# Disaster risk reduction at UNESCO Global Geoparks and Biosphere Reserves

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## Abstract

*UNESCO Global Geoparks and Biosphere Reserves are natural UNESCO designated sites that promote sustainable development and focus on the protection of natural and cultural heritage or the conservation and sustainable use of geological resources and biodiversity. More than 800 of these natural UNESCO-designated sites may be partly or entirely exposed to natural hazards and extreme weather events which can potentially impact the communities living in or near the sites and their livelihoods. Because of their high cultural and symbolic value, the impact of the loss or damage of a natural UNESCO-designated site can resonate across the world. At the same time, these iconic sites have tremendous potential as platforms to share knowledge on Disaster Risk Reduction. Many UNESCO-designated sites have community and tourism-oriented programmes to raise awareness about the source of natural hazards, associated risks, and ways to reduce their impact.*

**KEY WORDS:** Natural UNESCO designated sites, UNESCO Global Geoparks, Biosphere Reserves, Disaster risk reduction

## 1. Introduction

UNESCO's Natural Science Sector hosts Secretariats of two programmes dealing with designations of sites of international value. These two programmes are the International Geoscience and Geoparks Programme (IGGP) (UNESCO 2018a) and the Man and the Biosphere (MAB) Programme (UNESCO 2018b).

UNESCO Global Geoparks and Biosphere Reserves [Fig. 1] promote sustainable development and focus on the protection of natural and cultural heritage or the conservation and sustainable use of geological resources, in the case of UNESCO Global Geoparks, and biodiversity, in the case of Biosphere Reserves.

These two designations are complementary with another UNESCO designation – World Heritage properties.

### *1.1 Brief description of UNESCO Global Geoparks and Biosphere Reserves*

UNESCO Global Geoparks are single, unified, geographical areas where sites and landscapes of international geological significance are managed through the holistic concept of protection, education, and sustainable development (UNESCO 2018 d). Their bottom-up approach consists of combining conservation with sustainable development while involving local communities. As of July 2018, there are 140 UNESCO Global Geoparks in 38 countries.

Biosphere Reserves are areas comprising terrestrial, marine, and coastal ecosystems. Each Biosphere Reserve promotes solutions reconciling the conservation of biodiversity with its sustainable use (UNESCO 2018e). Biosphere Reserves are 'Science for Sustainability support sites' – special places for testing interdisciplinary approaches to understanding and managing changes and interactions between social and ecological systems,

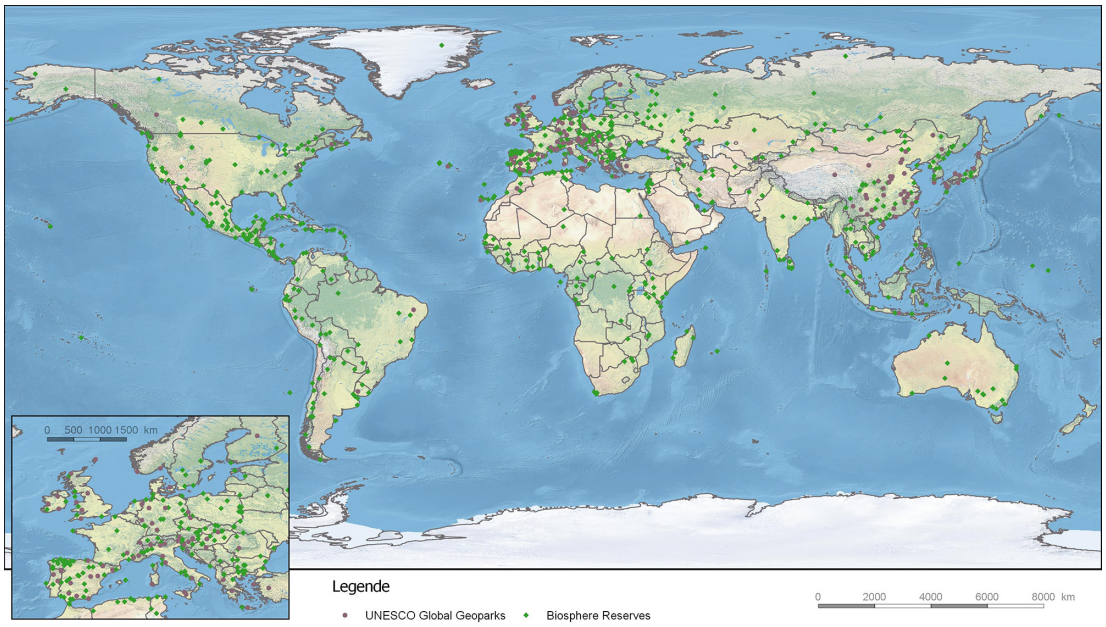


*Figure 1: UNESCO Global Geoparks and Biosphere Reserves*

including conflict prevention and management of biodiversity. As of July 2018, there are 686 biosphere reserves in 122 countries, including 20 transboundary sites.

Together with the other UNESCO site designations – World Heritage natural and cultural sites (UNESCO 2018 f) – these sites give a complete picture of celebrating our heritage while at the same time conserving the world's cultural, biological, and geological diversity as well as promoting sustainable economic development. Biosphere Reserves focus on the conservation and harmonised management of biological and cultural diversity while the UNESCO Global Geoparks give international recognition to sites that promote the importance and significance of protecting the Earth's geodiversity and World Heritage sites promote the conservation of natural and cultural sites of outstanding universal value. Some of these sites are called Multi-Internationally Designated Areas (MIDAs) (Schaaf, Th. and Clamote Rodrigues, D., 2016) when they have two or even three of these international designations overlapping, sometimes this is in addition to other international designations as well (e.g. Ramsar sites).

### *1.2 Overview of natural hazards at UNESCO Global Geoparks and Biosphere Reserves*

UNESCO Global Geoparks and Biosphere Reserves are located in geographical settings which may be partly or entirely exposed to natural hazards and extreme weather events which can potentially impact the communities living in or near the sites and their livelihoods. Because of their high cultural and symbolic value, the impact of the loss or damage of a UNESCO Global Geopark and a Biosphere Reserve can resonate across the world.

In recent years, natural hazards, both geological (such as earthquakes, volcanic eruptions, landslides, and tsunamis) and hydro-meteorological (such as floods, droughts, and avalanches), have already caused extensive damage to UNESCO Global Geoparks and Biosphere Reserves. Major earthquakes disrupted the functioning of the Wolong Biosphere Reserve in Sichuan, China, in 2008. Japanese Global Geoparks (Aso, Itoigawa, and Unzen) have been damaged by multiple hazards, including earthquakes followed by tsunamis, as well as volcanic eruptions. Many sites, such as the Katla UNESCO Global Geopark in Iceland and the Tacaná Volcano Biosphere Reserve in Mexico, have experienced significant volcanic eruptions, damaging infrastructures and the natural environment. Different types of landslides frequently occur on the slopes of mountainous sites, such as the Nanda Devi Biosphere Reserve, damaging access roads and tourist paths. Many sites face a high flooding risk, as was revealed by heavy floods in the past decade in Canada (Waterton Biosphere Reserve), France (Camargue Biosphere Reserve), Slovenia (Idrija UNESCO Global Geopark), and many other regions.

## 2. UNESCO's work on disaster risk reduction at UNESCO Global Geoparks and Biosphere Reserves

UNESCO assists the Member States and its designated sites in strengthening livelihood capacities in Disaster Risk Reduction (DRR) (UNESCO 2018f). Secretariats of the above-mentioned UNESCO Programmes, together with experts from

the UNESCO Section on Earth Sciences and Geo-Hazards Risk Reduction, encourage the identification of risks and protection from different hazards as well as fostering climate change resilience and the preservation of UNESCO Global Geoparks and Biosphere Reserves and their communities. UNESCO continuously contributes to building capacity in DRR, developing innovative policy, tailoring management strategies, and recognizing the value of resilient protected area systems.

In line with Shimabara (2012) and the English Riviera Declarations (2016), the Global Geopark Network established, in 2017, an official Working Group entitled «Geohazards Working Group», aiming to find ways on how to mitigate risks at UNESCO Global Geoparks in the face of geological and hydrometeorological hazards, with a view to strengthening the potential of UNESCO Global Geoparks in awareness raising.

This aim will be achieved through the following three objectives: (i) identify and assess disaster risks at UNESCO Global Geoparks; (ii) enhance and support collaboration and sharing knowledge among the UNESCO Global Geoparks, as well as with other international organizations, to mitigate risks in their territories, ensure the safety of visitors and staff, and improve resilience of their Geoparks; (iii) foster better communication through educational and awareness activities, among people, administrators, decision makers, and scientists on disaster risk reduction at UNESCO Global Geoparks.

According to the MAB Strategy 2015-2025 (2015) and the Lima Action Plan (2016), in the coming 10 years, the MAB Programme will concentrate its support to the UNESCO Member States and stakeholders in (i) conserving biodiversity, restoring and enhancing ecosystem services and fostering the sustainable use of natural resources; (ii) contributing to sustainable, healthy and equitable societies, economies and thriving human settlements in harmony with the biosphere; (iii) facilitating biodiversity and sustainability science, education for sustainable development and capacity building; and (iv) supporting mitigation and adaptation to climate change and other aspects of global environmental change.

## 3. Current State of Conservation and Challenges for Continuity

In 2017, UNESCO DRR experts undertook a global assessment (https://www.soscisurvey.de/naturlhazardsunescosites/), aiming to create an overview of disaster risk reduction at UNESCO Global Geoparks and Biosphere Reserves, in particular, to provide qualitative information concerning the global exposure of these natural UNESCO-designated sites to natural hazards and the increase the awareness of their site managers.

Further work was then undertaken to add to the database all available information on disaster risk reduction issues, including exposure and vulnerability to risks, current experience on prevention and mitigation measures, awareness raising activities, and site managers' needs. The evaluation of DRR issues started through the analysis of site managers awareness. For each site, records from various sources, including thematic surveys, published literature, and reports, were stored in one georeferenced database, provided by UNESCO Secretariat, and analysed using descriptive statistics.

Results reveal that more than 90% of UNESCO Global Geoparks and Biosphere Reserves could be potentially exposed to at least one out of the main natural hazards (94% of Biosphere Reserves and 96% of UNESCO Global Geoparks). Overall, earthquakes and landslides are the most frequent geohazards, while floods and wildfires are the most frequent among hydrometeorological hazards. As for the current regional distribution of sites, most hazardous regions appear to be Asia and Europe.

Despite a large number of sites potentially exposed to natural hazards, only 8% of Biosphere Reserves and 30% of UNESCO Global Geoparks have performed a detailed risk assessment. The list counts 14 Multi-Internationally Designated Areas (MIDAs). Twenty-one percent of the Biosphere Reserves, including 8 MIDAs, perform various monitoring activities. Twenty-four Biosphere Reserves are interested in assistance in risk assessment.

A number of Biosphere Reserves and UNESCO Global Geoparks are engaged in awareness raising, including educational activities, as well as mitigation strategy development on natural hazards and the need for the sustainable use of natural resources. Half of UNESCO Global Geoparks and at least 19 % of Biosphere Reserves participate in different kinds of educational and prevention and mitigation awareness activities.

Overall, more than 53% of UNESCO Global

Geoparks, in both the Europe and Asia regions, and 23% of Biosphere Reserve responded that they have good practices and are interested in sharing them with other UNESCO designated sites. At the same time, those who do not have practices to share are very motivated to receive training on prevention and mitigation. Twenty-six percent of UNESCO Global Geoparks and 6 % of Biosphere Reserves confirmed existing cooperation with other UNESCO designated sites.

As for MIDAs, from all natural Multi-Internationally Designated Areas, 7 MIDAS, that are designated as UNESCO Global Geoparks, and 68 Biosphere Reserves are exposed to at least one natural hazard.

## 4. Recommendations

As is evident from the present study, Biosphere Reserves (which are located the world over), UNESCO Global Geoparks (which are mostly located in Europe and in Asia – see map), and their territories may be partly or entirely exposed to various natural hazards and extreme weather events. Potential harm to these natural sites may, or may have already, also put the livelihoods of local communities at risk.

However, even though there is a clear understanding that many UNESCO sites and their communities may be potentially threatened by disasters, no united methodologies on managing disaster risks at these natural UNESCO sites exist. Moreover, analysis of reported thematic surveys reveals that most Biosphere Reserves and UNESCO Global Geoparks currently do not have risk assessment and efficient risk management plans, nor do they have sufficient expertise and guidance on how to perform them.

Nature-culture linkages at many UNESCO designated sites created after major disasters have proven that lessons learned from past disasters can be embodied in local heritage and traditions and contribute to raising awareness on disaster risk. For these intangible forms of heritage to be effective, their story must be constantly told, transmitted, and shared within communities and with visitors. It is within this framework, that UNESCO Global Geoparks and Biosphere Reserves can play an essential role, providing guidance on good practices and sharing messages among communities.

UNESCO encourages activities which focus on providing assistance to site managers and the Member States in the form of training and capacity building on the topic of Disaster Risk Reduction & Climate Change Adaptation. Closer links and knowledge exchanging should be established with World Heritage sites and their activities, such as already leveraging on existing training for site managers. In this sense, training organized at the regional level by UNESCO Chairs presents a good example of knowledge exchange, when practitioners and site managers from all three UNESCO designations could learn from each other and adapt gained experience in their countries.

## Literature cited

English Riviera Declaration 2016. http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/The_English_Riviera_Declaration.pdf [accessed 19 July 2018]

Lima Action Plan for UNESCO's Man and the Biosphere (MAB) Programme and its World Network of Biosphere Reserves (2016-2025). http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/Lima_Action_Plan_en_final.pdf [accessed 19 July 2018]

MAB Strategy 2015-2025. http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/Lima_Action_Plan_en_final.pdf [accessed 19 July 2018]

Schaaf, Th. and Clamote Rodrigues, D. (2016): Managing MIDAs: Harmonising the management of Multi-Internationally Designated Areas: Ramsar Sites, World Heritage sites, Biosphere Reserves and UNESCO Global Geoparks. Gland, Switzerland. IUCN.

Shimabara Declaration 2012. http://jgc.geopark.jp/files/Shimabara%20Declaration.pdf [accessed 19 July 2018]

UNESCO 2018a. International Geoscience and Geoparks Programme (IGGP). http://www.unesco.org/new/en/natural-sciences/environment/earth-sciences/international-geoscience-and-geoparks-programme/ [accessed 19 July 2018]

UNESCO 2018b. Man and the Biosphere Programme. http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/man-and-biosphere-programme/ [accessed 19 July 2018]

UNESCO 2018c. UNESCO Global Geoparks. http://www.unesco.org/new/en/natural-sciences/environment/earth-sciences/unesco-global-geoparks/ [accessed 19 July 2018]

UNESCO 2018d. Biosphere Reserves. http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphere-reserves/ [accessed 19 July 2018]

UNESCO 2018e. Disaster Risk Reduction, UNESCO's contribution to a global challenge. http://www.unesco.org/new/en/natural-sciences/special-themes/disaster-risk-reduction/ [accessed 19 July 2018]

UNESCO 2018f. World Heritage properties. https://whc.unesco.org/en/list/ [accessed 19 July 2018]