

## How can we conserve geology?: a classification of geoconservation methods

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Geoconservation is carried out by a variety of methods, but these have never been systematically classified or compiled into an organised system. This presentation will seek to do this by proposing a classification involving site management, curation, licencing, supervision, benevolent ownership, restoration, legislation, policy and education. Examples and applications of the methods will be presented.

Keywords: Geoconservation, Legislation, Policy, Planning, Education, Site management

## Geoconservation in Japan

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A term, geodiversity, was first introduced in Japan in 2004, and then some scientists have gathered to discuss geodiversity including geoconservation since 2011. Meanwhile, the first academic paper on geoparks was published in 2005, and a notion of geoparks was widespread then. Discussion among the community of geoparks in Japan seems to be somehow weak, mainly because the community has a variety of tasks to commit. A special issue on geodiversity in an English journal published in Tokyo in 2005 carries a few papers dealing with geoconservation, and another special issue on geodiversity of Hokkaido, northern Japan published in Sapporo in 2009 contains a few papers on geoconservation issues in Hokkaido. Besides these efforts, actual in-depth research on geoconservation is likely to be minimal in Japan so far. Balancing research on geoconservation and research on geoparks would be one of the issues found in Japan. Japanese academic arena should pay more attentions to emphasize the necessity in lectures at a university level. At the same time, a responsible ministry (most probably, the Ministry of the Environment) should be convinced of the merits of developing a notion of geodiversity conservation in Japan, as they have been addressing biodiversity conservation as a national strategy.

Keywords: geodiversity, geoconservation, geopark

## Geoconservation's Dilemma: How to Value Diversity Itself for Conservation Benefits

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This paper critically analyzes two fundamental questions: why is geoconservation important and how to ground this concept in practice. Geoconservation differs from other conservation frameworks because it focuses on the diversity of the abiotic environment. Most conservation discourses focus on the biotic environment and on specific flagship species. Geoconservation in this sense is more holistic as a conservation framework, it holds that the abiotic diversity in itself is important for the well-being of the planet. However this concept is weakly integrated in praxis. Furthermore as the case studies reveal; geoconservation in practice tends to focus disproportionately on specific landforms (volcanic or natural hazard related) that are considered uniquely valuable, and less commonly values diversity itself. This is a natural result of stakeholder dynamics and institutionalism in nature governance, but it also poses a fundamental problem for geoconservation. This paper discusses case studies of the Izu Peninsula, Minami Alps, Hakusan Reserve, and Kamikochi National Park, and argues through these case studies how an alternative framework of diversity evaluation can provide better conservation benefits.

Keywords: Geoconservation, holistic conservation, diversity, case study

## Conservation of geoheritage in tectonically active and intensely denuded region

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The Japanese islands is one of the most tectonically active and intensely denuded regions on the planet, and therefore is a region with a very high natural hazard frequency. Many of the land features and soil strata are proofs of disturbances in the natural environment due to the tectonic and denudation related mechanisms. Naturally these land features are related to natural hazards that either occurred in the past or are likely to occur in the future. Engineering solutions that seek to prevent natural disasters are a natural response of the society, but many of such disaster prevention schemes cause significant damage to the land formation or landscape change mechanisms that are fundamental to the geological heritage of geologically active regions. Geoconservation in such tectonically active and aggressively denuded areas therefore needs to have a different approach from geoconservation in tectonically stable continental locations.

Keywords: geoconservation, natural hazard, landform, mass movement, sustainable development, soil and water conservation

## Japanese Geopark activity: its history and role in sustainable development of local community.

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Promotion of geopark concept by Japanese scientists began in 2004. Through the symposiums and workshops held by them, strong movement to establish geoparks in Japan gradually activated from 2007 by local people in several areas where they had been making an effort to conserve and promote geological heritages for years. Responding the movement of these people, Japan Geopark Committee (JGC) was established in 2008 to evaluate aspiring geoparks in Japan.

JGC decided first three candidate areas to apply for Global Geoparks Network (GGN) from Japan in October 2008 and endorsed first seven national (domestic) geoparks including above mentioned three candidates for GGN in December 2008. The JGC played an crucial role to expand the concept of geopark that includes the idea of geoconservation and to launch geopark projects in Japan. It was top-down movement from the academic side. On the other hand the bottom-up network activity of the Japanese Geoparks Network (JGN), which was established in February 2009 by the seven first national geoparks in Japan, have been becoming active recent few years. Now evaluation of geoparks are conducted both JGC and JGN members. JGC and member geoparks of JGN have been playing an important role in conserving geodiversity, promoting geoheritages, dissemination of knowledge for disaster prevention, and also sustainable economic development through geotourism. Both top-down academic movement and bottom-up local movement now work together to establish sustainable local society.

Keywords: Geoconservation, sustainable development, Geopark, local community

## Geoconservation and Sustainable Development in Langkawi: Opportunities and Obstacles for Geopark Rangers

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This paper analyses the opportunities and obstacles for Geopark Rangers at Langkawi, Malaysia. Since the Langkawi archipelago became a duty-free destination in 1987, the number of annual visitors has increased rapidly and now numbers over three million. The certification of Langkawi as the first Global Geopark in Southeast Asia in 2006 was thus part of a broader strategy implemented by the Langkawi Development Authority (LADA) to reposition the island's rapid development along a more sustainable trajectory. A new geopark ranger system was introduced to encourage sustainable tourism via three service missions: enforcement of regulations, conservation and maintenance. This research examines the role of the rangers, investigating the set-up, current state and challenges faced by the ranger system. A mixed method approach combined primary data from interviews with the rangers' monthly report and log books (January to July 2013) at three geoforest areas that represent the geopark core zones. Findings detail the set-up process of the ranger system, from design in 2011 under the Tourism Blueprint through to implementation in 2012. Currently there are twelve rangers within the LADA Geopark Division, but the age range (19-27) reveals most to be high school graduates with little specialist knowledge of nature parks or visitor management. Analysis of primary data shows damage reports and maintenance issues to be most frequent, with little evidence of conservation and emergency reports. Challenges were identified as job conditions and organizational capacity of ranger personnel along with inter-organizational collaboration. The Langkawi case provides insight into the new ranger system as a means of regulating visitor flows within geopark core zones toward sustainable development.

Keywords: Geoconservation, Sustainable Development, Langkawi Global Geopark, Geopark Ranger, Regulation, Visitor Management

## Conservation and Interpretation of Natural Forests from Global Geopark Program

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Muroto Geopark became a Global Geoparks Network Member in 2011. This recognition actually paved the way to explore different aspects of nature through media coverage. Not only limited to geology these include natural aspects that were not adequately focused upon earlier. A notable case is the natural colony of giant Japanese Cedar (*Cryptomeria japonica*) trees located in Dannotaniyama. This colony was protected as a part of a national forest area but increased media coverage coupled with strong citizen advocacy led to the designation of 'protected forest' in October 2012 (by MAFF and Muroto City). In 2014, local residents formed a guiding group called DANSUGIKAI. This group is conducting various activities like educating people about the geological origin of Muroto cape, conservation of the mountains and of course, preservation of this natural forest. All of this actually became possible after Muroto became recognized as a geopark, so geopark activities became directly related to conservation in this case. Especially the 'Global' geopark recognition acted as a stimulant in local residents, who successfully sought expression in different types of nature related activities, such as this example of forest conservation.