environmental education, socio-economic development and local decision-making. However, this article suggests that the functions of the biosphere reserve are not very well understood by visitors and by local people, and that the biosphere reserve objectives are not very clear and are not reflected clearly enough from the DDBR management to the visitors and people living in the Danube Delta. Therefore, the dissemination and implementation of all objectives of the biosphere reserve designation could benefit not only the sustainable development of tourism, but also the biosphere reserve itself. This article recommends the integration of the "cultural landscape", as

described by the German MAB National Committee (2005) and "wilderness" concepts into the official biosphere reserve definition.

Keywords: biosphere reserve, sustainable tourism, Danube Delta, sustainable mobility, cultural landscape, wilderness

Introduction

The mission of the biosphere reserve as a place that identifies and designates land/seascapes is to ensure environmental, economic, and social sustainability through the development and integration of knowledge, including scientific, to advance the understanding and harmonize the interaction between people and nature (UNESCO, 2017). The three functions of biosphere reserves are biodiversity conservation, improving the socio-economic well-being of people, and promoting learning that fosters awareness and ability to balance economic, social, and environmental aspects of development through advancing sustainability approaches (UNESCO, 2017).

However, the image of the biosphere reserve and especially of the word "reserve" is often considered as a place where nature is strictly protected, natural resource use - restricted, and economic activities - forbidden or limited (Ishwaran, 2013). In this light, the main aim of this article is to contribute to the understanding of the biosphere reserve designation and to find out whether the Danube Delta demonstrates the characteristics of a biosphere reserve, and if its

functions help the sustainable socio-economic development, particularly tourism, without causing negative impacts on the ecological integrity.

As the International Conference on Biosphere Reserves, organised by UNESCO in Seville (Spain) in 1995, recognised the strong potential and need to apply the biosphere reserve concept in the coastal and marine environments (Ishwaran, Tri, and Persic, 2008), the Danube Delta Biosphere Reserve (DDBR) is an interesting site to investigate the extent to which people, nature, and economic development are in a harmonious relationship through the involvement of the local communities, international co-operation, use of traditional knowledge, education, and respect for cultural values.

The DDBR is characterised by rich biodiversity, giving shelter to over 300 migratory birds, numerous ecosystems, and diverse cultural heritage. Nevertheless, during the 20th century, the communities in the area have struggled with insufficient economic growth, poverty, and ecosystem degradation. This in part is due to the draining of vast amounts of water and the suppression of the cultural identity of the small communities. The Delta has also been challenged by the impacts of climate change, rapid urbanization, and industrialization along the Danube river, and the increasing number of tourists (Marin et al., 2012). The Danube Delta Biosphere Reserve Authority (DDBRA) has been trying to recover the Delta's ecosystems and improve economic benefits for the local communities, to maintain and develop ecological and cultural diversity – but at the same time – to develop economic systems that include tourism with the contribution of education and collaboration between the different stakeholders in the Danube Delta (Hall, 1993; Nichifor and Covaliov, 2011; Marin et al., 2012). Tourism is being greatly promoted as an important factor for sustainable development for the whole biosphere reserve.

There is weak accessibility in the Danube Delta, but high tourism interest. The question how to

manage tourist flows is significant; to keep the reserve's attractiveness for tourists; creating social and economic benefits for the region; and sustaining the environmental conditions. Therefore, the key question of the article is whether the interconnected functions of the biosphere reserve are contributing to sustainable tourism in the Delta. Do the biosphere reserve functions contribute to the environmental, economic, and social sustainability of the Delta, as provisioned in the biosphere reserve designation?

The main reason for using mixed research methods in this study is complementarity between qualitative and quantitative data (Greene, Caracelli, and Graham, 1989). The aim is to elaborate, develop, and further enhance the literature on this subject with new results, and to give an integrative view from different perspectives. Prior to the fieldwork, a range of secondary sources was consulted. A review on literature concerning the objectives of sustainable development and sustainable tourism and on the biosphere reserve concept was undertaken to provide a broad academic context for the research. Including, to outline the importance of this research in the light of the current objectives and trends in sustainable development and tourism. Materials directly related to the Danube Delta were consulted in order to place the study in its geographical and historical context, and to outline the paradigm of challenges and issues to be covered and discussed in the article.

Certain limitations have hindered the study from being fully elaborated, which will provide further contribution to the successful achievement of this article's aims. Firstly, the time constraint: a period of two weeks is relatively short for interviews with regards to the seasonality and scale of different types of tourism, including the heightened work load of the management and the tourism bodies in the Danube Delta. Secondly, the language constraint: the majority of local people and tourists only spoke Romanian. The research potentially can achieve much deeper and satisfactory results if the Romanian speaking tourists and local people were interviewed. And thirdly, the number of interviewees constraint:

the total number of tourists interviewed was 15. A bigger number might lead to more successful quantitative study results. The list of observational remarks, suggested results, and analysis are a result of qualitative rather than quantitative data collected. Therefore, they should be adopted as general suggestions on the basis of the experiences of the participants, rather than as a general tendency in tourism in the DDBR.

Finally, this article hopes to outline possible recommendations for improving the harmonious relationship between people and nature in this area of remarkable natural, cultural, and ethnographic heritage so that it can turn into a sustainable "gate" to the Black Sea. Having all these characteristics, the Delta has an enormous potential to be a model biosphere reserve on the basis of different economic activities, including sustainable tourism, if sustainable management tools are implemented. While recognising that the objectives of a biosphere reserve and the sustainability approaches can be developed and promoted in any field, it is suggested that tourism has a particular opportunity to demonstrate that travel, recreation, observation, and learning through exploring cultural landscapes and wild nature in biosphere reserves. This contributes a significant impact to the sustainable development and to harmonious human-nature relationship both in the Danube Delta and in other destinations.

Literature Review

Sustainable development and sustainable tourism

In order to understand the relationship between the functions of the biosphere reserve and sustainable tourism, there is a need to critically evaluate theoretical definitions and how have they been explored through research and related to the objectives of protected areas, and biosphere reserves in particular.

Adapting the principles of sustainable development, sustainable tourism was initially viewed as a positive approach to reducing the tensions between the tourism industry, the environment, and the host communities, with the

recognition that tourism is an important form of development (Bramwell and Lane, 1993; Lane, 1994). The principles of sustainable tourism development have been outlined as improving the life of the local host community, while being included in decision-making. Including, satisfying the demands of tourists and the tourism industry; protecting the natural and cultural resource base for tourism; it should consist of holistic planning policy and strategies, and develop in such a way that productivity can be sustained over the long term for future generations (Cox, 1985; Pigram, 1990; Cater, 1993; Bramwell and Lane, 1993; Sharpley, 2000; Foucat, 2002; Honey, 2008; Farelly, 2011; Ahmad, 2014; Coria and Calfucura, 2012).

The convergence between economic incentives and conservation in the concept of sustainable development are increasingly questioned (Friend, 1992; Sharpley, 2000; Kiss, 2004). This is frequently the result of limits on the natural resources and the difference in economic systems (Cohen, 1988; Butler, 1991; Wheeler, 1992; Rees, 2002; Romeiro, 2012). Similarly, other scholars argue that sustainable tourism ignores or is not consistent with the broader principles of sustainable development (Hunter, 1995), or that it is synonymous with eco (or responsible) tourism (Lu and Nepal, 2009; Weaver, 2014; Ruhanen et al., 2015). Other authors, such as Hardy, Beeton, and Pearson (2002), argue that sustainable tourism has given more focus to aspects related to the environment and economic development, and that more focus should be given to community involvement. Rather, there is a need for balanced focus on the different objectives of sustainable development, as studies suggest (Butler, 1998; Bramwell and Lane, 2000), and for interdisciplinary approach towards sustainable tourism research (Lu and Nepal, 2009).

Protected areas and the biosphere reserve concept

The relationship between tourism and protected areas is complex - the economic focus of tourism and the conservation focus of protected areas have been described as contrasting (Wilson et al.,

2009). Tourism infrastructure and visitation and their negative effects on biodiversity, as well as changing visitor demands for facilities in protected areas have been explored (Wang et al., 2012; Wearing and Neil, 2009). On the other hand, the poor communication between the tourism industry and protected area authorities that impose restrictions and prohibitions rather than implementing sustainable development measures is noted (Sharpley and Pearce, 2007). With the growing importance of sustainability issues, Becken and Job (2014) conclude that biodiversity protection and conservation require networks of protected areas that limit or manage economic development, including tourism, but that also acknowledge the role of tourism for creation of financial resources as well as awareness raising. Researchers recommend the necessity for more systematic, integrative, holistic, and innovative approaches towards sustainable development in protected areas; these include sustainable market orientation model (Mitchell et al., 2013), partnership as informal information exchange between tourism representatives in governments (Buckley, 20014), managing sites through creative and integrative approaches (Mitchell and Eagles, 2001) and adaptive resource management at vulnerable sites such as Machu Picchu, Peru (Larson and Poudyal, 2012). Other majorly recommended approaches are shifting finance options towards park self-governance or opportunities for sustainable funding for tourism in protected areas (Marsden, 2000; Eagles et al., 2012; Whitelaw et al., 2014). The concept of the "biosphere reserve" appears to match these needs of integration of ecosystem protection and restoration, sustainable economic growth, and increased research capacity - all objectives from the current UN 17 Sustainable Development Goals (UN, 2015).

The biosphere reserve is a rather unexplored concept. Becken and Job's overview on protected areas (2014) confirms that research on tourism in protected areas has been mainly conducted on World Heritage Sites, national parks (Leask and Fyall, 2006; Su and Wall, 2012; Eagles, 2014; Mayer, 2014; Whitelaw, King and Tolkach, 2014;

Stanford, 2014), and private reserves (Pegas and Castley, 2014).

The evolutions of the concept and its practice, as well as its potentials and challenges are explored through different studies and reviews. For example, Ishwaran, Tri and Persic (2008) give an elaborated overview on biosphere reserves and their evolution as 1st, 2nd, and 3rd generation biosphere reserves, according to the year they have been designated. Other studies discuss and investigate the practical dimensions of the functions of biosphere reserves (Batisse, 1986; Selvam and Ravichandran, 1996; Croze, Sayialel and Sitonik, 2006) and their role for ecosystem conservation and for innovations in sustainable development (Moller, 2007; Jamieson, Francis and Whitelaw, 2008; Hani, 2011) and sustainable tourism development (Nianyong, Qian and Hogn, 2008). With numerous examples from the fourteen German Biosphere Reserves, the German MAB National Committee (2005) conducts an exemplary overview of the strong potential of biosphere reserves for achieving the sustainable development objectives. Nevertheless, as mentioned by the German MAB National Committee as well, the tourism potential of biosphere reserves has not yet been fully exploited. While these investigations suggest practical implications and analyse the characteristics and the evolution of the biosphere reserve concept, no comprehensive studies were carried out on the relationship between the biosphere reserve functions and tourism, and how they contribute to each other and the sustainable development in a particular biosphere reserve. Tourism and its dynamics are seen as one of the most important factors of economic development in the DDBR (Bozagievici and Nichifor, 2007; Gâcțețcu and Știucă, 2008), but research and approaches for sustainable tourism development there are scarce (Hall, 1993). Biosphere reserves are often part of a tourist region, therefore local government decision-making and regional planning for tourism is necessary (German MAB National Committee, 2005).

An empirical analysis on the relationship between the biosphere reserve designation and sustainable

tourism, which would attempt to answer whether the biosphere reserve status contributes to the sustainable development of tourism in the Danube Delta and vice versa, will fill the gap in research on this area. In light of the need of context-specific sustainable tourism cases and approaches (Lu and Nepal, 2009; Ruhanen et al., 2015), this article, which studies a particular biosphere reserve, will provide new perspectives towards illustrating the state of the biosphere reserves around the world.

Biosphere Reserves - an overview and objectives

The biosphere reserve concept was defined within UNESCO's Man and the Biosphere (MAB) Programme and launched in 1971. The institution aims to establish a scientific basis for the improvement of relationships between people and their environments, based on systematic observation of the changes brought by people in the biosphere (UNESCO, 2017). The first biosphere reserves were designated in 1976, when their basic function was to be tools for international co-operation for nature and wild species conservation through interdisciplinary research, public awareness, education, and monitoring approaches (Ishwaran, Persic, and Tri, 2008). They included zones of fundamental importance for the biosphere reserve and were initially core and buffer zones.

The concept and design of biosphere reserves and their application to specific territories have evolved in the First (1983; Minsk, Belarus), Second (1995; Seville, Spain), Third (2008; Madrid, Spain), and the Fourth (2016, Lima, Peru) World Congresses on Biosphere Reserves. Following the Congress on Biosphere Reserves in Minsk in 1983, the vision of biosphere reserves was elaborated to "protected areas of representative terrestrial and coastal environments which have been internationally recognized for their value in conservation and in providing the scientific knowledge, skill and human values to support sustainable development" (UNESCO, 1984). The buffer zone

included a larger area, referred to as "transition zone" (Batisse, 1986) with an emphasis on the need for cooperation between researchers, managers, and the local population to ensure planning and sustainable development, harmonious land, and resource use (UNESCO, 1986). The functions of the newly described transition area included experimental research, traditional use, and ecological restoration (Ishwaran, Persic, and Tri, 2008). Batisse (1986) notes that biosphere reserves continued to serve the three basic roles - conservation, logistic support, and development.

By 1995 about half of all biosphere reserves were simply national parks wherein the biosphere reserve status as well as buffer and transition zones were added. Notably, there was no comprehensive evaluation of the economic, social, and ecological progress, and therefore it was difficult to identify how successful the implementation of the objectives of the MAB Programme was (Price, Park, and Boumrane, 2010). The strategies that were adopted on the Second World Congress of Biosphere Reserves in Spain, 1995, aimed to increase the consistency between the concept and its implementation in practice.

The Seville Strategy (UNESCO, 1995a) emphasised and supported the function of biosphere reserves as international learning laboratories – sites of research to demonstrate and test approaches for sustainable development and conservation. Therefore, to the three fundamental functions of biosphere reserves, the notion of sustainable resource use and economic development was added (UNESCO, 1995). The buffer zone was no longer including the transition zone, but were separated into two different zones. The three zones, the core, the buffer, and the transition zones had to contribute to conservation, sustainable development, scientific research, and public understanding (Ishwaran, 2013) through the three functions of the biosphere reserve. The Seville Strategy appealed for more attention on the transition area of biosphere reserves,

especially on the need to integrate biological and cultural diversity, traditional knowledge and genetic nature resources, and their mutual role for sustainable development. Article 4 of The Statutory Framework of the World Network of Biosphere Reserves (WNBR) states that every site has to comply with the general criteria in order to be qualified for a biosphere reserve designation (UNESCO, 1995b). These criteria include the ecological characteristics, its significance for biodiversity conservation, nature and landscapes protection, opportunities for sustainable development, appropriate size and zoning (including one or more core and buffer zones and a transition area), a management policy or plan with actions, a nationally designated authority or mechanism for implementation, programmes for research, monitoring, environmental education, and training that involves stakeholders and local people in the management of the biosphere reserve (Price, Park and Boumrane, 2010).

The Madrid Action Plan 2008-2013 (MAP) - approved at the 3rd World Congress of Biosphere Reserves (UNESCO, 2008), was developed in order to further highlight the concept of biosphere reserves as exemplary and learning sites for sustainable development. The most recent one, the Lima Action Plan 2016-2025 also places strong emphasis on the dissemination of the models of sustainability and successes throughout the biosphere reserves (UNESCO, 2017). The objectives of the newest MAB strategy include the promotion and support of sustainable development initiatives through labels for products and services that consist of the main biosphere reserves objectives (UNESCO, 2017). One of the main strategic outcomes is the recognition of biosphere reserves nationally and internationally (UNESCO, 2017). Under the increasing threats that climate change, rapid urbanization, loss of biological and cultural diversity pose, and the current Millennium Development Goals, the biosphere reserves need to develop partnership between all sectors to foster sustainable development, test and apply adaptation strategies for climate change, enhance the functioning of zoning with a particular regard

to transition areas, wherein economic activities are greatly allowed, improve financing opportunities, and support traditional knowledge use (UNESCO, 2017).

In spite of all the functions that they have, biosphere reserves are thought to be simply conservation or protected areas - either national parks or nature reserves (German MAB National Committee, 2005). Reserves are referred to as protected areas that do not involve economic development and do not support the objectives of sustainable development, but rather that of nature conservation (German MAB National Committee, 2005; Ishwaran, 2013). The conservation and protection objectives of the biosphere reserve push the sustainable development task into the background and the public does not quite understand what exactly the functions of a biosphere reserve are. It is especially the zoning and the changes in the zoning that create misunderstanding and confusion around biosphere reserves.

In biosphere reserves only the core area is a legally and strictly protected area of relatively unspoiled natural places that support the most sensitive species and natural resources, wherein only scientific research can take place that contributes to the conservation of landscapes, ecosystems, species, and genetic variation (DDBRA, 2007 - 2017; UNESCO, 2017;). The buffer and transition zones both have resident communities that practice nature conservation activities. The difference between them is that the buffer zone surrounds the core areas and traditional economic activities such as forestry, agriculture, and fishing are practiced to foster socio-economic well-being, as well as nature and landscape conservation, monitoring, training, research, and education, and it is designed to reduce the negative human impact on the environment (DDBRA, 2007-2017). In the transition area broader sustainable economic activities are fostered that maintain the friendly relationship between nature and the regional socio-economic development processes. A particular example of such activity is sustainable

tourism (German MAB National Committee, 2005).

As shown by the above examples, and especially as sustainable tourism is promoted in the buffer and mainly in the transition areas by the objectives for sustainable economic, social, and cultural development, sustainable tourism development is an important factor that inevitably influences biosphere reserves and it is important to understand how. As laboratories for sustainable development methodologies, biosphere reserves represent excellent sites to study the relationship between sustainable development, tourism, and the biosphere reserve functions in a specific context and within different sites. Being a vital point for migratory birds, marine, and fluvial ecosystems, home for communities from different ethnic origin and an increasingly popular tourist

destination, the Danube Delta is an interesting place to examine the challenges in the implementation of the biosphere reserve concept with regards to tourism.

Research Site: The Danube Delta characteristics and historical background

Geographic position and area characteristics

Where the Danube meets the Black Sea is the Danube Delta - the largest wetland in Europe, one of the biggest (after the Volga delta) and most diverse deltas in Europe (Gâțescu and Știucă, 2008). The total area of the delta is about 5800 km², 85 percent of which (3510 km²) belong to Romania and the remaining area is in the territory of Ukraine (Gâțescu and Știucă, 2008).



Figure 1. The Danube Delta Geographic Position (DDBRA, 2015). Copyright 2015 by Danube Delta Biosphere Reserve Authority, Tulcea, Romania. Adapted with permission.

The Danube Delta (Figure 1) lies between three main channels – Sfântu Gheorghe, the oldest, Sulina, and Chilia - the youngest, between which the large units Letea, Caraorman, and Dranov are situated (Gâțescu and Știucă, 2008). The Delta consists of river and marine sand banks, predeltaic territories, forests, sand dunes, a complex network of river channels, canals, lakes, swamps, backwaters, swamp, and marsh vegetation (Gâțescu and Știucă, 2008). Danube Delta is home to 30 types of ecosystems, hosting 2383 species of flora and 4029 species of fauna (DDBRA, 2007 - 2017). It is a major refuge for migratory birds that live, migrate, or winter within (Gâțescu and Știucă, 2008).

Population and settlements

There are 24 rural and one (Sulina) urban settlements in the Danube Delta and 12 666 inhabitants (DDBRA, 2007 - 2017). Today, Romanians make up 87 percent of the population, with ten percent Russian Lippovans, two percent Ukrainians, and one percent other nationalities (Turkish-Tatar, Greeks, Hungarians, Bulgarians, Germans, Armenians) (DDBRA, 2007-2017).

Economic activities

Traditional economic activities and occupations in the Danube Delta since ancient times are fishing, sheep and cattle breeding, medicinal plants harvesting, and beekeeping. Agriculture are practiced on the areas with low risk from flooding (the areas Chilia, Pardina, Plaur Sălceni in the Danube Delta, Romania) (Gâțescu and Știucă, 2008).

After the end of the suzerainty of the Ottoman Empire over Romania and the independence of Romania in 1877 (Romania Tourism, 1994 - 2017) and in the beginning of the 19th century, the mosaic of ecosystems are largely impacted by human activity after correction of the Sulina and Sfântu Gheorghe arms to facilitate the navigation of sea vessels (Gâțescu and Știucă, 2008). Subsequently, inland canals to increase fish production were built between 1910 and 1935, enclosures were created for agriculture, and fish-farms were developed, but this resulted in the exploitation of reed and timber.

After 1960, under the communist regime, the traditional occupations were drastically modified by agricultural exploitation, forest plantations, and fishing with large fishing nets (Gâțescu and Știucă, 2008). As Gâțescu and Știucă note, the management works performed between 1960 and 1989 included the creation of navigation channels within the delta, drainage of lakes, swamps, and marshes for agriculture, blockage of side channels. These changes contributed to major negative impacts on the deltaic ecosystems, the water movement, and quality within the delta. As a result of these interventions and modifications, at the end of the 1980's the normal hydrological cycles were disrupted and it is confirmed that the restoration process of the natural balance of the Delta will take a lot of time (Gâțescu and Știucă, 2008).

Danube Delta Biosphere Reserve and functions

The Danube Delta was declared a Biosphere Reserve in 1990, and in 1994 its boundaries and internal zoning were established. The Danube Delta Biosphere Reserve Authority and its Scientific Council (Gâțescu and Știucă, 2002; 2008) were appointed. The DDBR is also a member of the EUROPARC Federation and is listed as a wetland of international importance as important waterfowl habitat under the Ramsar Convention in 1991, and as World Heritage Site since 1990. Beginning in 1998, the Danube Delta became a Transboundary Biosphere Reserve (UNESCO, 2015), with the Ukrainian secondary delta of the Chilia Arm and two kilometers of sea waters (Gâțescu and Știucă, 2008).

Zoning

The Danube Delta consists of core, buffer, and transition zones. In a study from 2002, the three zones were indicated as "core", "buffer" and "economic areas" (Gâțescu and Știucă, 2002, p.?). Now, the Authority refers to the core zones as strictly protected areas, the "transition" zones - "economic zones" or "sustainable development areas" - it might be to avoid confusion in representing the areas to the public and visitors of the DDBR. The ecosystem reconstruction has become a major priority after the Danube Delta was

designated a Biosphere Reserve and there are additional ecological reconstruction areas. Therefore, according to Figure 2, the DDBR includes strictly protected areas (8.7 percent of the Reserve's surface), buffer areas (38.5 percent), economic zones or sustainable development areas (covering 52.8 percent of the Reserve's territory) and areas for ecological restoration where only

projects and activities for ecological restoration and reconstruction can be practiced, as well as activities that are specific to the buffer and sustainable development areas, dependent on the basic areas in which the reconstruction activities are conducted. In both buffer and economic zones, tourism can be practiced, but in the buffer zones no building is allowed.

THE DANUBE DELTA BIOSPHERE RESERVE

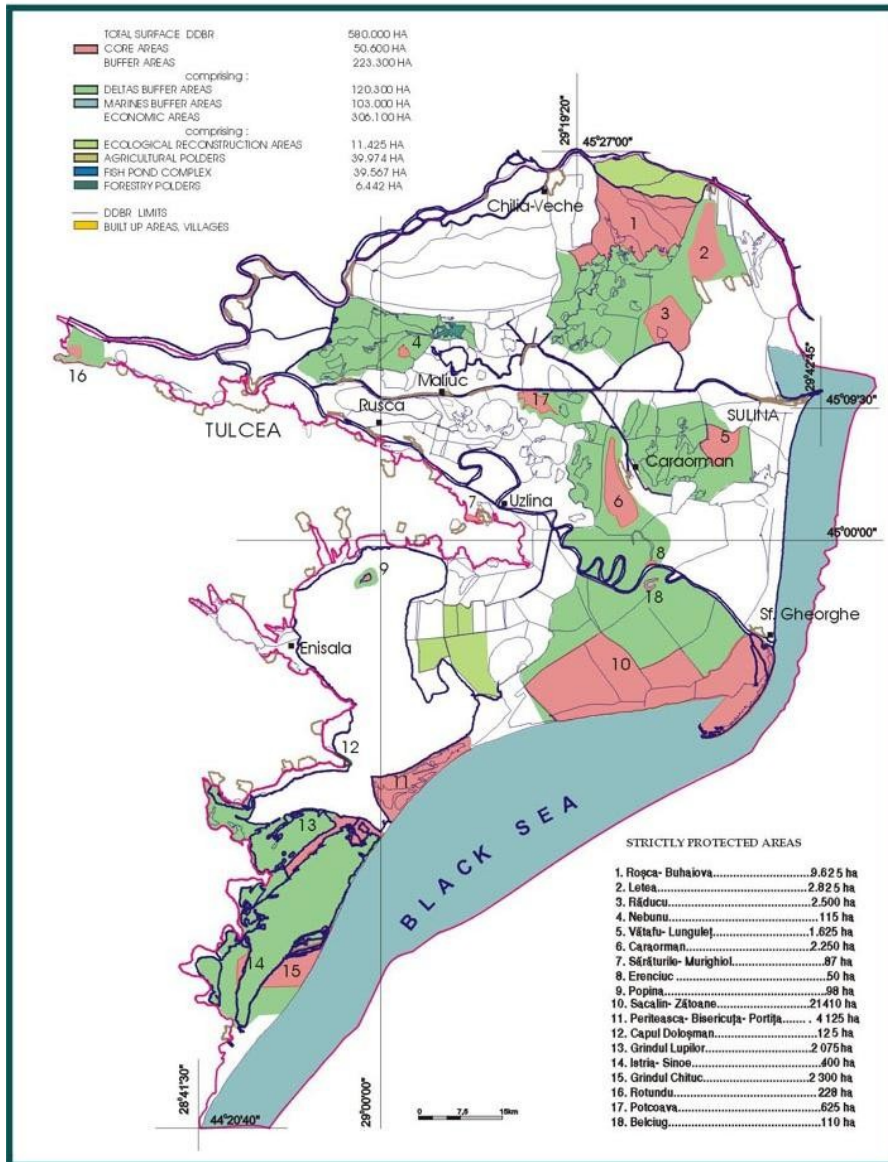


Figure 2. Danube Delta Biosphere Reserve Map (DDBRA, 2007-2017). The red is for the core zones, the dark green is for the delta buffer zones, the blue is for the marine buffer zones, the green is for ecological restoration areas, the plain is for economic areas with agricultural, fish ponds and forest complexes, and the pink is the boundary of the biosphere reserve. Copyright 2017 by Danube Delta Biosphere Reserve Authority, Tulcea, Romania. Adapted with permission.

Tourism in the Danube Delta Biosphere Reserve

Evolution of tourism in the Danube Delta

With rich history and cultural heritage from the Roman, Greek, Byzantine, and Ottoman periods, the natural and cultural values of the DDBR are turned into tourist attractions, and products and tourism is increasing. Some material and spiritual values such as fishing, fish dishes, and rural landscape, were preserved and are important resources for tourism (Popa, Nichersu and Poruncia, 2005). In 2004, the number of arrivals increased by almost 50 percent (total of 17 632 tourists), compared to 2003 (Bozagievici and Nichifor, 2007). This is explained by the huge publicity in mass media, the large investments in new accommodation facilities, and diversified and more attractive tourist packages (Bozagievici and Nichifor, 2007). In 2003, a 4-star green village complex was built in Sfântu Gheorghe village in the Danube Delta, Romania and, due to film and music festivals organised every July and August, the number of tourists reaches 4000 per week in the high season (Ivan, 2012). In 2009, about 85 percent of the local people in Sfântu Gheorghe were involved in activities connected to tourism and, in 2010, they confirmed that tourism is now a traditional activity, wherein men are engaged with fishing and boat tours, and women are in the household and catering for tourists (Ivan, 2012).

In the DDBR, through social, political, and economic influence, the environment and the cultural values underwent changes. By 2005, despite the fact that the Danube Delta was a biosphere reserve for 15 years, there were drawbacks to tourism development. Including, a low socio-economic development and lack of jobs and education, harsh living in the rural environment, youth migration towards the urban centres, low level of accommodation, lack of local handicraftsmen for house building, restricted access to natural resources, high prices of reed harvesting for the locals because of the DDBR objectives, lack of staff in the delta to supervise, inform, and direct tourists, and few funds granted for cultural activities (Popa, Nichersu and

Poruncia, 2005). Different issues and challenges for the tourism development have been outlined: the limited number of foreign visitors, the low level of accommodation and insufficient investment in modern facilities, ecological and landscape changes (due to human actions) (Gâștețcu and Știucă, 2002), as well as the lack of a holistic perspective and the weak training of professionals for the development of ecotourism (Hall, 1993).

Studies reveal that high tourism activity pushes local people to renovate their houses in a modern style with building materials that last longer in time than reed, which makes it difficult to preserve the traditional architecture (Poruncia and Marin, 2007; Ivan, 2012). Popa, Nichersu, and Poruncia's study (2005) reveals that locals adjust to the socio-economic changes but it is difficult for them, especially after many decades of a centralized system, changes to modern resource use, and building patterns that occurred (not necessarily with their approval).

These conclusions suggest that there is perhaps an inconsistency between the sustainability objectives of the biosphere reserve designation, which include the involvement of the local communities and preservation of their cultural values, and the actual state of development in the Danube Delta. On the other hand, traditional architecture in the Danube Delta represents great interest for the tourists. Moreover, one study (Ivan, 2012) showed that despite the increasing economic pressure, and modern ideas and practices brought by tourists, a fisherman's family in Sfântu Gheorghe village adapted well and receives the benefits from tourism directly. Tourism has not disrupted their traditions and activities, but it is rather becoming a durable business for the family and plays an important role in slowing down the youth migration (Ivan, 2012). Therefore, the locals must be supported and encouraged by the local and national authorities to preserve and promote the cultural touristic values and the sustainable development in the Danube Delta as a biosphere reserve.

Danube Delta Biosphere Reserve and tourism - a sustainable relationship?

The results of these studies show that the Danube Delta has a strong potential for a sustainable human-nature relationship especially in terms of tourism. Nevertheless, tourism could have negative impacts that must not be neglected. The laws and regulations of the DDBR are not strictly followed by visitors (V. Bîscă, personal communication, June 24, 2015), and especially fishermen (A. Codreanu, personal communication, June 24, 2015). Understanding how different modes of recreation are influencing the communities and the ecosystems is crucial. For these reasons, ecotourism and sustainable tourism activities are essential for the healthy functioning of the DDBR. The next section summarizes the primary data collected through face-to-face interviews with representatives of the DDBRA and with tourists and aims to outline general suggestions about the practical state of tourism in the DDBR.

Interviews: context, aims and overview of the focus groups

Context: The Danube Delta Biosphere Reserve Authority

The Danube Delta Biosphere Reserve Authority (DDBRA) is the public institution appointed to administer the DDBR and it is subordinated and funded by the Ministry of Environment and Waters of the Republic of Romania (A. Codreanu, personal communication, June 24, 2015). The Authority regulates and provides assessment of natural resource status and conditions, monitoring of natural resource use, and authorisation of all economic activities in DDBR (setting maximum quota limits for resource use) (DDBRA, 2007-2017). The Authority issues permits for all activities conducted in the Reserve (DDBRA, 2007-2017). As required by the World Network of Biosphere Reserves (WNBR), the DDBRA establishes and implements a Management Plan. It comes out every five years and consists of objectives and measures organised in a program of planned actions consulted with all

stakeholders and local communities. This is based on researching the natural conditions in the Biosphere Reserve, conducted in collaboration with the Danube Delta National Institute for Research and Development. The main objectives are separated into different actions and priorities (DDBRA, 2017b), such as:

management of species and habitat protection
sustainable use of natural resources
conservation of cultural heritage, including restoration of buildings with historical and cultural value, infrastructure and waste management improvement, and trade of traditional products, such as honey, medicinal plants, products made of reed
public awareness and environmental education support, including community involvement, working meetings and public debates, Public Awareness Strategy for different target groups, and codes of good behaviour
scientific research and monitoring
international co-operation, including collaborative projects and experience sharing with the Transboundary Danube Delta Biosphere Reserve partner, Ukraine support of sustainable tourism.

Interviews with DDBRA representatives

The structured interviews with Ms. Bîscă Viorica, the executive director of the DDBRA, Ms. Alina Codreanu, a councillor from the Ecological Education and Information Department of the DDBRA, and Monica Cacencu, a DDBRA officer in Crişan, Danube Delta, aimed to obtain information on the management activities and functions of the DDBRA, as well as on the challenges that they face. A customer service representative from from The National Centre for Tourism Promotion (CNIPT) - Tulcea was also interviewed on the tourism promotion process in the DDBR.

Interviews with visitors

The aim of the interviews was to observe and discover how familiar the visitors were with the concept of the biosphere reserve, and what the reasons were for choosing the Danube Delta for their vacation. The people interviewed were approached randomly during travelling in different parts of the biosphere reserve.

15 tourists were interviewed from Romania (2), Albania (1), France (4), Germany (2), Austria (2), Switzerland (1), United Kingdom (2) and Bulgaria (1). Among them there were cyclists (who were cycling along the Danube and their final point was the Delta), nature lovers, bird watchers, students in Romania, and recreation tourists. All of them preferred travelling with small boats or kayaking, which enables the potential observance of wildlife, but does not harm nature. The semi-structured interviews included general questions on the purpose of visiting the delta, accommodation and activities. Table 1, 2 and 3 indicate the questionnaires for each participant group.

Results, observational remarks, and analysis

In accordance with the groups of questions and the biosphere reserve functions, the results from the interviews are separated in sections.

Nature conservation. As it is indicated in the DDBRA website, Ms. Codreanu and Ms. Bîscă confirm that no activities, except for research, management, and monitoring, are allowed in the core zones:

They are strictly protected areas. Except for our staff and the Research Institute no one can go there. The access is forbidden, totally forbidden. Only in buffer zones, ecotourism is allowed, but without building roads or facilities, only walking, this kind of light tourism. (V. Bîscă, personal communication, June 24, 2015).

Table 1. Interview questions for DDBRA Representatives.

1. What had the state of the Danube Delta been before it became a biosphere reserve?
2. How do you achieve the functions of the biosphere reserve - conservation, development, knowledge and research place, logistic support for training and research?
3. What are the core, buffer and transition zones in the Danube Delta?
4. How do you provide knowledge and information to the local people regarding the

sustainable development of the area and the other objectives of the biosphere reserve?
5. How do you educate the tourists in the issues of ecosystem conservation, local communities benefits and natural heritage protection?
6. What are some of your past, recent and future projects for ecosystem management, conservation and development?
7. Does the Danube Delta Biosphere Reserve get funding from the UNESCO Man and the Biosphere Programme, The Ramsar Wetland Sites Network, the UNESCO Network of World Heritage Sites to fund projects?
8. How do you control tourist activity? Do you issue special permits?
9. Do you integrate ecosystem conservation with tourism in the Danube Delta and how?
10. Do you work together with other institutions and organisations and with the local communities on your projects?
11. In what way do you demonstrate and maintain the Danube Delta's "Biosphere Reserve" status and do you do periodic reviews?
12. How do you integrate the cultural with the biological diversity in the Danube Delta and do you use traditional knowledge and the help of the local people in ecosystem management and nature conservation?
13. What, in your opinion, are the biggest problems and challenges that the Danube Delta is currently facing and how do you think they can be dealt with?
14. Do you think tourism helps or is an obstacle for sustainable development in the Delta? What types of tourism are allowed? What is the influence of tourism on other activities, on the local people and on the environment in the Danube Delta?
15. Do you think that access and transportation harms the environment and is a problem for the sustainable development of the region and how it could be improved?

Table 2. Interview questions for tourists.

1. Is this the first time you visit the Delta? How did you find out about it?
2. What do you know about the Danube Delta?

3. Where are you staying?
4. What are you doing while on vacation here? Which places in the Delta do you visit?
5. Where do you come from and what is your profession?
6. How did you come here - by car, by bus, by boat/ship?
7. Do you know what a "biosphere reserve" is? Do you have an entrance permit?
8. How do you protect and conserve nature while you are here and when you go back home?
9. Do you meet and talk to any local people, and buy local products?
10. Is there anything that you do not like in the DDBR?
11. Are you going to visit any other cultural or natural heritage attractions here?
12. Did you come to the Danube Delta only or this is only a part of your vacation?
13. What do you think can be improved in the Danube Delta?

Table 3. Interview questions for CNIPT – Tulcea (National Centre for the Promotion of Tourism, Romania.)

1. What types of tourism are mainly practised in the Danube Delta?
2. What types of tourists are mainly visiting the Delta? Mostly individuals or families?
3. Are there specific zones for tourism activities - with free, restricted or prohibited access?
4. What types of tourism are allowed in the Danube Delta?
5. Do you work together or get advice from other institutions - the Ministry of Tourism, other organisations or government institutions, companies or other tourism businesses and do you work on specific projects to market Danube Delta as a tourist attraction?
6. Do you use the "biosphere reserve" designation to market and advertise the Danube Delta or you think that people do not know what a "biosphere reserve" is?
7. Do you integrate the issues of ecosystem conservation with tourism in the area and how?

8. Do you work together with the local communities to develop tourism and to gain economic benefits for the area and how?
10. Do you think that too many or too few tourists come to the Delta? What are the negative impacts of tourism in the Danube Delta?
11. How do you connect the importance of cultural heritage with the importance of biological diversity when you advertise the Danube Delta?
12. How do you disseminate information about the environment and about how important nature protection is to the tourists and to your employees?
13. How do you think the transport to and within the Danube Delta influences the tourism development?

Furthermore, the Authority promotes ecological education for children. Ms. Cacencu is involved with ecological education in the school in Crişan and she works very closely with teachers. The participant highlights the importance of environmental education for children:

It is very important to provide ecological education to the children so that they can discover nature: to feel, to touch, to observe, to stimulate their creativity... I like the idea of adopting the place, to feel that it belongs to you and it is important to clean it... You cannot change one adult's life, but you can change the children. Life is hard here and they do not have many perspectives, some of them go abroad. They can go outside and have more, and different experiences, or they can return and appreciate the beauty of our place or country. I want for the children to talk about the Danube Delta (M. Cacencu, personal communication, June 15, 2015).

Providing ecological education and supporting awareness. One of the important elements for information provision and awareness raising are the six information and ecological education visitor centres in the main localities in the DDBR. They promote the importance of the Biosphere Reserve and nature conservation, allow the access

to information, its correct understanding and interpretation for visitors, and encourage the local communities to take part in the decision making and in nature conservation activities. They provide information, leaflets, brochures, and ecological conservation guidelines not only to tourists, but also to students, organisations, and public institutions (A. Codreanu, personal communication, June 24, 2015). The centres use different interpretation techniques. One example is a wooden interactive map of the Danube Delta, where the strictly protected areas are highlighted by red lights, and the other areas by green and yellow lights (see Figure 3).

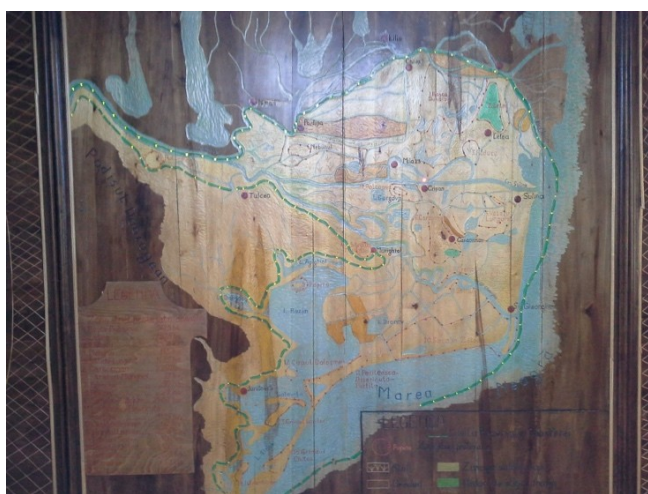


Figure 3. Interactive map of the DDBR in the Visitor Information Centre in Crisan. Photograph: Elitsa Barukchieva, 2015®.



Figure 4. Plans for the renovation of the Visitors Education and Information Centres in DDBR. Photograph: Elitsa Barukchieva, 2015®.

Currently, as seen from the plans on Fig.4, the visitor information centres in Tulcea, Crişan and Sulina are being renovated, through a project funded by the European Union (A. Codreanu, personal communication, June 24, 2015).

Unfortunately, the DDBRA is financed only by the Romanian government. The finances are not sufficient to equip the visitor centres with staff throughout the whole year and outside the tourist season, and in the Centre in Chilia village there are no personnel at all (A. Codreanu, personal communication, June 24, 2015). The DDBR does not receive funding from the UNESCO MAB Programme or from the Ramsar Convention on Wetlands (Ramsar, 2014). The Authority only applies for individual or collaboration projects funded by the EU or through the EU Strategy for the Danube region (V. Bîscă, personal communication, June 24, 2015; A. Codreanu, personal communication, June 24, 2015). This could be problematic for the achievement of the DDBR objectives and strategies.

Despite the renovation of the visitor information centres, there are many unused and underdeveloped facilities, some of which are falling into disrepair. For example, an observation tower next to the Visitor Information Centre in Crişan (Figs. 5, 6 and 7) is not only unused but almost destroyed and surrounded by dense vegetation.

Old watchtowers for hunters within the Danube Delta are rust-eaten and are intentionally destroyed so that they are not dangerous both for people and fauna. Ms. Cacencu believes that having modern and renovated visitor information centres is not enough:

They put European money in the hotels, restaurants, pensions... I do not think it is not so important to put it in some other categories - old people, children... In

Romania they make buildings like this, the visitor information centre, and do not put anything inside! But this is nothing without good materials, without people. If you do not have materials for them to see, to work with, and to go in the nature... In Donau Auen National Park when I saw the children's camp, it was like a revelation for me: 'Wow! It is possible!' (M. Cacencu, personal communication, June 15, 2015).



Figure 5. The Visitor Information Centre in Crişan. Photograph: Elitsa Barukchieva, 2015®.

In relation to this, four of the interviewed tourists shared that they would like the communication between the services within the DDBR to be better. For example, more information in English, more maps, instructions, and information about the DDBR for international tourists can be provided. The website that provides information for public boat transportation, Navrom Delta (2015), is only in Romanian. It could be extremely difficult for independent tourists to travel on their own without paying for an organised tour. Cyril, a French student in Bucharest, could not even find the DDBRA building:

I think that the signs can be improved. For example, this building should be more indicated with signs. It is hidden. When I first came to the Delta, I should have come here, but I did not

because I did not see it or did not know where it was. And I came now when I am already leaving" (C. Villiev, personal communication, June 25, 2015).



Figure 6. Watchtower, Visitor Information Centre in Crisan. Photograph: Elitsa Barukchieva, 2015.



Figure 7. The view from the watchtower. Photograph: Elitsa Barukchieva, 2015®.

Do people know what a biosphere reserve is? According to the Director of the DDBRA, Bîscâ

Viorica, most of the local people know what the biosphere reserve functions are and they work together with local committees and NGOs. Additionally, they have regular meetings to spread information and they also consult different stakeholders, including tourism agencies, about the decisions they make (V. Bîscă, personal communication, June 24, 2015). The Director notes that they have a lot of brochures, there are inscriptions and signs with information about the protected areas, as well as the rules and regulations. Furthermore, they provide education programmes and activities for children:

We celebrate different events - World Environment Day, Wetland Day, Danube Day, and so on. We work together, we go on trips. The local people usually ask me, I do not meet with them in special meetings. They ask me about the laws, what is forbidden, what is not I think if I manage to develop in them love for the nature, the rest will be from the mind - knowing what is good for the nature, caring about nature. Nowadays it is important to study outside the school as well. (V. Bîscă, personal communication, June 24, 2015).

However, Ms. Cacencu says that "not many locals know English and it is difficult for the local people to educate the tourists" (M. Cacencu, personal communication, June 15, 2015). Also, according to Ms. Codreanu, not many tourists know what a biosphere reserve is (A. Codreanu, personal communication, June 24, 2015). On the contrary, a customer service representative from the Tourism Promotion Centre claims that people visiting the centre already know what a biosphere reserve is and the tour guides are local and they explain to the tourists everything about the biosphere reserve. The participant notes that only individuals who are familiar with the concept visit the centre, not big groups (CNIPT representative, personal communication, June 18, 2015).

In order to shed more light on this matter, interviews with tourists were conducted and they were asked if they know what a biosphere reserve is. The research results show that from the fifteen

interviewed tourists, three knew what a biosphere reserve was and they have known and read about it before they came to the Delta. Two of them were from Germany and gave reference to a German biosphere reserve, and one was from Austria. The rest of the participants connected their reasons to visit the Danube Delta with its natural uniqueness and attractiveness, and four of them indicated their strong desire to see pelicans and other flagship species of birds of the Danube Delta. Six people thought a biosphere reserve is a kind of area for nature protection and two visitors thought it is a nature reserve. Roman Dueckeus from Germany says that it is hard to explain in English what a biosphere reserve is (R. Dueckeus, personal communication, June 20, 2015). Four of the participants did not know that they should purchase permits for the DDBR. This suggests that the permit system is not successfully indicated and information provision for tourists is not sufficient.

Economic activities and sustainable tourism. As this article has already outlined, traditional farming and fishing are slowly being replaced by other economic activities (Price, 1995; N.Damian, 2011). As the communities in the Danube Delta are very poor (A. Codreanu, personal communication, June 24, 2015), tourism represents a very important economic activity that helps the local people to earn some additional money, above what they earn from agriculture and fishing with its reduced importance and increased restrictions nowadays. It is hard for the local communities in the DDBR to earn enough money from the traditional activities of the past. Especially the isolated communities in the areas with sand dunes in the Delta because they cannot earn enough from fishing, they are too far away from water, and they cannot do agriculture as there is only sand dune vegetation present (A. Codreanu, personal communication, June 24, 2015).

Danube Delta is a part of the so-called "unfavoured zones" in the South-East Region of Romania with a strong potential for good development but with more disadvantages for the local people, as transportation, communication,

education, work commute and health-care are challenged by lack of roads and by the deltaic ecosystems (MDRL, 2007; A. Codreanu, personal communication, June 24, 2015). According to Ms. Codreanu, the state has passed a law to help the local people from these areas, but in the Danube Delta this does not happen. Furthermore, the Biosphere Reserve does not have any doctors - the state has offered a 200 percent increase in the salary of Romanian doctors who go to live in the Delta and practice there, but no one wants to go in the isolated Delta, where access is difficult and it is more difficult for people to provide for themselves. Consequently, tourism is an economic activity of vital importance. Many local people and families, including fishermen and farmers, offer tourist accommodation and tours (A. Codreanu, personal communication, June 24, 2015; M. Cacencu, personal communication, June 15, 2015). The question arises on how tourism is promoted in such a way so that the objectives of the biosphere reserve for sustainable development and sustainable people-nature relationship can be fostered.

An issue in the sustainable tourism development is that from the 10 925 permits issued between January and June 2015, 7 885 were for fishing in the Delta, whereas only 18 were for scientific research, and seven were for educational and documentary filming and photography. This information, provided by Ms. Codreanu (personal communication, June 24, 2015), shows that ecotourism and ecological education activities and scientific research can be further developed to correspond to the biosphere reserve objectives.

The DDBRA promotes and takes measures to implement ecotourism by strategic planning, education and promotion, public involvement and support, monitoring and regulations (V. Bîscă, personal communication, June 24, 2015). In the DDBRA there is a special department that controls tourism activity in the biosphere reserve. It issues entrance permits for visiting the buffer and the sustainable development areas, and Reserve Authority inspectors periodically check all the areas for poachers and whether tourists follow the regulations. here are 31 specially designated areas

where recreational and sport fishing is allowed (A. Codreanu, personal communication, June 24, 2015). The Visitor Information Centres provide information through materials, guides, maps or indication of tourist routes within the Delta that aim to create understanding and spread knowledge about the Biosphere Reserve and its functions, and the allowed or prohibited activities. For example, the Visitor's Guide to the DDBR presents all the information about the Delta, as well as recommended and specially designed tourist routes (15 boat routes and nine hiking trails), regulations and requirements for conducting tourism in the Danube Delta. According to the Director, there are panels indicating the strictly protected areas in the DDBR, where access is forbidden (V. Bîscă, personal communication, June 24, 2015).

According to the Executive director, there are not too many tourists in the biosphere reserve, but there are boats with engines too powerful for the Delta and people that do not respect the laws:

We have got enough places to accommodate tourists... That is not the problem, the problem are the boats, the engines, the speed. That is why we try to have a special regulation for boats - a special law, which is, hopefully, coming soon. At that moment we will be able to control the speed of every boat, the location of every boat - we can find them and there will be punishment too (V. Bîscă, personal communication, June 24, 2015).

Traditions and knowledge of the local people are maintained and promoted. The Tourism Promotion Center in Tulcea advertises the cultural attractions and heritage in the Danube Delta to tourists (CNIPT representative, personal communication, June 18, 2015). The DDBRA supports traditional architecture (Figs. 8 and 9) and they have a special regulation law for buildings:

They need our approval to build something and they have to follow this regulation. The height, the colour of the roof (must be blue or green),

materials (reed), they cannot use all kinds of materials there. Also, how much of an area they can use for a building - let's say 1000 km². They cannot use more than this. The traditions are very important...This is the area where you can find big ethnic diversity - there are at least 13 nationalities and they have lived together in peace for so much time. Every nationality has its own traditions - songs, costumes, and so on, and they respect each other very much. They have coexisted peacefully for decades (V. Bîscă, personal communication, June 24, 2015).



Figure 8. A traditional house in Chilia Veche town, on the Chilia branch. Photograph: Elitsa Barukchieva, 2015®.



Figure 9. A traditional house in Crișan, Crișan village. The height cannot be more than two floors and the roof must be made of reed or green/blue wood. Photograph: Elitsa Barukchieva, 2015®.

Apart from the traditional knowledge, collaboration with local organisations and councils is developed on all levels and they consult with tourism agencies when taking decisions on ecosystem conservation (V. Bîscă, personal communication, June 24, 2015; A. Codreanu, personal communication, June 24, 2015; CNIPT representative, personal communication, June 18, 2015).

All of the interviewed tourists supported local communities. They communicated with the locals and bought local products during their stay in the Delta. Mr. Dueuckeus and his Romanian girlfriend wanted to especially go around the Delta with a small boat and they paid an old Romanian fisherman to be their guide in order to learn more things and to help the local people with additional money (Dueuckeus, 2015). Furthermore, all of the interviewees were mainly focused on nature-based activities during their stay and were staying overnight in local accommodation facilities.

Inside the Biosphere Reserve there are no places where local people sell souvenirs, except for Sulina town which is at the entrance to the Black Sea. Restaurants and dining places are scarce. Six of the tourists that were interviewed in Crișan admitted that they were hoping to find a place to eat and they could not. Two journalism students regretted that they could not buy any fish from the local people:

I have met some fishermen from the local villages (for example Mila 23) and I have talked to them. It was a time to remember. I buy from the shops - drinks and food. I wanted to buy fish, but I did not... If you know them better, they can give you fish, but not if you don't know them (J. Cimpoero, personal communication, June 14, 2015).

Therefore, it is concluded that the tourists spent their money locally, but only on organised tours, accommodation, and public transportation (e.g. ferries) along the channels (Fig.10).



Figure 10. Tourists going on a tour with a small boat with local guides from Letea village. Photograph: Elitsa Barukchieva, 2015®.

Apart from all the measures and regulations that the DDBRA implements for the promotion of sustainable and ecotourism in the biosphere reserve, there are still a lot of problems regarding the achievement of the sustainability in the relationship between people, nature, and tourists in the Delta.

Challenges

Waste management is not very well developed in the villages and localities in the Delta. Despite the fact that there has been collaboration with a company for cleaning materials that provided waste receptacles for the local people, transport to Tulcea (where waste is processed) is expensive (A. Codreanu, personal communication, June 24, 2015). A lot of garbage is left by fishermen, especially the sport fishermen (A. Codreanu, personal communication, June 24, 2015), and the tourists (M. Cacencu, personal communication, June 15, 2015).

Pollution of waters with nutrients leads to acute algae blooms in the warm season, which forms a layer on the surface of the water (DDBRA, 2015). Because of this and climate change, water is deprived of oxygen and light and this leads to the death of animals and plants (Bîsca, 2015). Another issue is the transportation; boats with powerful engines can disturb ecosystems and wildlife. Recently, a colony of birds has moved from their

living place in Murighiol village to make home in a place where the tourist flow is not concentrated (A. Codreanu, personal communication, June 24, 2015). Ms. Cacencu illustrates this with an interesting experience: " and then there are the other - they have big boats, loud music. Sometimes they come to me and ask me: 'Why don't we see any birds?', and I say: 'You are strange...'" (M. Cacencu, personal communication, June 15, 2015).

High tourist activity also disturbs wildlife and causes pollution. According to Nichifor and Covaliov (2011), individual camping in the Delta is increasing and is the biggest threat to the integrity of the delta ecosystems, even if it is practiced in areas specifically designated for this type of tourism. By 2011 there were 28 designated camping areas (Nichifor and Covaliov, 2011). However, presently, there are only three authorised camping sites (DDBRA, 2007-2017). In the Danube Delta camping is forbidden in most of the area to reduce littering (Höfer et al., 2014) and to increase control of tourist activity (Nichifor and Covaliov, 2011).

Big ships and motor boats cause waves that cause erosion and loss of riverbanks and sediments (Höfer et al., 2014). Illegal hunting and poaching are also a big threat to many species (A. Codreanu, personal communication, June 24, 2015). According to the DDBRA representatives, the biggest problem for the Reserve to achieve its objectives is lack of education, both for local people and tourists, as well as disrespecting the laws and regulations: "They want to use the most powerful engines, expensive boats, they want to see the entire Danube Delta in several hours and some of them do not care that this is a protected area" (V. Bîscă, personal communication, June 24, 2015). Such tourists do not care about the speed (M. Cacencu, personal communication, June 15, 2015)

Lack of education and respect for nature is resulting in pollution and the picking of big quantities of water-lilies, such as these on Figure 11, by Romanian tourists:

Romanians usually cause this big problem - they bring lots of water lilies with them back home to do...nothing! Because they (the water-lilies) die! And it is forbidden to pick them. Maybe it is normal to bring one, but they take a lot of them! Why? With the children we make these water lilies from paper so that we can give them instead of them picking the water lilies" (M. Cacencu, personal communication, June 15, 2015).



Figure 11. Water-lilies in the DDBR. The water-lilies are an essential part of the natural habitats in the DDBR, but also an important touristic value. Photograph: Elitsa Barukchieva, 2015®.

The DDBRA develops monitoring system and assessment of the tourism flow (V. Bîscă, personal communication, June 24, 2015). The visitor centres have monthly reports for visitors and all tourism companies need to report how many tourists they take in the Delta and for how many days and where (A. Codreanu, personal communication, June 24, 2015). However, according to Ms. Codreanu, not all of them conduct these reports. Consequently, it is hard to control the tourist flow and activity, as well as the tourism companies. For example, the report for the January-May 2015 period shows that 339 tourists in total have visited just the visitor information centres, whereas the reported tourists that visited the entire Danube Delta for this period are only 186 (172 Romanian and 14 international), which cannot be possible, says Ms. Codreanu, because at least six ships, with around 180 people each, visit

the Delta monthly and there are a lot more individual tourists.

In order to improve the monitoring and the control in the Biosphere Reserve, the Authority has implemented different strategies, such as training courses for rangers in collaboration with the DANUBEPARKS Network in 2010. They have consisted of English language course and international nature protection course in order to improve the day-to-day contact with visitors and the transfer of knowledge. Constant monitoring and research is important, because the ecosystem conditions are not static, but very dynamic (A. Codreanu, personal communication, June 24, 2015). However, there are not sufficient financial resources for training and for enough staff in the DDBR (V. Bîscă, personal communication, June 24, 2015).

Having all this in mind, it is especially hard to maintain a people-friendly and environment-friendly tourism. Despite the fact that Ms. Codreanu believes that the cruise ship tourists are not more in numbers than the individual tourist, in reality they do not practice sustainable tourism. For example, most cruise ships reach the Black Sea along the Sulina Channel and go back, which means the tourists do not travel around the Delta, do not communicate with the local people, do not buy local products or spend money locally, do not observe the nature and therefore do not acknowledge the importance of nature conservation, and understand the hardships of life in the Danube Delta (A. Codreanu, personal communication, June 24, 2015). The DDBRA does not encourage this type of tourism. The DDBRA promotes sustainable and slow tourism and such activities that bring benefits for the local people. As long as the cruise ship tourism companies arrange local tours with local guides, tourism has only positive impacts on the sustainable development of the area (A. Codreanu, personal communication, June 24, 2015).

DDBRA promotes slow tourism and sees rowing as the most suitable means of transportation for tourists (V. Bîscă, personal communication, June 24, 2015; M. Cacencu, personal communication,

June 15, 2015; A. Codreanu, personal communication, June 24, 2015). Especially interesting is the *canotca* - a new type of rowing boat that has been created by Ivan Patzaichin, a Romanian canoe champion, and his Rowmania Ecotourism Association (ROWMANIA, 2015). Since it is bigger than the canoe it can take bigger groups. However, it is not as harmful as the motor boat. It is built from local wood of highest quality in the tradition of Danube Delta wood crafts (A. Codreanu, personal communication, June 24, 2015).

Furthermore, the DDBRA believes that tourism helps the local people and brings benefits, when it is sustainable and light: "It helps because people who live there need money from something else, not only from fishing. And why not - this is a special place! We would like to have tourists here. But - respecting the laws..." (V. Bîscă, personal communication, June 24, 2015).

Among the biggest challenges that most visitors indicated were poverty, lack of communication between the different services and public institutions, and pollution. Pollution was seen as a major negative impact of tourism in the Danube Delta according to five of the visitors. One couple, a German man and a Romanian woman, was especially upset with the situation with the waste:

There is quite a lot of garbage here. We went to the other side of the houses here in Crișan and we saw so much garbage: plastic, a car, a refrigerator! Just so much. There are cows and chickens. But there is the car and the refrigerator which leave a lot of chemicals. So much garbage, we are so upset. We see a lot of places around the delta that were in garbage plastic, cans. All this is very sad. I think in two ways: in one way you destroy the nature - the fish and the birds eat the garbage and they die, and in the other way, when the garbage increases, after 10 years nobody will want to go to the Delta. It is sad from every point of view... (R. Dueckeus, personal communication, June 20, 2015).

The man thought that the most important problem is the garbage and the ignorance of the local people:

We were talking to our guide. We mentioned the garbage problem, but he just said 'Yeah, yeah'. We were by his house and there were a lot of plastic things. He surprised me because obviously he likes the nature, but...he doesn't care about it. I think the people do not think about this problem. Maybe the children need to be more educated, maybe is an important topic for the children. (R. Dueckeus, personal communication, June 20, 2015).

Even though the DDBRA claims that the local communities are involved in the decision-making and in the projects for the development of DDBR, poverty is still a huge problem, as three of the interviewees indicated. Erina, a student from Albania, shared:

I saw that in the villages people are really poor. The only thing that they do is fishing. This is good but they do not earn a lot of money from this because they do not have possibilities to sell all the fish. I think if the Danube Delta Biosphere Reserve Institution does something to help these people, this will be good. They live in a biosphere reserve with beautiful nature. A lot of people would like to have such nature around them. The people here have it, so why cannot they live better (E. Kryeziu, personal communication, June 14, 2015).

A retired German couple, travelling on a bike along the Danube has the feeling that there is a great deal of poverty and something needs to be done about it, because there are a lot of old people in the Delta: "There are different parts along the Danube: the Western part is more developed and when we came to the Eastern part we saw a great deal of poverty..." (B. Waltje, personal communication, June 18, 2015). Furthermore, Mr. Waltje shares that the cycling route along the Danube is really well maintained but when it reaches the Romanian part, the conditions are not as good, there are no signs or indications or they are only in Romanian; therefore, the cycling infrastructure could be improved.

Observational remarks and analysis: drawbacks and positive aspects in management of the DDBR

Overall, the research found that the DDBRA undertakes all measures to fulfil the criteria of the biosphere reserve designation: it focuses on nature conservation and maintaining cultural heritage, it supports opportunities for socio-economic development, it implements a management plan, monitoring, it has the three basic zones, it supports research and environmental education, and involves all stakeholders in the decision-making. The changes in the biosphere reserve concept from emphasis on nature conservation to broader sustainable development activities are visible in the Management Plan of the DDBR: actions for socio-economic development, sustainable tourism, research, and ecological education support as well as information provision and international co-operation are prioritised.

On the basis of the findings it can be suggested that the functions of the DDBR are not very well understood by visitors and by local people; therefore, the Biosphere Reserve objectives are rather separated and not convergent in the management of the DDBR. Visitors do not realise they are in a biosphere reserve or that it has special objectives, even though they know that the Danube Delta is a kind of protected area for particular species. Tourists, especially those on organized trips and tours, do not know that they need a permit for the DDBR or they do not know what the permits are for. Therefore, there are many challenges perhaps due to lack of integration between the biosphere reserve functions in the DDBR Management Plan, whereas they need to be viewed together, as an integrated whole, and disseminated among the visitors of the DDBR. As a result, there is no clear evidence how the biosphere reserve status and sustainable tourism contribute to each other and how the DDBR has functions different than that of a nature reserve in support of sustainable tourism.

At present, it is more realistic to conclude that sustainable tourism could contribute more to the dissemination of the biosphere reserve concept

and development, than it is to conclude that the biosphere reserve status of the Danube Delta contributes to sustainable tourism development. Sustainable tourism in biosphere reserves could not only help nature conservation, but also improve the lives of the local people, as shown in the case of the Danube Delta. After analysing the results from the primary data collected, potential drawbacks, but also positive aspects in the management of the DDBR could be observed, that, respectively, limit or could enhance the mutual contribution between the biosphere reserve status and sustainable tourism.

Potential drawbacks

Insufficient finances for staff and rangers in the biosphere reserve, poor control of the violations of the DDBR regulations, and tourist flow

There are training courses for rangers in the DDBR, but, as noted by the DDBRA, the financial capacity is insufficient for human resources that can improve the monitoring and law enforcement in the Reserve. For example, in one of the core areas, Letea Forest, there were visitors being transported to the area by big tourist jeep vehicles (Fig.12). Although they were on foot, they were violating the regulations by entering the strictly protected area. Moreover, despite the fact that a long fence separates Letea Forest from the buffer zone around it (Fig.13), there was no sign indicating that this is a strictly protected area, even though the Executive director highlighted that there are such signs.



Figure 12. Tourist vehicles parked at the gate of Letea Forest strictly protected area. Photograph: Elitsa Barukchieva, 2015®.



Figure 13. A fence separates the Letea Forest core area from the buffer zone. Photograph: Elitsa Barukchieva, 2015®.

The DDBR has a complex network of branches and channels. Therefore, it is important to have nature rangers to restrict the devastating effects on wildlife of illegal poaching, fishing, and violation of tourist rules. Observation in one of the core zones near Sfântu Gheorghe village, *Sacalin-Zatoane*, concluded that illegal fishing is a problem that is hard to be controlled when there are not enough rangers. Conversely, higher control of activities in the DDBR will also solve a portion of the pollution problem, caused by tourists and by local people. Moreover, the findings show that not all of the tourist companies create monthly reports of their

tourist numbers and activities, including environmental impacts.

Unsustainable mobility

Another issue highlighted is excessive tourist activity and large, powerful motor boats that disturb wildlife, cause erosion and loss of vegetation. However, rowing is too slow for people that want to see the entire Delta in a day or two. Consequently, among other reasons, motor boats dominate the DDBR waterways to detrimental effect.

As stated before, most cruise ships do not ensure that their activities are sustainable, including tourists not spending money in local businesses and interacting with the local population. Unfortunately, as a result of the predominant popularity of powerful personal boats, and cruise ship traffic, the majority of water transportation is unsustainable in the DDBR.

Insufficient development of traditional craftsmanship

Traditional craftsmanship could be turned into a tourist product. Regional products and souvenirs for tourists and the number of restaurants have the capacity to expand. A very interesting example is the making of the *canotca*, a boat-canoe combination, made of high quality Romanian wood to encourage slow ecotourism along the waterways. This initiative is not very popular and needs to be further supported.

Low level of education and respect for the rules and insufficient scientific research

The results of the interviews illustrate the local people's lacking ability to communicate in English and other languages. This can result in insufficient dissemination of information about the DDBR and lack of understanding between tourists and locals. In addition, there are a low number of permits for scientific research in comparison to those for tourism. Furthermore, according to the interview responses, pollution and picking of water-lilies, is a result of low education levels and lack of respect for the law.

Lack of familiarity with the biosphere reserve concept

Not many tourists know what a biosphere reserve is. This in part, can be attributed to a lack of information signs. While there are visitor information centres, brochures, tourist guides, and maps, they are only in Romanian. Conversely, the three tourists from Germany and Austria that knew about biosphere reserves, indicates that in these countries the biosphere reserve concept is more prevalent within education, or culture.

Positive aspects.

There are different interactive interpretation techniques and information provision methods, such as guides, brochures, leaflets, ecological education for children, interactive maps, and six visitor information centres. The DDBRA promotes ecotourism and sustainable tourism activities, such as kayaking. Furthermore, the innovation by a local canoe champion, *canotca*, is ingenious and has a strong potential to be further developed through advertising and promotion by the DDBRA, and by international ecotourism organisations. The tourism businesses and accommodation facilities, including the indigenous boats, are locally owned, small-scale, and the tour guides are local. The Danube Delta is big and there are enough accommodation facilities and zones for tourist activities without disturbing flora, fauna, and habitats. However, community-based tourism requires further development, which will boost the ethnic and cultural diversity within the Biosphere Reserve.

The results suggest that sustainable tourism in the DDBR has strong potential, however, it is challenged by many factors. The biosphere reserve objectives need to be further spread among the different stakeholders and visitors. The relationship between sustainable tourism and the biosphere reserve designation in the Danube Delta could be developed and turned into a more symbiotic relationship. Through better dissemination of information on the biosphere reserve concept, regulations and educating the importance for sustainable development of the

Danube Delta (and the whole region) will be improved. The use of terms "strictly protected areas" and "economic areas" instead of "core" and "transition" areas can help people can better understand the concepts of zoning. This is a good example for the MAB Programme to facilitate the simplifying of these terms, which could eventually eliminate the confusion around the biosphere reserve concept.

This article has shown that traditional knowledge and landscape play an important role for the management of the DDBR (e.g., transportation, economic activities, and tourism). The MAB Programme focuses on the relationship between humans and the environment. In line with this idea, the harmonious human-nature relationship depends on the traditional knowledge in society and the importance and use of landscape by each community, nation or region (German MAB National Committee, 2005). Therefore, the concepts of "cultural landscape" and "wilderness" as untouched nature (discussed below), can convey the complicated terminology of the biosphere reserve to the tourists and local people through simple description that is closer to them and can boost sustainable tourism development. On the basis of the research results and the analysis, suggestions and recommendations regarding the DDBR management and the relationship between the biosphere reserve and tourism are offered in the next section.

Recommendations

Cultural landscapes and wilderness

"Cultural landscape", as described by the German MAB National Committee (2005), is the continuous process of changing the surrounding nature by developing transport routes on water and land that use natural resources. This includes the symbolic appropriation of nature and its cultivation through artistic representations, myths, stories; wherein knowledge, religion, language, and traditions play a crucial role. In the same way, in the Danube Delta, the indigenous peoples and larger community have adapted to

the living conditions and natural resources to create cultural landscapes. Subsequently, every inhabitant or tourist appropriates this landscape by exploring the areas, by using, but also protecting and appreciating the environment and the diverse knowledge systems (German MAB National Committee, 2005).

Natural landscapes have slowly come from cultural to exploited, or "production landscapes" (German MAB National Committee, 2005). However, the need to live in the countryside and to see wild nature is growing both in the tourism industry and in the concept of the world as a whole (German MAB National Committee, 2005). The biosphere reserve concept stands for the conservation of rural areas, cultural landscapes, and of unfavourable zones, such as the Danube Delta, through more ecologically and socially oriented land use policy and through core zones in which nature can be restored to its original function and dynamics. In that sense, the wilderness concept has an interesting potential for the promotion of the Danube Delta on both national and international level.

Danube Delta is still relatively wild, such as forest landscapes in their natural state, including the wild horses and cattle. Furthermore, the dynamic river network, the ecosystems and the influence of the Black Sea have formed favourable habitats for huge biodiversity and landscape that is relatively unspoiled from infrastructure (Rewilding Europe, 2014). Under the biosphere reserve criteria, the core zones preserve the ecological integrity of the Danube Delta ecosystems and wildlife (DDBRA, 2007-2017). The harsh conditions, difficult access, and use of traditional knowledge provide the grounds for restoration of vast areas and of native species. Furthermore, these wilderness areas can attract tourists, scientists, activists, and entrepreneurs.

If the cultural landscape and wilderness concepts are added to the description of the DDBR, the biosphere reserve concept can be wisely elaborated and the Danube Delta can be the first to demonstrate this integration. In other words, the human-nature balance, which the biosphere

reserve as a model strives to achieve, can be represented by the relationship between cultural landscape (an expression of the interaction between humans and nature, of cultural and biological evolution, as described by the German MAB National Committee) and wilderness (wild or semi-wild nature that the reserve is trying to preserve and restore in the core areas). Additionally, the relationship between cultural landscape and wild, untouched areas can boost environment-friendly and sustainable forms of tourism. Sustainable tourism can contribute to socio-economic development in these cultural landscape-wilderness areas, as people - both visitors and locals - become more environmentally-sensible as a result (German MAB National Committee, 2005). It is confirmed that nature-based tourists are sympathetic to environmental issues and they are more open to learning (Wight, 2001). Furthermore, research has shown higher levels of tourist satisfaction when activities are combined with education (Orams, 1997). Last, but not least, tourism development drawbacks have been outlined in the Danube Delta, such as the decline of traditional activities and building techniques due to modern requirements, lack of jobs, tourist flow control, waste management systems, and insufficient knowledge of foreign languages. Conversely, this can be overcome when nature conservation community projects are combined with slow, small-scale, landscape, wildlife, or nature-based tourism (Koens et al., 2009).

Sustainable tourism contributes to restoring and preserving wildlife, and can further simplify the biosphere reserve concept and contribute to its dissemination. However, the three fundamental functions of the biosphere reserve need to be integrated in the Danube Delta so that they can serve an equally strong role in the sustainable development mission. If sustainable tourism is the link between the cultural landscape and wilderness, then it could also be the link between the sustainable development, conservation, and logistical functions of the DDBR. On the basis of the research results, components that further enhance the balanced relationship between the

Biosphere Reserve and sustainable tourism are recommended.

Tourist flow control and carrying capacity

One of the ways to boost sustainable tourism and to implement visitor management in the biosphere reserve is to measure the carrying capacity in the biosphere reserve. The DDBR is one of the pilot areas for measuring the carrying capacity in the protected areas along the Danube within a project (*Danube River Network of Protected Areas - Development and Implementation of Transnational Strategies for the Conservation of the Natural Heritage at the Danube River, 2007-2013*, DANUBEPARKS, 2014; DDBRA, 2007-2017). This study shows that visitor's access to nature parks in May and July must be restricted for effective preservation of flora and fauna. Furthermore, visitors' information, guidance, and education programs can encourage the awareness towards the sensitivity of wildlife and regulations (e.g. sticking to paths) are essential (Höfer et al., 2014). However, only general statements and recommendations were made as a result of this research because the evaluation of carrying capacity is based on general indicators and is made for all the parks from the DANUBEPARKS Network. Therefore, it does not take into consideration the specific characteristics of flora, fauna, and their habitats and visitors of each park and it cannot be completely accurate in assessing the carrying capacity in the Danube Delta context.

Monitoring and evaluation strategy according to the Danube Delta's individual characteristics, including regular carrying capacity studies, are needed in order to control and manage all elements in the biosphere reserve. Tourist flow control can be improved by better indicated permit purchase points, incentives for tourist companies to send their monthly business reports, and more rangers within the Biosphere Reserve. Violation of regulations for tourism in the core areas could be prevented if better indication and signs existed, as well as better co-operation between stakeholders.

Sustainable mobility

Sustainable tourism promotion in the Danube Delta was part of the TRANSDANUBE Project (2012-2014), which was a collaboration of the 10 countries along the Danube for environmentally-friendly mobility in sensitive areas and transboundary regions (TRANSDANUBE, 2014). After carrying out of feasibility studies and implementation plans, sustainable mobility solutions are integrated in the Danube Delta. For example, cycling, canoeing, electric boats, and, in addition to the existing five cycling routes, there are two new potential biking trails (TRANSDANUBE, 2014). These ideas are also illustrated by the *canotca* local project, as well as by ecotourism companies that operate in the Danube Delta.

Despite these provisions, motor boat speed violations are still an issue and need to be regulated and controlled. Bike routes in the DDBR need to be developed and improved. For a better human-nature relationship, and for the promotion of slow and sustainable tourism, special regulations for cruise ships and better regulations for water transport and speed of boats are needed (e.g., different signs for boats rather than the use of km/h instructions, or the use of kayaks, canoes or boats without motors in specified areas, as well as restricted number of cruise ships per week/month). The Executive Director of DDBRA has admitted that if only rowing is practiced there will be too many boats within the Reserve. That is why a balance between cruise ship tourism and slow tourism, such as kayaking and cycling, can be fostered. Ship-to-bike connections in the entrance (Tulcea) or exit (Sulina) points of the DDBR, as suggested by the TRANSDANUBE Project (2014), could be a possible solution. Promoting sustainable mobility and tourism and transboundary co-operation with different countries in the region and along the Danube River can be essential in encouraging sustainable development in terms of access, biodiversity protection, healthy lifestyle, research and education, and economic benefits.

Socio-economic development and use of traditional knowledge

The local people live in unique environment with diverse natural resources and they have always known ways to use natural resources in a sustainable way. Today, their traditions are slowly dying because of the historical past, the out-migration of the young population, the lack of infrastructure, health and education institutions, and restrictions related to the management of the biosphere reserve. Because of the hardship of life and the uneasy access, the local people could revive and re-create old traditions, re-use old knowledge and re-examine the sustainable use of natural resources - this could lead to sustainable socio-economic development. For example, rather than developing tourism instead of traditional agriculture and fishing, local people could diversify their traditional activities and combine production with rural, farm tourism, or cultural events and traditional agriculture festivals for tourists. Furthermore, the DDBRA can raise awareness for nature protection among the tourists by combining existing projects for species conservation and restoration (e.g. Dalmatian pelican, Danube Sturgeon, or the Letea wild horses) with ecotourism and volunteer tourism activities. For example, an international poster competition on ecological themes called *A Chance For The Blue Danube* - in partnership with *George Georgescu Arts High School* in Tulcea, is displayed in exhibitions in museums and in ecotourism centres in order to maintain the interest of the public, the tourists, and of the younger generation on the need for conservation of natural ecosystems (DDBRA, 2017). Such projects can attract the attention of tourists on the issues of nature protection (Fig.14). The bringing of traditional knowledge and the involvement of the local population are driving factors in the expansion of the biosphere reserve concept.

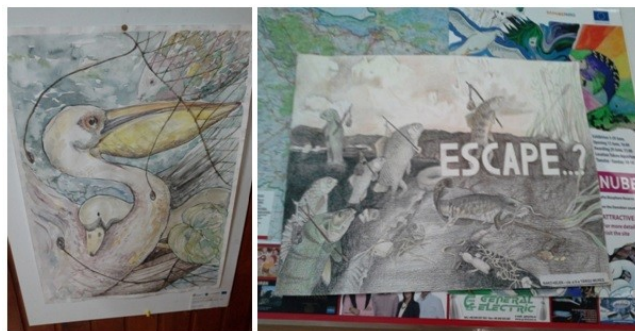


Figure 14. Participants in the poster competition "A Chance for the Blue Danube". Photograph: Elitsa Barukchieva, 2015®.

Information channel expansion can go beyond only information centres. For example, through local skills and handicrafts, markets, and workshops. The abandoned and rust-eaten watchtowers and other facilities can be repurposed and used for observation towers for tourists and educational activities, including for souvenir shops, handicrafts workshops, small museums, and ranger stations. This will promote the Biosphere Reserve and attract visitors interested in alternative tourism, but also increase benefits for local people without putting the integrity of their local culture at risk. Furthermore it will increase tourists' attention on the importance of nature conservation (e.g., donations, volunteering). Volunteering and awareness raising can increase human and financial resources for nature conservation and increase visitor satisfaction from first-hand experience and familiarity with the objectives of the Danube Delta as a biosphere reserve. And last but not least, the local involvement in these initiatives can decrease the levels of pollution and degradation of water-lilies and other species by local people.

Support for training and scientific research

Increased support for research projects and training for universities and schools can successfully disseminate knowledge on the biosphere reserve functions, and on the importance of sustainable economic development among all the stakeholders. Language courses

organised by the DDBRA in collaboration with local communities, NGO's, and representative organisations, can improve the knowledge of English. More positive contributions include, educational facilities for children (e.g., camps), for professionals, economic agents, and NGO's, as well as maps and ecological education for tourists, and training for nature rangers. Nature rangers can play an important role for the enforcement of the core and buffer zones, ecological education, and the dissemination of information about the Biosphere Reserve through different events, guided tours, presentations, and everyday contact.

In conclusion, the integrated and simultaneous implementation of all objectives can benefit not only the sustainable development of tourism but also the biosphere reserves. The integration of the cultural landscape and wilderness concepts into the biosphere reserve description in combination with the two complementary UNESCO Programmes present the opportunity for the Danube Delta to be a leading example for a biosphere reserve that is a model for sustainable development (Fig.15). If the adequate measures are adopted in achieving the symbiotic and clear relationship between sustainable tourism and the aims of the biosphere reserve status, it will not be perceived as futuristic for the Danube Delta to receive the image of the "sustainable gate" to the Black Sea.



Figure 15. Landscape from the Danube Delta where culture and wilderness meet to form a peaceful relationship.

Conclusion

The research aimed to find out whether, under the biosphere reserve objectives, tourism development, nature, and human well-being are convergent in the Danube Delta. On the whole, the results did not identify clear evidence that the biosphere reserve status of the DDBR contributes to the sustainable development of tourism. Although sustainable tourism has a great potential and the DDBRA focuses on each of the objectives prescribed by the biosphere reserve criteria, a lot of challenges are present for the environmental, social, and economic sustainability in the DDBR. The majority of the research participants were not aware of the status. This suggests that visitors in the DDBR are not very familiar with the biosphere reserve concept, even though the administrative authority has prioritized information campaigns and the dissemination of the biosphere reserve objectives.

A lack of sufficient financial resources for staff in the biosphere reserve result in poor control of the tourist flow and violations of the DDBR regulations. Pollution, lack of education, and low respect for the rules, unsustainable mobility, and low socio-economic development especially in terms of traditional activities, are also problematic for the healthy functioning of the DDBR. Conversely, the DDBRA is trying to develop ecological education activities and information provision and supports local communities for sustainable development of tourism, specifically through active domestic and international co-operation. Tourism businesses and accommodation facilities are locally owned, and while cruise ship tourism is increasing, small-scale tourism is developed and vast natural areas are still relatively wild.

The DDBRA uses different terms for the core and transition zones, such as strictly protected and economic (sustainable development) areas, that serve to simplify the biosphere reserve concept if better information signs, maps and indication in English were provided for visitors in the DDBR. On the basis of the findings, recommendations for the improvement of the relationship between the

biosphere reserve designation and sustainable tourism were suggested. Referring to the description of cultural landscapes and wilderness areas that are continuously interacting through people's resource use, traditions, knowledge, and cultural diversity (German MAB National Committee, 2005).

It is suggested that the biosphere reserve concept and its basic functions for conservation and sustainable development can be further elaborated and better comprehended if the cultural landscape and wilderness concepts are added, and sustainable tourism is the link. Being a part of the WNBR, this can contribute to economic development and market the Danube Delta as a unique destination for sustainable and ecotourism, volunteering and development of different local traditions, and natural heritage conservation projects. The components of the cultural landscape, (traditional knowledge and activities, local businesses, big ethnic and cultural diversity, transportation, community projects) and of the wild areas, nature in the core areas, native species, restoration and sustainable tourism as the balancing wheel, represent the DDBR and can improve the explanation of the basic functions of the biosphere reserve to tourists. Sustainable forms of tourism, which are happening right on the doorstep or even in the houses of local people, help to fulfil one of the main objectives of the Danube Delta Biosphere Reserve, such as educate and guide visitors so that they acknowledge and conserve nature, raise awareness about the vulnerability of the natural resources, and their sustainable use.

Why is there need for further research?

Secondary research on the evolution of the wilderness and cultural landscape concepts, including primary research on the affinity of people towards these concepts, can contribute to an evaluation of how these could be implemented in DDBR's and in other biosphere reserves tourism marketing strategies. This, as well as research on cruise ship tourism and on the specific impacts of transportation on the components of the Danube Delta; on the number, types of

tourists, and tourism companies, activities and expenditure can give clear results on the negative and positive impacts of tourism and contribute to establishing a tendency for tourism activities in the biosphere reserve.

Overall, the biosphere reserve designation and sustainable tourism can contribute to each other if the biosphere reserve concept is more comprehensive and better understood by people. As places of excellence that can be used to experiment and learn practical approaches to sustainability objectives (UNESCO, 2017), biosphere reserves should provide innovative solutions, where ecosystems, local communities, traditions and modern economies can be combined, and where technologies and policies that can help meet the 17 Sustainable Development Goals (UN, 2015). Therefore, through harmonizing cultural landscapes and wildlife through sustainable tourism, biosphere reserves can provide a solution and accomplish one of the main goals of the MAB Programme - the harmonious human-nature relationship.

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Using *Enhancing our Heritage Toolkit* for assessing management effectiveness of the Kien Giang Biosphere Reserve

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ABSTRACT: Biosphere reserves operating under the UNESCO Man and the Biosphere Programme aim to achieve three mandate management objectives of conservation, sustainable socio-economic development, and logistic support. The apparent mismatch between the biosphere reserve (BR) concept and implementation reality has led to the call for assessment of management effectiveness as part of a system to support management of sites under the Seville Statutory Framework for the Biosphere Reserves Network since 1995. We used the *Enhancing our Heritage Toolkit* developed by the International Union for Conservation of Nature (IUCN) and UNESCO to evaluate the management effectiveness of the Kien Giang Biosphere Reserve (KGBR). A lack of broad understanding for the conceptual model leads to the biosphere reserve concept being essentially an artificially constructed model with little buy-in from agencies of government and limited efforts to pursue an adequate planning and implementation process. The management system established in KGBR lacks operational funding and its staff lacks adequate knowledge of the BR model, but exhibit strong sectoral commitments that cut across the BR approach. Consequently, most of the important values found in the KGBR are ineffectively protected and managed. The case study in Kien Giang suggests that this management effectiveness evaluation tool can be used to assess performance and management outcomes of sites and assist stakeholders in adaptive planning and improving BR performance and effectiveness.

Keywords: Biosphere reserve, management effectiveness, evaluation, *Enhancing our Heritage*, Kien Giang

Introduction

The global network of Biosphere Reserves formalised under the UNESCO Man and the Biosphere Programme (MAB) from the 1970s aims to provide mechanism for balancing the needs for nature conservation and human development (UNESCO, 1996a; Ishwaran et al., 2008; Ishwaran, 2012). With introduction of the Seville Strategy in 1995, the BR concept has evolved from a primarily conservation and research focus to paying greater attention to sustainable development for the local communities (UNESCO, 1996a). Especially, since the adoption of the Seville Statutory Framework (UNESCO, 1996b), only proposed sites which comply with the requirement for clearly defined core, buffer and transition zones with a focus on fulfilling three core functions (conservation, sustainable development and logistic support) have been designated as BRs. The recent Lima Action Plan sets up strategic directions and actions for continually implementing the Seville Strategy and Statutory Framework for WBNR to 2025 (UNESCO, 2016a). There are currently 669 sites in the global network indicating that BRs are regarded as important potential models for conservation and sustainable development (Ishwaran et al., 2008;

UNESCO, 2016b). However, the recent studies (e.g., UNESCO, 2010; Ishwaran, 2012; Coetzer et al., 2013; Reed, 2016; Cuong et al., 2017b) revealed a significant concern relating to an apparent mismatch between the BR concept and practical implementation. Thus, evaluation is recognised as a crucial process to assess management progress and improve BR success and effectiveness (Stoll-Kleemann, 2005, 2010; UNESCO, 2010; Coetzer et al., 2013; Matar & Anthony, 2017).

Systems for assessing the effectiveness of management provided a vital tool for assessing how well sites were being managed and to provide an informed base for adaptive management (Hockings, 2003; Cook et al., 2014). Management effectiveness evaluation (PAME) began to be applied to protected areas in the mid to late 1990s (Hockings et al., 2000; Hockings, 2003) and it has now become an important tool to monitor management systems, provide for adaptive management, and assess conservation outcomes (see e.g., Cook et al., 2014; Coad et al., 2015). Because the BR concept has originally evolved from PA approach (every BR must have one or more PAs as the core area in designation) (Ishwaran, 2010), it is a necessary to undertake progress assessment to ensure that all designated sites under the WNBR are being managed in compliance with the concept model and international criteria for BRs (Price, 2002; Price et al., 2010; Reed & Egunyu, 2013). Thus, the Statutory Framework for WNBR approved by the UNESCO conference in 1995 (UNESCO, 1996b), calls for assessment of management effectiveness as part of a system to enhance management of sites within the world network through a system of periodic reporting. The primary aim of such periodic review is to assess achievements of site management relating to the three core functions of BRs and explore learning opportunities at both national and international scales (Price, 2002; Price et al., 2010). Evaluation can also provide information from site management that can inform planning and decision-making processes and generate lessons learned at national and global levels (Bertzky & Stoll-Kleemann, 2009; Price et al., 2010; UNESCO, 2010; Reed & Egunyu, 2013). However, periodic reports often lack indicators that support evaluating BR performance and management effectiveness because they mainly focus on assessment of the zonal compliance of

sites under the Article 4 of the Seville Statutory Framework (Price, 2002; Lotze-Campen et al., 2008; UNESCO, 2010; Matar & Anthony, 2017).

In this article, we used the Enhancing our Heritage (EoH) Toolkit developed by IUCN and UNESCO for assessing management effectiveness of natural World Heritage Sites (Hockings et al., 2008) to (1) evaluate the performance and management effectiveness of the KGBR, (2) test PAME methods in BRs and examining how systemic BRs issues identified in the literature play out at the site level, and (3) recommendations on using management evaluation to improve BR performance and effectiveness.

Method

Study area

The study site was KGBR and located in the Mekong Delta. Its coordinates are 9° 24'0.75" and 10°31'45.54" North latitudes, and 103° 44'23.64" and 105° 19'48.28" East longitudes. KGBR was created in 2006 and under direct management of the Kien Giang Provincial People Committee (PPC). Designation of the BR was based on the expansion of three existing core areas (U Minh Thuong NP, Phu Quoc NP and Phu Quoc Marine PA, and Hon Chong-Kien Luong PA) and their mandated buffer zones to the wider landscape that encompasses over 200 km of provincial coastline, marine, islands, and nearby mainland. The total area of the KGBR is 1 118 105 ha and includes 3 zones; core zone (36 935 ha), buffer zone (172 578 ha) and transition area (978 592 ha).

Management effectiveness evaluation

The framework for evaluating management effectiveness originally developed by the International Union for Conservation of Nature (IUCN) World Commission on Protected Areas includes six key elements for evaluation of the complete management cycle: context, planning, inputs, processes, outputs, and outcomes (Hockings et al., 2004). Ninety-five methodologies have been developed and applied in evaluation for both global PA systems and approximately 18 000 individual

sites (Coad et al., 2015). One of the most detailed evaluation methods, UNESCO's Enhancing our Heritage (EoH) Toolkit, was designed for assessing effectiveness at the site level (Hockings et al., 2008; Hockings et al., 2009). EoH was developed by UNESCO and IUCN in 2001 and piloted in nine natural World Heritage sites in Africa, South Asia, and Latin America (Hockings et al., 2008), and has subsequently been applied in a number of other natural World Heritage sites around the world (Coad et al., 2015). The EoH Toolkit consists of twelve assessment tools that uses quantitative and qualitative data to understand key site values and threats as well as develop a rich understanding of management strengths and weaknesses. It was designed to directly aid site managers in improving their management strategies and practices (Hockings et al., 2008; Hockings et al., 2009; Stoll-Kleemann, 2010).

Data collection and analysis

EoH guidelines and worksheets were downloaded online from website <http://whc.unesco.org/en/eoh> and translated into Vietnamese prior to the field visit in Kien Giang. The information used for management effectiveness evaluation of the KGBR was compiled from document analysis, meetings with 5 key members of the Kien Giang Biosphere Reserve Management Board (BRMB) and a final participatory workshop with managers and stakeholders.

The management effectiveness evaluation process started with initial meeting between the principal researcher and key members of the BRMB in January 2014. EoH toolkits were briefly introduced and handed over to key managers of BRMB during the meetings. At this stage, all publications, official reports, and data from research and monitoring studies relating to KGBR were collected. The management effectiveness evaluation and EoH toolkits were officially presented at the KGBR workshop in February, 2014. The summary of EoH and evaluation tools was also included in the monitoring and evaluation section of the Action Plan for KGBR (Cuong et al., 2014).

The reports and documents collected in Kien Giang

were reviewed by the principal researcher and KGBR Operating Office staff and relevant evidence was transferred to the worksheets. A provisional assessment based on this evidence was then developed by this group. In April 2016, the principal researcher organized five meetings with the key people from BRMB including vice standing director, chief officer of the BRMB, vice director of U Minh Thuong (NP) and Phu Quoc Marine PA and director of Hon-Dat Kien Ha Forest Protection Management Board. Each meeting lasted approximately three hours where the preliminary assessment was discussed, additional evidence was added to the worksheets in advance of the final workshop.

Twenty people, including two representatives from local community in Hon Dat who had good knowledge and experience related to the management of the KGBR and who had already been involved in previous discussions and the management effectiveness evaluation training workshop participated in one-day participatory workshop in Rach Gia. Participants used the initial worksheets and information to discuss, change or validate, and add additional information to complete the evaluation facilitated by the principal researcher. Information collected from the meetings, field observations and participatory workshops was synthesized and analyzed using the six elements of the management cycle as outlined in the IUCN-WCPA framework.

Results

Six elements of the IUCN-WCPA framework were summarized in the Table 1. The study revealed a low overall performance and management effectiveness in KGBR. Although the BR values, threats, and management objectives were identified and agreed by stakeholders, the practical planning and management of the KGBR was hindered by the lack of legal status, low priority in the provincial management framework, and lack of stakeholder engagement with the BR approach. The designation of site theoretically followed the landscape approach, but exhibited weak integration and connectivity due to the

the predominance of sectoral planning and management being confined to administrative boundaries. There were inadequate efforts and commitment to complete the BR planning process. Consequently, no official work plan exists which,

coupled with inadequate capacity staff and operational resources, meant that management was hindered. This in turn, limited the achievement of desired outcomes and reduced overall management effectiveness.

Table 1. Summary of management effectiveness assessment results

IUCN-WCPA element	EoH tools	Key issues	Data sources	Required follow up actions
Context	Tool 1: Biosphere reserve values	<ul style="list-style-type: none"> • Incomplete biological and social survey • Non-existence of the systematic information at the BR level • Most information is not up to date • Unshared information between institutions, departments and agencies 	Kien Giang PPC, 2005; Dang, 2009; Cuong & Dart, 2011; Carter, 2013; Hai, 2013	<ul style="list-style-type: none"> • Set up a system to compile and update information • Set up mechanism for information sharing and exchange across the BR stakeholders • Conduct new studies to collect information gaps • Update management objectives
	Tool 2: Threats to the BR	<ul style="list-style-type: none"> • KGBR is facing 11 key threats deriving from human activities and climate change 	Dang, 2009; ADB, 2011; Carter, 2013; Cuong et al., 2014; Mateo & Garforth, 2014	<ul style="list-style-type: none"> • Set up clear indicators to monitor the change of threats and conditions
	Tool 3: Stakeholder relationship and engagement	<ul style="list-style-type: none"> • Lack of understanding and engagement in BR approach from provincial stakeholders, communities and industry 	Cuong & Dart, 2011; Cuong et al., 2014	<ul style="list-style-type: none"> • Improve stakeholder awareness and understanding about the role and benefit from having BR • Engage local people and industry in BR planning and management
	Tool 4: National and provincial management context	<ul style="list-style-type: none"> • BR has weak national legal position • There was a weak integration BR approach in the provincial socio-economic and sectoral plans 	Cuong et al., 2017a; Evaluation workshop	<ul style="list-style-type: none"> • Improve legal position and creditability of the BR through integration into the provincial socio-economic and sectoral planning processes and management plans
	Tool 5: Management planning	<ul style="list-style-type: none"> • Incomplete planning process 	UNESCO Hanoi, 2013;	<ul style="list-style-type: none"> • Revise BR Action Plan and obtain PPC approval

IUCN-WCPA element	EoH tools	Key issues	Data sources	Required follow up actions
Plan		<ul style="list-style-type: none"> • Low priority BR planning and management 	Evaluation workshop	<ul style="list-style-type: none"> • Develop annual plan and funding based on the approved Action Plan
	Tool 6: BR designation and planning	<ul style="list-style-type: none"> • Small core areas • Low integration and connectivity among 3 zones due to predominance of sectoral planning and administrative boundary management 	Carter, 2013; Evaluation workshop	<ul style="list-style-type: none"> • Improve stakeholder participation and collaboration in BR planning. • Improve knowledge of ecosystem approach for managers and staff, and encourage them to apply in practice
Inputs	Tool 7: Management needs and inputs	<ul style="list-style-type: none"> • Very limited contribution (time and effort) from BRMB • Lack of staff capacity • No BR operational fund 	Annual reports (Kien Giang BRMB, 2012, 2013, 2014, 2015, 2016)	<ul style="list-style-type: none"> • Improve management capacity for BRMB and staff • PPC allocates operational funding for BR • Sectors assign staff working with BR office
Process	Tool 8: Management process	<ul style="list-style-type: none"> • Inadequate capacity to manage the system and reporting process 	Annual reports (Kien Giang BRMB, 2012, 2013, 2014, 2015, 2016); Evaluation workshop	<ul style="list-style-type: none"> • Develop annual work plan • Set up monitoring and evaluation system • Improve reporting system and use for adaptive planning and management • Improve management capacity and communication.
Outputs	Tool 9: Assessment of management outputs	<ul style="list-style-type: none"> • Low management progressing • Ineffective managing and conserving BR values 	Annual reports (Kien Giang BRMB, 2012, 2013, 2014, 2015, 2016);	<ul style="list-style-type: none"> • Improve management capacity to improve delivery services. • Improve law enforcement • Develop standard indicators to measure management outputs
	Tool 10: Site output indicators	<ul style="list-style-type: none"> • No standard indicators set up to measure management outputs 	Evaluation workshop	
Out-comes	Tool 11: Assessing the outcomes of management	<ul style="list-style-type: none"> • No monitoring and evaluation (M&E) tool for assessing the management outcomes • Most of key ecosystems are deteriorating or in a degraded condition 	Dang, 2009; Long et al., 2011; Johnstone, 2013; Van & Lam, 2013	<ul style="list-style-type: none"> • Increase investment in ecosystem research and restoration • Set up new PAs to increase level of ecosystem protection • Develop and implement regular M&E at PA and BR.

Context

Biosphere reserve values. KGBR has a rich and significant biodiversity, many historical heritage sites, and cultural values and events (Kien Giang PPC, 2005; Dang, 2009; Carter, 2013; Vietnam Sustainable Tourism Institute, 2013). However, most of the information relating to biological values, socio-economic conditions, and human population in the KGBR has not been systematically updated since 2005 when the KGBR was designated. Some more recent information exists, but it is often kept by different departments and agencies and used internally. The biological information of the BR is mainly available at site level of the NPs and where the research efforts have been focused. Recent efforts to compile biodiversity information at the BR level were only for vascular plants, terrestrial vertebrates (mammals, birds, reptiles and amphibians), coral reefs, and sea grass. There is some data on threatened species but with Table 2. Key threats to KGBR

very little detail on their population sizes and ecological processes due to the lack of a monitoring and evaluation program (Appendix 1).

Threats. The study identified 11 key threats affecting to KGBR management objectives (Table 2). Ten out of eleven threats were identified at site level of NPs and PAs while eight threats were found in buffer zone and transition area. Most identified threats in KGBR come from economic and development activities. Habitat loss and degradation due to economic and infrastructure development, forest fire, and climate change were the three most significant threats to the biological values of the KGBR. Although illegal hunting and wildlife trading was a low threat, it is occurring across the BR (Appendix 2). Many species including endangered species such as dugongs, sea turtles, sea horses, pangolin, and reptiles are subject to illegal hunting and trading (e.g., Stuart, 2004; Giles et al., 2005; Hamman et al., 2006; Hines et al., 2008; Dang, 2009; Nuwer & Bell, 2014)

Threats	Existing Core areas				PAs in planning			Buffer zone and transition area	Rating level of threat*
	U Minh Thuo NP	Phu Quoc NP	Phu Quoc MPA	Kien Luong PA	Phu My Gras s-land	Lime-stone crops	Dong Ho lagoon		
Habitat loss and degradation	x	x	x	x	x	x	x	x	High
Forest fire	x	x		x				x	High
Climate change	x	x	x	x	x		x	x	High
Limestone quarrying						x			Medium
Coastal erosion								x	Medium
Inappropriate and over fishing			x				x	x	Medium
Pollution		x	x				x	x	Medium
Heritage degradation	x	x		x				x	Low
Illegal poaching and wildlife trading	x	x	x	x		x		x	Low
Illegal land encroachment		x			x		x		Low
Invasive species	x	x					x		Low

* Low: 10 percent or less of the value is threatened; Medium: 11-25 percent of the value is threatened; High 26 – 75 percent of the value is threatened; Very high: 76-100 percent of the value is threatened.

Stakeholders and their engagement. Nine key groups of stakeholders directly involved in planning and management of the KGBR were identified (Table 3). Using rating system with 4 levels (very good, good, fair, and poor), we found that the stakeholder engagement in Kien Giang was generally weak (Appendix 3).

Table 3. Stakeholder engagement in KGBR

Stakeholders	Stakeholder engagement values		in biosphere reserve		Overall rating
	Biodiversity and natural values	Heritage and cultural values	Economic development	Environmental education and research	
Province People Committee	Fair	Fair	Good	Fair	Fair
District and Commune People's Committees	Fair	Fair	Good	Poor	Fair
Kien Giang BRMB	Fair	Fair	Fair	Fair	Fair
Provincial departments	Fair	Fair	Fair	Fair	Fair
NPs, PAs and FPMB	Good	Fair	Fair	Fair	Fair
Enterprises	Poor	Fair	Fair	Poor	Poor
Local People	Poor	Poor	Fair	Poor	Poor
Socio-political organisations	Fair	Poor	Fair	Poor	Poor
Projects, NGOs	Good	Fair	Fair	Good	Fair
Education and research institutes	Fair	Fair	Fair	Fair	Fair

* Poor: 25 percent or less of the aspects of the relationship is positive; Fair: 26-50 percent of the aspects of the relationship is positive; Good: 51-74 percent of the aspects of the relationship is positive; Very good: More than 75 percent of the aspects of the relationship is positive.

Five group provincial stakeholders directly involved in BR management and their engagement was rated at “fair” level. Although the Management Regulation for KGBR requests all relevant stakeholders collaborate with BRMB to coordinate and facilitate BR activities through integrating sectoral plans and activities in the BR planning, the study revealed inadequate commitment of stakeholder to follow through in practice. The level of stakeholder cooperation in BR management varies depending on their understanding of the role of the BR approach and the engagement of the PPC

Vice Chairman who is the chair of the Management Board (Cuong, pers. obs. since 2009).

Local people and socio-political organizations², and business enterprises were identified as the key natural resource users but their engagement in BR planning and management was poor.

The large population (c. 735 000 people) and local enterprises living in the buffer zone and transition area directly exploit and use natural resources (land, water, forest, and marine area) and ecosystem services in production and generating incomes activities. Although they are considered as key audiences needed for threats management and

² Women Association, Farmer Association, Youth Union, and Veteran Association

maintenance of the KGBR values, the dominant practice of the top-down and state control approach devalues their role in BR planning and management.

External projects and NGOs provide technical and finance support to the provincial authorities and local communities in awareness raising, capacity building, biodiversity conservation, and livelihood development. Except for the conservation and development of the KGBR project (GIZ/DFAT project) that provided large scale technical support other development projects tended to focus on a limited area with specific intervention and thematic targets. There was no long-term engagement of these projects in BR planning and management.

Universities and research institutes undertake their research and studies using different funding sources in the NPs, PAs, and BR. Information and scientific evidence from studies assist in planning and decision making that improves natural resource management. However, the current communication and contact relating to research and scientific studies is often made between researchers and their organization with the NP, PAs, or other departments rather than with BRMB or BR office. Except for the studies using funding from the province, not many researchers/institutes return their reports and findings after finishing their studies. There was no formal agreement or partnership established between BRMB and research institutes and universities in supporting BR management.

National and provincial management context. The BR approach was initiated in Vietnam starting in 2000 to promote biodiversity conservation, sustainable development, and scientific research and environmental education. In contrast to the PA system, BRs have not yet legally recognised in the national laws and management framework in Vietnam. In addition, there was unclear management structure for the BR system at the central level that led to the governance structure and policy applied in BR management varies from province to province (Cuong et al., 2017a).

In Kien Giang, the BR is under the direct management of the Kien Giang PPC. The province sets up a BRMB to facilitate the BR approach through coordinating relevant sectoral activities under the umbrella of the five-year provincial socio-economic development plan (2016-2020) that established target of 14 percent economic growth rate and forest cover increase from 8.5 percent in 2015 to 14 percent by 2020 (Kien Giang PPC, 2015). In supporting this master socio-economic development plan, all departments and provincial agencies are implementing their sectoral and other related strategic plans in line to the central ministries. The study identified at least 26 official plans including socio-economic development for province and (10) districts, land use plan, and sectoral development that are relevant to BR operation and management (Appendix 4). However, all of these plans were developed and managed without any acknowledgements and linkages to the BR.

Designation and planning

KGBR is the second largest BR in Vietnam and its designation conforms to the Seville criteria. The BR delineates a core zone with legal management under the national laws and overlap with other international designations (e.g., Ramsar site and ASEAN Heritage Park in case of U Minh Thuong NP) and a buffer zone and transition area. Although the core areas play the main role in conserving the last remaining ecosystems, species, and ecological processes, these parks are too small for ecosystem integrity and isolated from each other in the large production area with high economic growth demands (Figure 1). Additionally, establishment of the buffer zone and transition area aims at creating a buffer protection area for the core zone and connecting fragmented NPs and PAs across the landscape. In fact, there was a weak integration and connectivity among the three zones of the BR that allows for application of the ecosystem approach.

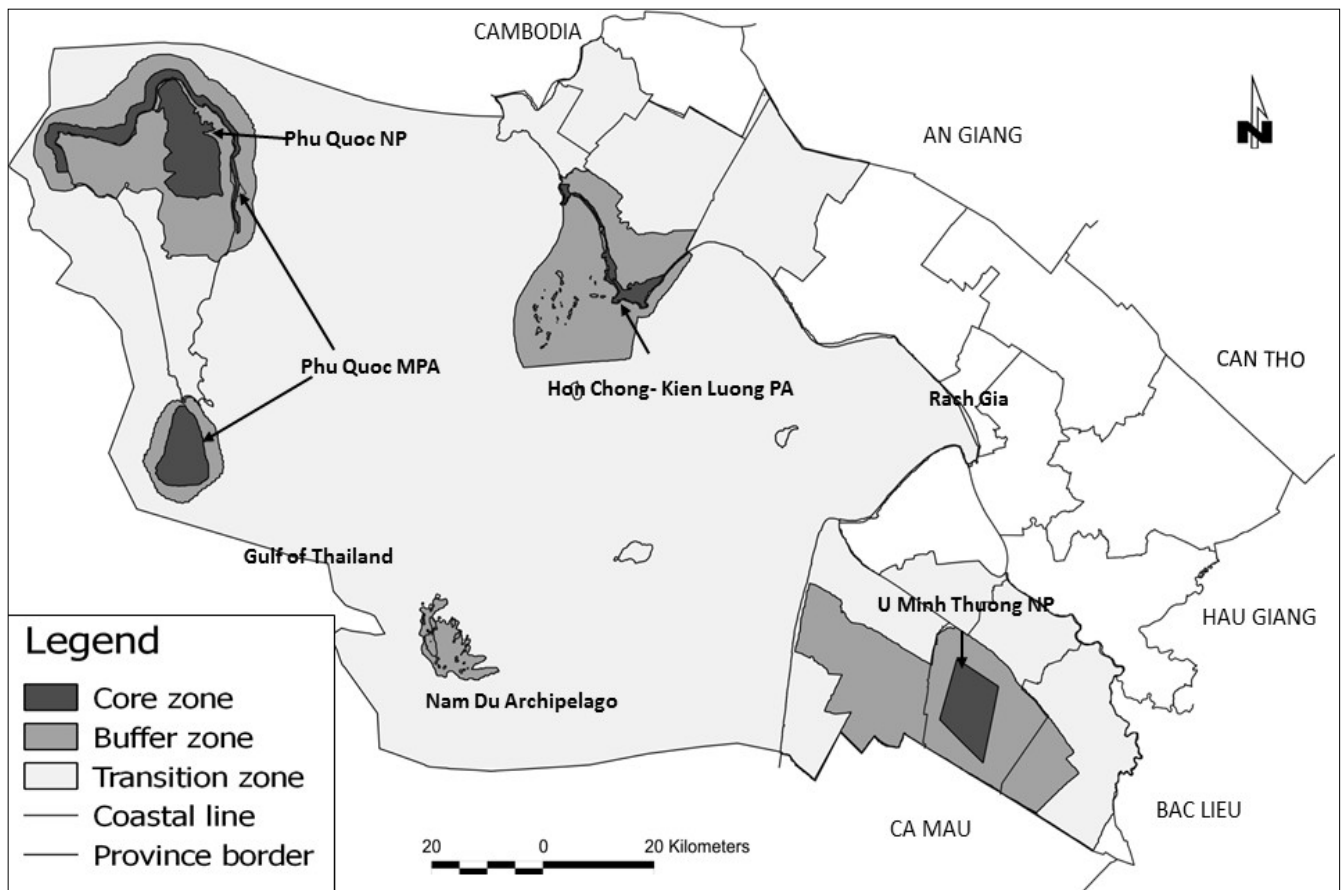


Figure 1. Designation of the KGBR

It appeared an incomplete planning process even though the Action Plan for KGBR has been developed since 2014. The Action Plan clearly identified values of the site, threats, and the set of nine action programs (Management policy, awareness and capacity building, improvement of cross-sectoral planning and collaboration, biodiversity conservation, livelihood improvement, scientific research, international cooperation, BR finance mechanism, and climate change adaptation) that mainly based on the information and lessons learned from implementation of the GIZ/DFAT project. It also identified the need to develop and undertake a monitoring and evaluation system for whole KGBR and its core areas (Cuong et al., 2014). However, the Plan did not quantify human resources, operational funding, and specific funding sources required to deliver actions and achieve management objectives. Strikingly, the Plan has not yet become officially approved by PPC for implementation (Appendix 5).

Management inputs

The recent BR activities are coordinated by the BRMB that includes 29 members who only have good education background and skills relating to sectoral and administrative state management. The actual contribution from BRMB to BR operation and management is limited due to working for KGBR in part-time and unpaid roles.

The BR Operating Office nominally has six permanent positions, five of which are actually employed (Table 4), including one chief office (Information Technology), two technicians (one Forester and one Fishery staff), one administrator (English education background), and one accountant. Most of BR office staff have limited BR management capacity and working experience, particularly the communication, engagement, and fundraising skills. BR staff are not active and have little effort in communicating and building

partnership with provincial departments and other stakeholders for funding and support (Kien Giang DARD manager, interviewed June 2014).

Table 4. Staff and funding for KGBR

No.	Items	Requirement	Actual
Human resources			
1	Number of permanent staff	6	5
Annual PPC funding for BR (Million VND)			
2	Management and administration	600	400
3	Biodiversity conservation	500	0
4	Livelihood development	600	0
5	Training, environmental education	200	0

There was no operational funding allocated from Kien Giang PPC for implementing BR activities even though it was repeatedly highlighted in all annual reports since 2011. Table 4 shows that the only two thirds of funding requirement (600 million VND or 28 000 USD) for BR administration (staff salary, payment for electricity, water and stationary of the office, and travel allowance for BRMB members when attending BR meetings) are allocated from provincial budget. Strikingly, no PPC and sectoral funding has been allocated for operating activities to improve BR functions. PPC, provincial departments, NPs, and PAs are struggling to find enough funding and resources to achieve their obligation tasks and targets, so it is unrealistic to ask for additional funding and staff support for BR activities (Kien Giang DARD senior planner, interviewed January 2014).

² Department of Science and Technology in charges in BR administration and scientific study in the BR, Department of Agriculture and Rural development in charges in forest, biodiversity conservation and livelihood improvement;

Management process

Twenty nine indicators were used to evaluate management process in KGBR. Apart from the site values, almost criteria belonging to four management themes of management structure and system, resource management, management and tourism, and management and communities) were rated as fair or poor (Appendix 6). This result showed a lack of capacity to manage the system in KGBR. Annual work plan criterion of the EoH was rated as poor because in contrast to most core areas (U Minh Thuong and Phu Quoc NPs, and Phu Quoc MPA), KGBR is currently operating without an annual plan. Similarly, there was no evaluation and monitoring system for the BR in place, even though some monitoring activities are being taken in the NPs and PAs mainly by projects and scientists.

Management structure and system. BRMB is chaired by a PPC vice chairman, but the actual BR administration and coordination falls in the Department of Science and Technology Director who will cooperate with other members, particularly three other vice chairs of the Board from key provincial departments and agencies³ to undertake specific BR management topics that fit to their sectoral management responsibilities. The BRMB only organizes one or two meetings annually and often integrated as part of GIZ/DFAT project's planning workshops. The study revealed a weak management structure due to unstable leadership and weak commitment and accountability from departments and agencies. BR management is perceived to be shared responsibility by all BRMB members and their agencies, but it actually is nobody's business (Kien Giang DARD manager, interviewed June 2014).

The lack of a work plan, and absence of M&E data did not allow assessment of BR implementation. The BRMB has produced annual reports since 2012, but they only contain the minimal annual reporting requirements from PPC and national MAB Committee, and are not useful for constructive

Department of Culture, Sport and Tourism in charges in tourism promotion and development and BR branding, Kien Giang Union of Friendship Organization in charges in fundraising and external cooperation.

assessment, and adaptive planning and management.

Indicators 10 to 12 (Appendix 6) are regarded as indicating low empowerment of staff in BR planning and management because they can only participate in discussions of some stages of planning process but not involved in final decision. Staff trainings and personnel management provision were also inadequate due to the irregular BR

activities, unclear staff task assignment. Lack of regular maintenance plan and resources led to generally inadequate maintenance of equipment and basic infrastructures in the parks and BR.



Figure 2. Infrastructure and sign boards with inadequate maintenance

Resource Management. Indicators 15, 18, and 19 (Appendix 6) revealed an ineffective resource management in KGBR. Weak law enforcement coupled with lack of alternative livelihood options for the local people living in the buffer zone consequently led to illegal access to the protection areas for hunting, fishing, and exploiting resources. The study revealed little effort and investment in inventory of the marine resources. Information on the key critical habitats, ecosystems, and

threatened species has not been updated to support effective planning and decision-making. Requirements for management of the key habitats, ecosystems, and threatened species are highlighted but there is a lack of human capacity and resources investing in conservation and restoration.

Management and tourism. Diversity of the natural landscapes, historical and cultural value, and local lifestyle associated the canal system attracts approximately 6 million visitors⁴ to Kien Giang in

³ Domestic, low-end tourists occur approximately 97 percent of the total visitors

2015 (Kien Giang PPC, 2015; Kien Giang DOCST, 2016). However, the tourism potentials, especially the ecotourism and BR branding based products and services are under exploitation due to weak tourism management and inappropriate investment strategy (see indicators 20 to 23 in Appendix 6 for further information). Besides the recent inadequate visitor facilities and services, the imbalanced investment in tourism infrastructure development with roads and associated concrete tourism facilities poses high risk to biodiversity and natural values in Phu Quoc and Dong Ho lagoon (Cuong & Dart, 2011; Carter, 2013; Tran, 2013). In contrast, many historical sites associated with typical local lifestyle and cultures in the mainland have not received proper investment in exploitation for revenues and benefits (Carter, 2013). Additionally, there were few efforts to enhance visitor experience and site values through providing essential information in the visiting sites and the main contact between site managers and tourism operators is about the matters of access permission to the parks and entrance fees. There was a limited environmental education program to improve awareness for visitors and local people. The visitor management systems were only partially effective in controlling access to the parks in accordance to the laws and regulations.

Management and communities. Indicators 25 and 26 (Appendix 6) indicated that the local communities, including ethnic minority people have not yet involved in BR planning and management decisions. Additionally, the Action Plan for KGBR highlighted the needs to improve local people's awareness, livelihood essentials, and preservation of the local cultural values, but only a few activities were designed and undertaken. The study also revealed a limited effort and motivation from BR Operating Office to improve communication and establish a strong partnership with local communities and industry.

Management outputs

Active management of the site as a BR is limited. Although the Action Plan for KGBR proposed 40 activities for implementation in 2014 and 2015,

only five percent were completely implemented with a further 30 percent in progress. 60 percent of the total planned activities were not started. Two activities (five percent) relating to BR international cooperation were cancelled because there was no further support from GIZ/DFAT project (Figure 3).

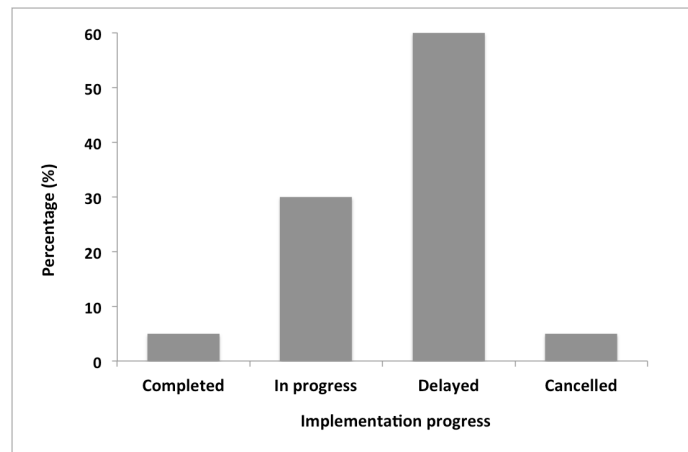


Figure 3. Management progress and outputs of the KGBR in 2014 and 2015

The most significant output under the nine areas in the Action Plan framework was management policy where the Management Regulation for the KGBR was prepared in 2014 (Figure 4). There was some progress in conservation and livelihood improvement but the activities under two these programs were undertaken by provincial departments and agencies. In contrast, scientific research, BR finance, and international cooperation revealed little progress.

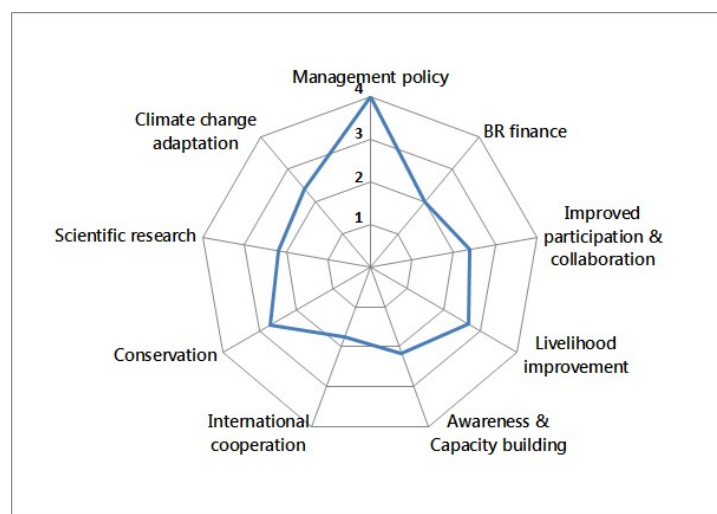


Figure 4. Management outputs of the KGBR in 2014 and 2015 (1= activities were cancelled; 2= activities are delayed; 3= activities are in implementation; 4= activities are completed).

Management outcomes

Core area coverage. The BRMB is recently cooperating with relevant departments to expand the core area through declaration of the last section of Phu Quoc NP (in the BR core zone). There has also been progress in establishing new PAs to provide legal protection of significant ecosystems and species in the KGBR, such as Phu My Habitat and Species PA, in 2016 which will support to protect the remaining grassland ecosystem and provide homeland for migratory threatened Sarus Cranes (*Grus antigone*). Additionally, Kien Luong limestone outcrops and Dong Ho lagoon are planning for establishment of new PAs by 2020 (Figure 5). However, due to the small and fragmented core areas⁵, which are surrounded by a large population with high economic development demands, the long-term integrity of these protected ecosystems, species, and associated ecosystem services are unlikely (Carter, 2013).

Biodiversity health. Lack of systematically monitored information and indicators prevented a detailed quantitative analysis of management progress in KGBR. The available information from studies and monitoring reports, and stakeholder workshop only allowed assessing the current condition of seven key ecosystems and it revealed a fairly weak conservation picture in KGBR (Table 5). Only Melaleuca wetland in U Minh Thuong NP was rated as good and its condition is improving as the result of the strong support from GIZ/DFAT project and investment from central government and province in improving water management practice applied since 2009 (Cuong & Dart, 2011; Thang, 2013a, b). Table 5 shows that without an increase investment in management and restoration, three ecosystems of coastal mangrove forest, primary and secondary broad-leaf forest in Phu Quoc NP, and seasonally-inundated grassland in Phu My PA will face potential degradation and loss. Particularly, coral reef and sea grass in Phu Quoc MPA, Dong Ho lagoon and limestone outcrops in Kien Luong are being degraded from excess harvesting of marine life, destructive fishing, limestone quarrying, the expansion of shrimp production, land reclamation for tourism and urban development, and water pollution.

⁴ Although there is no quantitative guidance and indicator from UNESCO about the BR zonal partition, Lourival et al. (2011)

recommended a minimum of 17 percent of the BR to be allocated in the core zone to meet conservation requirement. In fact, only 3.2 percent of the BR area is designed as core area in Kien Giang.

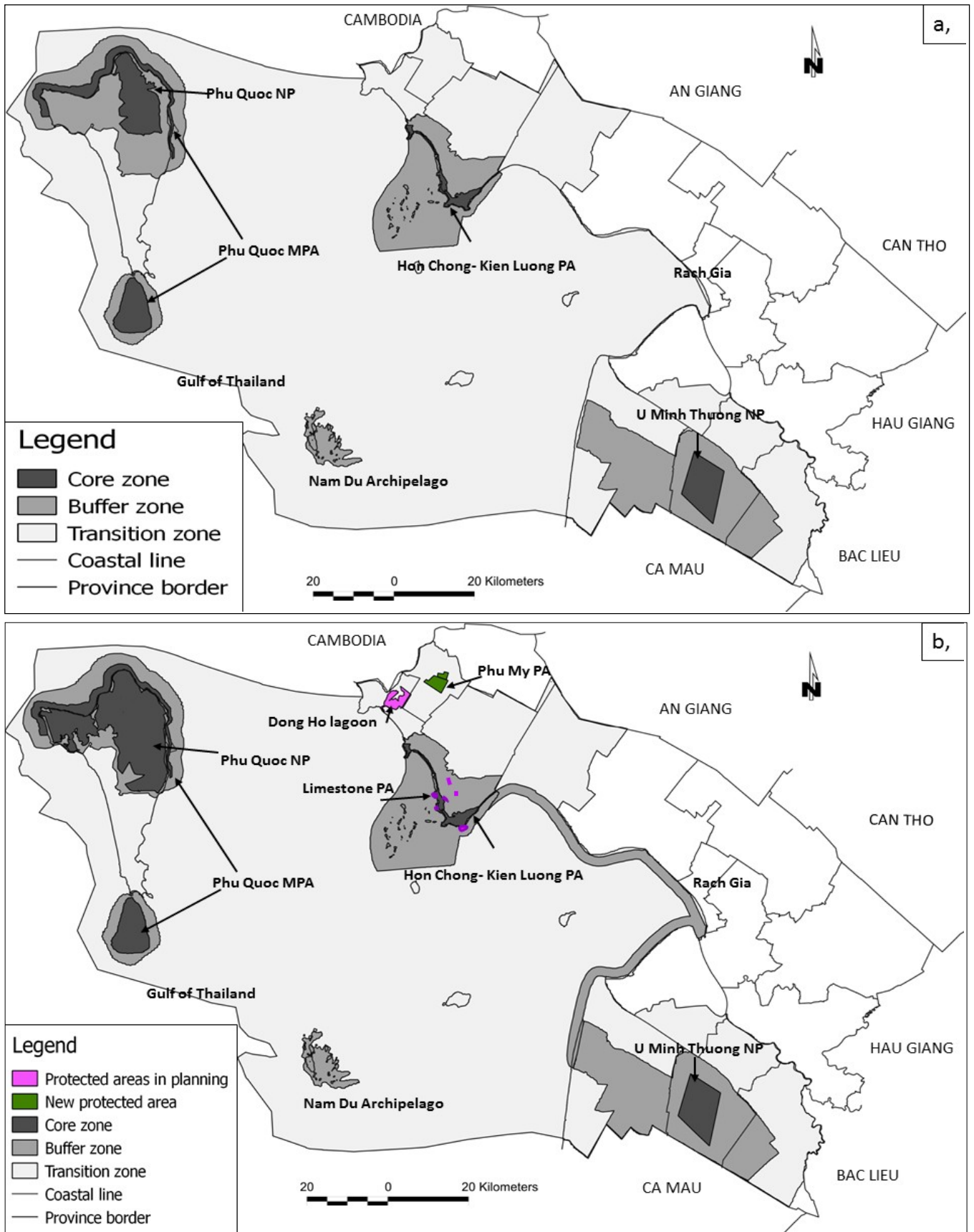












Figure 5. Changes of the core and conservation area in KGBR between 2006 (a) and 2016 (b)

Table 5. Ecosystem health in the key management sites of the KGBR

Key management sites and ecosystems	Size rating	Rating *	Data sources	References	Management intervention
U Minh Thuong and wetland Melaleuca forest	Good		Qualitative	Cuong & Dart, 2011; Thang, 2013a,b	Investment in forest fire prevention and fire fighting
Phu Quoc NP and primary broad-leaf forest with dominance of Dipterocarp (Dipterocarpaceae)	Good		Quantitative	Dang 2009; Cuong & Dart, 2011	Improvement of law enforcement to prevent illegal land encroachment and access to the park
Phu Quoc MPA and coral reef and sea grass	Fair		Qualitative	Long et al., 2011	Increase investment in site management Staff capacity; improvement of law enforcement; effectively control tourism activity
Kien Luong limestone outcrops	fair		Quantitative and qualitative	Van & Lam, 2013	Set up PA to increase level of habitat protection
Phu My grassland	Fair		Quantitative and qualitative	Truyen et al., 2014	Improve habitat management
Dong Ho lagoon	Fair		Quantitative and qualitative	Tran, 2011; Johnstone, 2013	Set up PA to increase level of habitat protection
Coastal mangrove protection forest	Fair		Quantitative and qualitative	Cuong et al., 2015	Investment in coastal reforestation and erosion protection

 Good and condition is improved;  Developing concern and condition is unchanged  Condition is deteriorating

Discussion

Our case study findings in Kien Giang provided an example of the challenges encountered in effectively implementing the BR model in Vietnam. The lack of basic information on site management together with a consistent monitoring and evaluation system is identified as a common challenge for assessing performance and management effectiveness of sites within the WNBR (Bertzky & Stoll-Kleemann, 2009; UNESCO, 2010). Using evaluation references of identified challenges in implementation of the Madrid Action

Plan for BRs (Popelier & Vaessen, 2014), we found many similarities with the case of Kien Giang (Table 6).

Our findings reflected the common issue of scarcity and unavailability of the data and information at site level of BRs and PAs (Bertzky & Stoll-Kleemann, 2009; Geldmann et al., 2013), and this void hinders development of an integrated plan and strategic conservation actions in the KGBR and in similar cases such as Mexican BRs (Pino-Del-Carpio et al., 2014). Key factors causing these deficiencies were identified as the lack of human resource and capacity to collect and generate information,

unwillingness to publish and share the finding results due to scientific and administrative competitiveness, reluctance of government departments and agencies to provide information that might show the poor performance and management and KGBR is not an exceptional case as other research has shown (Price, 2002; Bertzky & Stoll-Kleemann, 2009).

Table 6. Key challenges to management of BR network and findings in Kien Giang

Key challenges to BR management globally*	Findings in KGBR
Legal framework and policy for BR management	Lack of legal framework and guidance in BR planning and management
Political support at the regional level	Lack of continuity support from PPC and department leaders
Strong regional integration and landscape planning	Artificial constructed BR model and preference for sectoral planning and administrative boundary management
Multi stakeholder partnership and participatory governance	Weak provincial stakeholder and community engagement and support for BR management
Funding and staff capacity to implement BR management plan	BR operation depends on the wills of a part-time and unpaid Management Board Incompetence BR staff and no allocated operational funding
Balanced conservation and socio-economic development	Strong economic focus, and conflict between infrastructure tourism investment and ecosystem protection
Monitoring and evaluation for adaptive management	No monitoring and evaluation system for BR in place

* Adapted from Popelier & Vaessen (2014)

The study also revealed recent concern of losing insightful and valuable information of the BRs if no additional efforts are paid to collect and manage data and information properly, which are found in the WNBR (Lotze-Campen et al., 2008). Therefore, it is necessary to establish an organized system to collect and update information together with preparation of the periodic review process for future and sharing of information, planning, and adaptive management.

The MABR and BRs support for a place based governance structure and appropriate local arrangement in planning and management of sites (Francis, 2004; Edge & McAllister, 2009), but it requires a strong and continual local leader support and stakeholder commitment to integrate different sectors' agenda and interests in the regional landscape (Ishwaran, 2010). However, our findings in the case of KGBR revealed that the BR concept is really an artificially constructed model with little buy-in from agencies of government and limited efforts to pursue an adequate planning and implementation process. Inconsequently, the BR is of limited relevance to stakeholders who strongly rely on a legally-based, sectoral planning, and administrative systems. Consequently, the practical planning and management of the site did not follow the ecosystem approach and principles as outlined by UNESCO (UNESCO, 1996; 2000). Lack of clear understanding about the BR approach and the potential benefits of the model can arise from insufficient communication (UNESCO, 2010; Cuong et al., 2017a, b) as was the case with KGBR. Strikingly, local communities and the private sector who are the key natural resource dependant entities and who are the main source of threats were not included sufficiently in BR planning and management. Without local community support and engagement, BR management failure is likely (Stoll-Kleemann & Welp, 2008; Coetzer et al., 2013; Reeds & Massie, 2013; Cuong et al., 2017b) and this is well demonstrated in the case of KGBR.

Lack of human capacity and management resources remains a challenge in BR implementation and delivery (Popelier & Vaessen, 2014; Cuong et al., 2017b). Having key people representing the local authorities (Province and district People Committees), provincial departments, NPs, and PAs involved in the BR governance should theoretically provide an advantage in coordinating and

facilitating BR activities across sectors. However, because of a lack of willingness and an absence of effort from the Management Board, the management objectives of the KGBR are unlikely to be achieved as the cases of many other BRs in the global network (Schultz et al., 2011). Our case study also highlighted the need to have a secure operational fund for delivering BR functional requirements (e.g., BR awareness, ecosystem and species conservation, and sustainable livelihood projects) rather than only allocating resources for administration and office operations. When the law enforcement is not strong due to the lack of management resources, the BR values and biodiversity are unlikely to be protected from threats and pressures of illegal access and exploitation (UNESCO Hanoi, 2013; Brook et al., 2014; Cuong et al., 2017a) as was evident in KGBR. Additionally, sustainable economic and livelihood development using eco-tourism and BR labels for local products and services was considered as one of the most significant advantages from BR listing (UNESCO, 2008; 2010; Cuong et al., 2017b), but this initiative was not promoted sufficiently in KGBR. Over emphasis on (tourism) infrastructure development in the sensitive and pristine conservation areas not only leads to destruction of ecosystems and biodiversity values but also compromises the future usage of these values and associated ecosystem services (Carter 2013; Godfrey, 2016). Thus, completion of BR planning and management plan will provide a long-term visions and strategic solutions to improve management process and promote using BR approach for balancing conservation and sustainable provincial socio-economic development.

Conclusion

The evaluation of management effectiveness using EoH Toolkit revealed an overall gap between the aims of the BR establishment and practical management capacity at the specific site level. We identified three main hindrances to ineffective management process and outcomes of the BR in Kien Giang: (1) Lack of legal framework and clear guidance about BR planning and management, (2) lack of stakeholder understanding of the BR approach and their engagement in planning and implementation process, and (3) lack of

management capacity and resources supported for meaningful BR functioning requirements. Management effectiveness evaluation is recommended as “a positive process, which allows us to correct and learn from our mistakes and build on success” (Hockings et al., 2006). This evaluation activity not only assists the provincial officials, BRMB and other local stakeholders to understand the current limitations but supports development of strategic solutions to improve BR performance and management effectiveness. While periodic review is still a key evaluation process to ensure compliance between the BR conceptual model and application reality, and management effectiveness of individual BRs (UNESCO, 1996b, 2016a), this assessment approach that mainly bases on qualitative and descriptive information would not allow measuring BR management outputs and outcomes (Matar & Anthony, 2017). Thus, quantitative and qualitative information generated from using EoH evaluation provides a baseline data that can be used for future monitoring and evaluation and adaptive planning and management of the BR model.

SUPPORTING INFORMATION **Appendix (attached)**

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Biosphere Reserves: Learning spaces for sustainability

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ABSTRACT: Since 1976, the research on sustainable development practices at the Biosphere Reserves (BRs) of the UNESCO Man and Biosphere (MAB) Programme have yielded valuable experiences and built an important knowledge base. The practical knowledge acquired in that collection is presently dispersed and risks disappearing due to its diffuse nature, complexity, social changes, and lack of suitable learning structures. However, the collaboration between BRs' managers as knowledge carriers and scientists from different disciplines, allows transformation of diffuse practical knowledge into scientific knowledge for Sustainability Science, which may be applied elsewhere, such as in the formation of rural development and sustainability professionals. With that purpose in mind, the Spanish Biosphere Reserve Network (comprising of 48 BRs) is now developing a "Knowledge Network", DialogosRB.net project. In it, BRs' managers and scientists, and together with experts in communication and information technologies, have agreed to work as a collective intelligence unit. This article presents the underlying reflections of this project. The results from the Knowledge Network will be available at www.dialogosrb.net on 2018 (initially in Spanish).

Keywords: Biosphere Reserves, UNESCO MAB, Sustainable development, Sustainable land management, Rural areas, Knowledge network, Learning from practice.

The MAB Programme

By the 1970s, the alarm bells had already been raised on biodiversity losses in many parts of the world. Protected areas were established in order to save animal and plant species from the unrelenting advance of destructive practices in the use and exploitation of natural resources. A part of society saw it as a blockage to economic development while for others it was an indispensable safety line.

The relationship framework between humankind and nature had changed for everybody and everywhere. It included the direct users of natural resources, like peasants and local communities, as well as the indirect ones, such as consumers and food markets.

The Man and Biosphere Programme, or MAB (UNESCO a, 2016), was created within UNESCO as a front line proposal for natural resources conservation. It was then clear that the long-term conservancy of such resources would be impossible unless it was associated with development models compatible with ecosystem preservation. MAB's purpose was to generate alliances between humans and the biosphere, not confrontations. Without them, both nature conservancy and human development is at risk.

The MAB challenge was put into practice by means of creating the Biosphere Reserve (BR) concept (Ishwaran et al, 2008), born within the MAB Programme in 1976. The new conceptual purpose was integrating conservation and development wherein tests and studies on different ecosystems and cultural environments were conducted all over the world.

A BR is much more than a protected area; it is a social group commitment to the natural values of their territory and a proposal for exploration of development models compatible with such values.

The Biosphere Reserves (BRs) facing sustainability challenges

Introducing production and management models for the natural resources of a territory according to the guidelines of the MAB Programme required strong commitments. It also required incorporating innovations in many fields, large doses of creativity, leadership, and a great amount of social interaction in order to reach consensus about interventions, which frequently produced conflicts of interest.

Many traditional practices, which for centuries had supported the coexistence of human development and

natural processes, succumbed or were seriously threatened by global changes. Notably, the protected areas were considered spaces excluded from human activities, favouring confrontation.

In the case of traditional models, proven knowledge was transmitted from fathers to sons, generation after generation. When necessary, the introduction of innovations allowed the coexistence of old and new habits, and assimilation was progressive. However, new-world models profoundly disrupted those transmission patterns (FAO, 2000).

The introduction of sustainable practices during the last decades, at odds with the general trend, required the accelerated incorporation of innovations and learning processes. With the MAB Programme began a trial and error path for how to put into practice a promising idea.

Implementing the BR concept in very different geographic and cultural landscapes resulted in very different interventions depending on local priorities, social actors, and territorial characteristics. However, all of them shared common principles and aims.

Each one of these trials, and the concept as a whole, has been operating as a catalyst agent oriented towards generating an inspiring resource-use model for the future of humankind. After 40 years of experience, the BRs now provide a very important body of knowledge, the main object of the present article.

The BR as a learning space

A sustainable development experience requires introducing innovations, which necessarily imply a learning process. In the case of the Spanish Network of Biosphere Reserve (SNBR) (48 BRs in 2016) (RERB, 2016), there are some thematic axes which have structured successful sustainable development initiatives:

(1) Improving the economic development opportunities for rural women, as an efficient way of keeping the population of mountainous areas and avoiding territory abandonment, as well as losses in biodiversity and potential of some ecosystem services.

(2) Transforming traditional olive groves into organic ones, looking for new market opportunities as well as diminishing pollution from chemical additives, especially in a territory with unique natural values.

(3) Modifying an island energy model in order to diminish the use of fossil fuels and the pollution they produce, with the aim of reaching a 100 percent renewable energy situation.

(4) Implementing its own BR trademark in products and services, as a guarantee for companies complying with environmental requirements and committed to transparency towards its consumers and workers.

(5) Transforming a natural park into a fully functional BR, by means of territorial consensus about its surface enlargement and about the governance model to be adopted.

Similar to many other BRs in different parts of the world, all managers involved with these initiatives underwent an innovation process in their own BRs when trying to make situation “A” evolve towards target “B”. Usually, the manager of the BR is its director/coordinator, but here I will use the word manager to include also his or her team.

At a closer look, any of the former examples imply a meticulous and laborious programming throughout a number of years. All of them require the collaboration from different social sectors, such as local politicians, representatives of departmental policies, BR governing institutions, economic agents for different sectors, social volunteers, social groups, and the local population.

In order to steer the process towards the chosen target, managers need to mobilize the interest of the different involved sectors. Additionally, they need to contribute in identifying and visualizing clear objectives and benefits for the involved agents (including individual, communal, or sectorial), as well as in designing the path to be followed and the possible role each agent will play in it.

Exploring a new path, even if the managers have a solid technical and academic background, will mean for them a new and accelerated learning process, as they confront many situations, circumstances, and details with which they were not familiar before. That learning process becomes incorporated in those individuals in the form of new knowledge and skills. That has happened in each one of the five above cited initiatives.

From such a viewpoint, the BRs’ sustainability research always constitutes learning spaces for the managers, thereby improving their capability to tackle new research armed with better tools. This is one of the products derived from the nature of the BRs, independent of other tangible results derived from the

thematic content of the intervention, or the new skills acquired by the involved social agents.

The value of the interchanges among BR managers

Since its beginnings, the MAB Programme has recommended interchanging experiences among its BRs managers, in order to accelerate the training needed to drive and expand sustainable development actions. Its networks have the objective of promoting, at different scales, the interchange of best practices by means of direct communication, transmission, or stimulation (UNESCO b, 2016), Action B5.1. of the Lima Action Plan).

Since 1992, the SNBR organizes one or two meetings per year with the BR managers. The personal interchanges and collaborations, which arise from such meetings, have repeatedly been praised by the managers as one of the main benefits of being part of the network.

Each of the previous five initiatives already quoted reflect a series of actions addressed towards their projects and themes, but all of them respond to the common objective of the MAB Programme and a number of actions will be similar. For example, preparing relevant reports and news items to publicize a project, participation processes with essential sector agents, formulas to deactivate conflicting situations, strategies and training patterns for involved agents, managerial mechanisms applied for establishing consensus, and putting agreements into practice.

When the managers of the SNBR share their experiences, the analysis is centered on the relevant and meaningful aspects which produced the positive results, as well as on those aspects that can help to improve the overall efficiency of the actions. Many of these aspects are of a subtle nature. Sometimes they look like small, unimportant details, but may be the triggers of important processes. Frequently they refer to social interactions which, once identified, may be of great help in future actions. However, to an external observer studying a large number of BRs, most of these subtleties are almost undetectable and, therefore, may miss essential features.

The skills the managers acquired during the practice at their respective BRs are shared in the interchange of experiences. Sharing common concerns and similar professional languages allows the quick understanding of other participants' contributions.

Synergies among them yield new ideas for the network as a whole and strengthen the implementation of existing practices.

The knowledge acquired in the aforementioned learning scenarios is characterized by hands-on experience, nourished by interchanges among equals, and directly applicable in improving actions.

Schultz, L. and Lundholm, C. (2010), in a study comprising 148 BRs, offer an interesting analysis of the learning processes inside a BR as well as in the interaction among BRs:

Most of the learning opportunities identified in this study are provided locally and even though the lessons learned are possibly spread elsewhere through the networks of participants we have found little evidence of cross-scale learning taking place in the World Network of Biosphere Reserves (p. 659)

The MAB Programme trajectory in the face of the changing challenges of society

During the first decade of the BRs, the focus was on introducing the idea of redirecting the association between humankind and nature, as stated at the Minsk Action Plan at the First International Biosphere Reserve Congress (Belarus) encounter in 1983 (UNESCO, 1984). Then, at the UN Conference on Environment and Development 1992-Earth Summit (United Nations, 2000), in Rio de Janeiro 1992, Earth Summit Agenda 21, 1992 (United Nations, 1992) established the sustainable development notion on a global scale.

The MAB Programme embraced the Rio '92 challenge in its Seville Strategy and the Statutory Framework of the World Network of Biosphere Reserves (WNBR) (UNESCO, 1996), at the Second World Meeting of the WNBR. In them were established objectives and requirements that the BRs need to meet in order to carry out their sustainable development mission.

The Strategy made recommendations on how it should to be applied at international, national, and individual BR levels. At the individual level, it highlights the task of supplying examples of managerial best practices apt to be extended to the regional scale, farther away from their limits. The Strategy also encompassed many other actors who contribute to the MAB Programme objectives and the BRs' functions: National MAB Committees, states, local

governments, international entities, academic and research sectors, social and economic sectors, etc.

The Seville Strategy and the Statutory Framework are still the general reference framework for the WNRB, complemented by the Madrid Action Plan (UNESCO, 2009) and the Lima Action Plan.

The Madrid Action Plan was one of the results of the Third World Meeting of BRs in 2008. It stressed the need to fully apply the Seville Strategy content to BRs all over the world, focusing their attention on applying the Millennium Development Goals.

Among the items highlighted by the Madrid Action Plan are sustainable development learning, research, and training. The Plan devotes one of its four main action lines to that purpose, specifying actions addressed to the BRs' interchange of experiences, to the development of research based upon BRs' management, to the training of managers and other actors, and to the communication of the lessons learned.

Lately a new MAB Strategy has been developed for 2015-2025 (UNESCO, 2015), as well as the Lima Action Plan for 2016-2025, focusing the attention on the challenges to be met until 2025. For the latter, the reference framework is the UN 2030 Agenda for Sustainable Development (United Nations a, 2015) and its 17 Sustainable Development Goals (United Nations b, 2015), approved in December 2015. These goals do not imply changing the MAB's present direction, but placing the attention on a development vision in accordance with humankind's most important challenges today.

Two of the Agenda 2030 goals deal with natural elements, three with interventions oriented towards improving natural resources (water, climate, and energy), eleven with improvements in living conditions and human group integration, and one with generating alliances for reaching these goals. The whole picture shows the urgency in working on the human group integration and in not allowing exclusion (be it economic, political, educative, etc.).

The Lima Action Plan was generated in 2015-2016 by the MAB community and adopted at the 4th World Congress of Biosphere Reserves, Lima, March 2016. From then on, sustainability and its many different components were established as the goal shared by all the BRs until 2025, a goal which encompasses a broader field than the strictly environmental.

Even more than any of the former WNBR meetings, Lima was an extraordinary scenario for interchanging

experiences among over a thousand participants from 120 countries, representing the existing 669 BRs in 2016. The maturity of the BRs and of the different MAB networks, as well as of members from MAB Programme communities supporting the functioning of the BRs, was clearly seen in the more than 100 presentations about successful experiences.

Those experiences showed not only the internal components within a BR but also the external ones that contribute to a good BR functioning. Among them, trans-border agreements, governance models and different kinds of networks such as thematic, geographical, scientific, and infrastructure for information management and dissemination. The content of 21 workshops and 13 side events at the 4th World Congress of Biosphere Reserves, Lima, March 2016 (UNESCO c, 2016) clearly highlights that BRs may greatly contribute to the last of the Agenda 2030 goals, generating alliances, by making available the lessons learnt during the last 40 years.

The experience gained at each BR, where does it go?

Firstly, the experience returns to the BR itself in the form of managerial improvements and more implication from its local agents and greater training of its managers when starting new initiatives. Outside the BR, the most common form of extension is person-to-person communication with other BRs, establishing direct contacts or new collaboration initiatives. A broader influence area includes the different MAB networks (thematic, regional, national, or the WNBR) and the diffusion of published documents, and the internet, for example. Another area of incidence is affecting other structures, external to the BR, which may contribute to the functioning of the BRs, such as departmental governments, state governing bodies, MAB National Committees, academic and scientific sectors, legislative and land-use planning areas, and business corporations.

Currently, in-person communication has a central role in disseminating successful experiences that are complemented with written documents. It is stimulating and effective for the participants, especially in frequent and repeated interchange scenarios which may provide the opportunity for delving into the underlying intangible aspects. Certain aspects which participants were unaware of, frequently surface spontaneously in the communication process.

The influence of in-person communication usually remains at the local scale. Conversely, in relation to its potential impact, it is subjected to a number of limitations: (i) limited presentation time and selected contents; (ii) small audience for oral presentations; (iii) changes in local social circumstances frequently affect the managers who may be substituted, moved, or reassigned to other tasks with higher priorities. Therefore, the knowledge they acquire risks becoming fragmented, scattered, non-operational, and even may disappear from the territory. Such loss has a direct effect locally, but also affects the interchange flows within the MAB Programme.

The evidence observed through direct personal contact with BRs, shows that conservation and dissemination of managers' accumulated knowledge is fragile and highly dependent on circumstances, people, locations, and the time at which the research took place.

Due to such limitations, many of the excellent experiences in BRs and in the WNBR, do not reach the rest of BRs, and may not even be available in the future to the BR from where they came. Therefore, BRs are presently making a very limited contribution to the advancement of the general sustainability processes. Unconsciously, we are little by little losing the highly valuable knowledge generated throughout decades of great economic effort, dedication, and determination of so many people. Shultz and Lundholm (2010) point out the weakness of the BRs in generating general-purpose knowledge and in communicating the lessons learned: "There is also a tension between action and reflection; or time spent providing learning opportunities versus time spent reflecting upon and evaluating actions taken to improve strategies" (p. 659).

No doubt, many places and communities all over the world could benefit from knowledge generated in the BRs. For instance, in rectifying land-use management and development towards more sustainable patterns. The BRs' 40 years of experience have generated an extraordinary stock of useful knowledge, which should be preserved to be able to extract from it when needed.

New knowledge for a new Sustainability Science

As evidenced at the 4th World Congress of Biosphere Reserves, a large number of scientists are interested in the developmental processes of MAB Programme and the BRs. A workshop on networking between

scientists and knowledge-carriers attracted more than 200 participants.

Broadly speaking, in that workshop there were two different approaches to scientific aspects and/or knowledge management:

(1) An academically-oriented approach. Including, an emphasis on the scientific sector is placed for reinforcing the scientific structures dealing with sustainable development (e.g. chairs, masters, research lines), as well as making their knowledge ready for other social sectors such as decision makers or the BRs' communities. Sometimes, however, they consider their own function as a source of one-way knowledge addressed towards other social sectors. It must be pointed out that typical scientific studies contribute general and rigorous views about certain functioning aspects of the BRs, which are not necessarily suitable for applying to the BRs' actions. However, they are very valuable for establishing policies and mobilizing resources, especially at global, regional, or national levels, and for increasing the receptivity of decision makers to the need for introducing sustainability criteria in broad programs and policies.

(2) Another approach is oriented towards knowledge generated within BRs' sustainable development initiatives, nourishing with it a Sustainability Science, presently under construction. At the workshop, the chair of the International Advisory Council, Sergio Guevara (Guevara, 2016), contributed this approach with a traditional expression that may well encapsulate it: "A knowledge dialog", a vision which attracted certain scientific sectors and which the present article shares.

Schultz, L., in an oral presentation (2016), expressed that necessity as: a) There is a wealth of experience in BRs that can inform Sustainability Science; b) There is a need to synthesize these to improve policy and practice-important role for scientists, and; c) There is no central repository of BR data that researchers and other knowledge holders can use.

That way of thinking about knowledge and the MAB Programme was included in the Lima Action Plan as objective B7: "An active interdisciplinary network open to scientists and knowledge-carriers, sharing a mission and a common MAB vision". The introduction of "knowledge-carriers" is a meaningful modification introduced in the final Action Plan document. Putting scientists and other knowledge-carriers on a same level opens a collaborating path for gathering and

processing useful knowledge, irrespective of where it comes from.

Rescuing the treasures of knowledge hidden among the BRs' diverse agents, and expressing it in appropriate ways, could be a major contribution of the MAB Programme, for the 2016-2025 period, to the sustainable development goals of the UN Agenda 2030. The collaboration among different knowledge-carriers is very much in line with the main axis of the Agenda's goals, which is integrating all segments of human population.

A first step in that direction could be integrating the knowledge managers accumulated while implementing best practices in their BRs. In order to reach that objective, several types of necessary agents and tasks should come together, working in a coordinated way in a form of collective intelligence. For instance, pooling different experiences, geographically apart, and carried out by unknown agents, in order to extract its common points and features from the lessons learned. The starting point is the managers of institutional BRs, but a coordinated and collaborative action is needed because the task exceeds the functions and competencies of each of them.

Making a scattered collective of contributors that function as a team, by means of a dynamic process to increase their participation, bringing out the most significant experiences from each of them, and producing a meaningful information flow.

Structuring the information store thus generated, complementing it with other kinds of knowledge and carrying out its content analysis. Dealing with such a heterogeneous data set needs an assemblage of rigorous scientific procedures and innovative methodologies, as well as scientists and experts ready to share their knowledge and technical skills.

The resulting products must comply with formats suitable for each segment of their interested public and be then broadcast by means of the most efficient and accessible communication channels. The communication campaign must also ensure that those products remain accessible for a long period of time.

Such a package would link the individual experience from promoters of BR's best practices to a large interested public, who could profit from the experience in many other places and at any time. It will be useful in the training of BRs' managers and technicians, as they are a key element in the BRs'

development and a bridge translating the acquired knowledge into action programs.

There would also be a large number of other potential recipients, such as professionals, experts under training, decision makers, and other sectors of society with an interest in land-use, development, and conservation. Furthermore, it would be useful for managers of public or private entities ready to collaborate in sustainability issues, local development leaders and, of course, the BRs' population at large.

From another viewpoint, rescuing high value knowledge coming from the BRs' practices opens a gate to a source worthy of being added to the new Sustainability Science. This approach may become an important challenge for scientists, as it somewhat diverges from the usual scientific study procedures and analysis, but may also offer new opportunities for them. Fortunately, present information and communication technologies offer resources and methodologies that facilitate the task of gathering, synthesizing, processing, and spreading the knowledge generated in a large number of successful sustainable development experiences around the world.

DialogosRB.net, a Spanish Network of Biosphere Reserve initiative

In order to generate a solution to the present loss of practical knowledge, specifically its rescue and dissemination, we need a collective effort that exceeds the usual BRs' capacities and its limited geographic extension. Therefore, we need to design a new collaborative space, where the different necessary agents may come together with a common objective in mind: sustainability for the 21st century.

Applying this approach, the project DialogosRb.net has started, at the beginning of 2017, a Knowledge Network for the SNBR, which will carry on its activities through this year (www.dalogosrb.net/blog).

A team of BR managers, scientists, and experts on communication and information technologies have accepted the challenge of jointly developing such a knowledge network. In its pilot phase, the team will work on five good-practice initiatives that have been carried out in five Spanish BRs during the last few years. The initiatives are scattered around the country and are representative of many other initiatives that have already been carried out within the Spanish BRs.

After a first in-person meeting, the team is now continuing its work online and its discussions are open to all the Spanish BRs, the Scientific Council of the Spanish MAB Programme and other experts.

The economic resources for the project come from a collaboration among the five BRs, an NGO that collaborates with one of them, and the Fundación Biodiversidad of the Spanish Ministry for Agriculture and Fisheries, Food, and Environment.

The project results will be available on www.dialogosrb.net (initially in Spanish) in 2018.

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The International Centre for Sustainable Rural Communities (ICSRC)

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ABSTRACT: The establishment of the International Centre for Sustainable Rural Communities (ICSRC) was proposed as a legacy project at the October 2013 meeting of UNESCO Biosphere Reserves, which included 36 countries from Europe and North America, known as the EuroMAB Group, held in Brockville, Ontario, Canada. The delegates endorsed the proposal to form an international EuroMAB Working Group to advance the project. The ICSRC will be located in Brockville, within the Frontenac Arch Biosphere Reserve. It will contribute to the EuroMAB Mission and Vision and address the objectives of the Lima Action Plan for UNESCO's Man and the Biosphere (MAB) Programme and its World Network of Biosphere Reserves (2016-2025). Here we summarize the status of the project, its vision and mission, and give an overview of the Centre's proposed activities.

Keywords: EuroMAB, Indigenous peoples, rural, Man and the Biosphere, ICSRC

Introduction

Over 650 Biosphere Reserves (BRs) worldwide are challenged by the UNESCO Man and the Biosphere Program (MAB) to develop innovative strategies to encourage sustainable development. The ICSRC would contribute to the EuroMAB Mission and Vision by providing "a platform for the sharing of knowledge, know-how, and experience on sustainable development, and a collective tool for the support of sustainable development practices amongst the various players of the 36 member states of EuroMAB". Importantly, the Centre will assist in achieving the Indigenous priorities endorsed at EuroMAB 2013 (UNESCO, 2013).

During EuroMAB 2015 in Estonia, delegates were asked to respond to a survey to put in order of priority the proposed functions of the Centre. In November 2016, the EuroMAB Working Group met to advance the ideas for the project. The Working Group developed the ICSRC's mission and vision, and proposed activities.

About the ICSRC

Mission

We will inspire creative, innovative, and effective ways for people and nature to thrive together in rural communities. By linking Indigenous and traditional knowledge from rural communities with modern science, facilitating networking among EuroMAB partners, promoting innovation, and leveraging funds and resources, we will generate solutions for important local, regional, national, and global challenges.

Vision

A world in which thriving, inclusive and healthy rural communities are recognized as integral to an inclusive sustainable future.

Outcomes

- A. A collective Centre for the support of sustainable development practices amongst the various players of the 36 member states of the UNESCO EuroMAB network.
- B. Recognition, recording, sharing, and application of Indigenous, traditional, and scientific knowledge to produce innovative solutions for the challenges of biodiversity loss, climate change, and sustainable development.
- C. Dialogue, research and education to inspire and inform community leaders and the

general public about pathways to achieving thriving rural communities.

- D. An inclusive governance system recognizing the diverse sources of knowledge and ways of knowing.
- E. A physical and virtual hub for achieving the UNESCO Man and the Biosphere program Lima 2016 strategic objectives (UNESCO, 2017), focusing on rural communities.

Indigenous and Traditional Knowledge

A key approach of the ICSRC is in bringing together the learning and approaches to sustainable development, biodiversity, and climate change of the many Indigenous peoples that are identified in the UNESCO EuroMAB area. Recognizing, recording, and applying Indigenous and traditional knowledge as well as modern science is essential to a sustainable future for all.

Freshwater Issues

The Centre will be located on the banks of the St. Lawrence River, which drains the Great Lakes and is the source of 21% of the world's freshwater. As a result of a local economic priority to invest in a Freshwater Institute (Millier Dickinson Blais, 2015), a Round Table met in November 2016 to explore freshwater issues and investigate whether the ICSRC might fulfill some of that role. The group determined that the Centre will act as a hub for collecting Indigenous knowledge and expertise from the EuroMAB network to find innovative strategies in the context of freshwater, which complements the work of other existing institutes that focus solely on freshwater issues.

Research

The ICSRC will be a hub that gathers together global Indigenous, traditional, and scientific knowledge on the key issues of Sustainable Development, Biodiversity and Climate Change, and applies the research to the benefit of rural communities. The ICSRC will facilitate collaborative research between organizations across the EuroMAB network and be a repository of experts and expertise on sustainable rural community research and practices.

Education

The ICSRC will be a venue for workshops and conferences where people can exchange

knowledge, ideas and best practices. It will also be a provider of tools and resources for education, such as Mass Open Online Courses, a location for school, college and university field trips, training for BR educators, and a venue for public engagement events.

Inspiration

The ICSRC will inspire all people to work together to build sustainable communities, prevent biodiversity loss and adapt to climate change. It will do this via its physical presence in Brockville, with interactive exhibits, through public engagement activities at its physical location and via its online presence.

Next steps

Fifty million people in Canada and the U.S. live within 500 miles of Brockville, Ontario, and EuroMAB members may access three nearby international airports: Ottawa, Montreal, and Toronto. A minimum area of 15,000 square feet will be required for exhibits, meeting rooms, auditorium, offices, classroom, training laboratory, and facilities. The ICSRC will require approximately 12 permanent full-time staff and will attract visiting researchers, educators, policymakers, and BR professionals.

An ICSRC sub-committee has been formed to develop, following consultation with interested parties, governance documents that will ensure balanced, inclusive, and respectful representation in governance processes.

The Centre programs align with local, regional, national, and international policy priorities. A preliminary economic analysis indicates good markets for the facility and a wide range of possible financing partners. Over the coming months the Working Group will be consulting architects, conducting a full economic analysis, incorporating the organization, and will then seek major capital funding to build the Centre. More information can be found at the ICSRC website: <https://www.sustainrural.ca>.

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