

A Second Edition of the IUCN Guidelines for Cave and Karst Protection

Professor David Gillieson
University of Melbourne

Introduction

Back in 1995, a group of ACKMA members gathered in the shadow of Mount Roland, Tasmania, with the aim of writing some generic guidelines on cave and karst protection. At the time, it was felt that many land use planners and managers (and politicians, as a subset of the general population) thought and acted in 'two dimensions' only and did not recognise or even ignored cross-boundary influences from outside the strict boundaries provided by the cadastre. We saw a need for a 'three-dimensional' approach to the complexity of karst management and that the smaller karst areas were particularly vulnerable to external influences, especially from adjoining land uses.

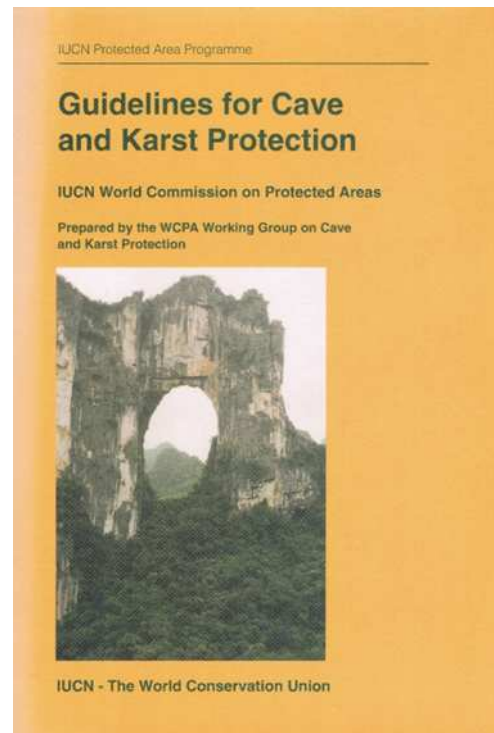
We produced the guidelines under the auspices of the World Commission on Protected Areas (WCPA), one of six Commissions of the World Conservation Union (IUCN). The WCPA is the leading global network of protected area experts with over 1,000 members in 160 countries, working in a voluntary capacity. WCPA promotes the establishment and effective management of a worldwide, representative network of terrestrial and marine protected areas. This is essential to ensure that protected areas can effectively meet the challenges of the 21st century.

The guidelines were written by John Watson, Elery Hamilton-Smith, David Gillieson and Kevin Kiernan. Others who made significant contributions were Andy Spate, Kevan Wilde, Nick White and Sue White. The final publication was edited, designed and produced by Dave Gillieson and Ric Longmore from Environment Australia. The full text can be downloaded at <https://www.iucn.org/content/guidelines-cave-and-karst-protection-0>.

The guidelines have been widely used and have been translated into several languages. They have informed the development of management plans for karst areas worldwide. It is now time to produce a new edition to take account of significant developments in karst science and protected area management.

A Second Edition

The new edition will be produced under the auspices of the Cave and Karst Working Group (CKWG) of the Geoheritage Specialist Group within WCPA. As the name implies, WCPA is focused on Protected Areas and, as a part of WCPA, the CKWG must have a primary interest in the management of caves and karst in protected areas. This is particularly true of World Heritage Sites (WHS) and Global Geoparks but also in other national protected areas (for example Ramsar Sites and MAB Reserves).



Cover of the First Edition

The CKWG currently has two goals:

- revision of the IUCN Guidelines for Cave and Karst Protection
- producing a report on caves and karst in international protected areas other than World Heritage Sites, specifically Global Geoparks, MAB Biosphere Reserves and Ramsar sites.

As one of the authors of the original guidelines, I am aware that, in addition to geoheritage, there needs to be an effective coverage of the biological issues involved in cave and karst conservation. Biological issues were not covered in the first edition and it is important for us to collaborate with the IUCN Cave Invertebrate Specialist Group, as well with as the Biology Commission of the International Union of Speleology. The original version had an Antipodean bias which we tried to reduce by gaining comments on the draft from a wide global community of karst specialists (about 300 in total). This inclusive process of review worked well for the first edition and we plan to have a similar approach to the second edition.

As John Watson has pointed out, the original guidelines did not restrict the coverage to protected areas alone. It is critically important to take a whole of landscape approach to cave and karst conservation, management and protection. This will make the new guidelines more useful for planning at local, regional or national scales.

We need to have a clear idea of the target audience and thus write the guidelines to improve readability and reduce use of technical terms and facilitate translation. Since the primary mode of dissemination is likely to be on line, we can use colour effectively with a few good diagrams to illustrate key concepts.

The use of boxed case studies and high-quality photographs will also improve readability. I look forward to hearing from people who are interested in being involved in writing the new edition. I have agreed to coordinate this work and contribute to the writing, but we need to be global in coverage and local in effective action. I have taken the liberty of putting down some of my ideas below so you have something to consider and respond to.

Email: David.Gillieson@unimelb.edu.au

Phone: +61 427 335 323 (0427 335 323 in Australia)

Draft Headings for Discussion:

- Introduction: The need for karst protection
- Some values of karst and caves
- The special nature of karst environments and cave systems
- Environmental impacts on caves and karst
- A landscape approach to karst protection
- Some basic management principles
- Developing effective monitoring

Appendices

1. The IUCN-WCPA-GSG-Cave & Karst Working Group (brief summary and Terms of Reference)
2. Guidelines in English (below are the present guidelines which will be substantially revised)
 - Effective planning for karst regions demands a full appreciation of all their economic, scientific and human values, within the local cultural and political context.
 - The integrity of any karst system depends upon an interactive relationship between land, water and air. Any interference with this relationship is likely to have undesirable impacts and should be subjected to thorough environmental assessment.
 - Land managers should identify the total catchment area of any karst lands and be sensitive to the potential impact of any activities within the catchment, even if not located on the karst itself.
 - Destructive actions in karst, such as quarrying or dam construction, should be located so as to minimise conflict with other resource or intrinsic values.
 - Pollution of groundwater poses special problems in karst and should always be minimised and monitored. This monitoring should be event-based rather than at merely regular intervals, as it is during storms and floods that most pollutants are transported through the karst system.
 - All other human uses of karst areas should be planned to minimise undesirable impacts and monitored in order to provide information for future decision. making.
 - While recognising the non-renewable nature of many karst features, particularly within caves, good management demands that damaged features be restored as far as is practicable.
 - The development of caves for tourism purposes demands careful planning, including consideration of sustainability. Where appropriate, restoration of damaged caves should be undertaken, rather than opening new caves for tourism
 - Governments should ensure that a representative selection of karst sites is declared as protected under legislation which provides secure tenure and active management.
 - Priority in protection should be given to areas or sites having high natural, social or cultural value; possessing a wide range of values within the one site; which have suffered minimal environmental degradation; and/or of a type not already represented in the protected areas system of their country.
 - Where possible, a protected area should include the total catchment area of the karst.
 - Where such coverage is not possible, environmental controls or total catchment management agreements under planning, water management or other legislation should be used to safeguard the quantity and quality of water inputs to the karst system.

- Public authorities should identify karst areas not included within protected areas and give consideration to safeguarding the values of these areas by such means as planning controls, programs of public education, heritage agreements or covenants.
- Management agencies should seek to develop their expertise and capacity for karst management.
- Managers of karst areas and specific cave sites should recognise that these landscapes are complex three. dimensional integrated natural systems comprised of rock, water, soil, vegetation and atmosphere elements.
- Management in karst and caves should aim to maintain natural flows and cycles of air and water through the landscape in balance with prevailing climatic and biotic regimes.
- Managers should recognise that in karst, surface actions may be sooner or later translated into impacts directly underground or further downstream.
- Pre. eminent amongst karst processes is the cascade of carbon dioxide from low levels in the external atmosphere through greatly enhanced levels in the soil atmosphere to reduced levels in cave passages. Elevated soil carbon dioxide levels depend on plant root respiration, microbial activity and a healthy soil invertebrate fauna. This cascade must be maintained for the effective operation of karst solution processes.
- The mechanism by which this is achieved is the interchange of air and water between surface and underground environments. Hence the management of quality and quantity of both air and water is the keystone of effective management at regional, local and site. specific scales. Development on the surface must take into account the infiltration pathways of water.
- Catchment boundaries commonly extend beyond the limits of the rock units in which the karst has formed. The whole karst drainage network should be defined using planned water tracing experiments and cave mapping. It should be recognised that the boundary of these extended catchments can fluctuate dramatically according to weather conditions, and that relict cave passages can be reactivated following heavy rain.
- More than in any other landscape, a total catchment management regime must be adopted in karst areas. Activities undertaken at specific sites may have wider ramifications in the catchment due to the ease of transfer of materials in karst.
- Soil management must aim to minimise erosive loss and alteration of soil properties such as aeration, aggregate stability, organic matter content and a healthy soil biota.
- A stable natural vegetation cover should be maintained as this is pivotal to the prevention of erosion and maintenance of critical soil properties.
- Establishment and maintenance of karst protected areas can contribute to the protection of both the quality and quantity of groundwater resources for human use. Catchment protection is necessary both on the karst and on contributing non-karst areas. Activities within caves may have detrimental effects on regional groundwater quality.
- Management should aim to maintain the natural transfer rates and quality of fluids, including gases, through the integrated network of cracks, fissures and caves in the karst. The nature of materials introduced must be carefully considered to avoid adverse impacts on air and water quality.



Lower Flint Ridge Cave, Mammoth Cave World Heritage Area, Kentucky, USA

- The extraction of rocks, soil, vegetation and water will clearly interrupt the processes that produce and maintain karst and therefore such uses must be carefully planned and executed to minimise environmental impact. Even the apparently minor activity of removing limestone pavement or other karren for ornamental decoration of gardens or buildings has a drastic impact and should be subject to the same controls as any major extractive industry.
- Imposed fire regimes on karst should, as far as is practicable, mimic those occurring naturally.
- While it is desirable that people should be able to visit and appreciate karst features such as caves, the significance and vulnerability of many such features means that great care must be taken to minimise damage, particularly when cumulative over time. Management planning should recognise this fact and management controls should seek to match the visitor population to the nature of the resource.
- International, regional and national organisations concerned with aspects of karst protection and management should recognise the importance of international co-operation and do what they can to disseminate and share expertise.
- The documentation of cave and karst protection/management policies should be encouraged and such policies made widely available to other management authorities.
- Data bases should be prepared listing cave and karst areas included within protected areas, but also identifying major unprotected areas which deserve recognition. Karst values of existing and potential World Heritage sites should be similarly recorded.

Further Reading:

BirdLife/FFI/IUCN/WWF (2014) *Extraction and Biodiversity in Limestone Areas*, Joint Briefing Paper

British Columbia, Ministry of Forests (2003)-Karst Management Handbook for British Columbia, <https://www.for.gov.bc.ca/hfp/publications/00189/Karst-Mgmt-Handbook-web.pdf>

Department of Primary Industries, Parks, Water and Environment (Tasmania) (2018) *Protecting and Managing Karst*, <http://dpipwe.tas.gov.au/conservation/geoconservation/karst/protecting-karst>

International Show Caves Association (I.S.C.A.), International Union for the Conservation of Nature (I.U.C.N.) and the International Union of Speleology (U.I.S.) (2014) Recommended International Guidelines for the Development and Management of Show Caves, http://www.uis-speleo.org/documents/Recommended_International_Guidelines_published_version.pdf

Kresic, N, (2013) *Water in Karst: Management, Vulnerability, and Restoration*, McGraw-Hill, New York, 736 pp

Prosser, C, Murphy, M and Larwood, J (2006) *Geological Conservation: A Guide to Good Practice*, English Nature, Peterborough, available at: <http://publications.naturalengland.org.uk/publication/83048>

Veni, G and seven others, 2001, *Living with karst: A fragile foundation*, American Geological Institute Environmental Awareness Series, 4, <https://www.americangeosciences.org/sites/default/files/karst.pdf>

Vermeulen, J & Whitten, T, 1999, *Biodiversity and cultural property in the management of limestone resources - lessons from East Asia*, The World Bank, Washington DC, 120 pp

Watson, J, Hamilton-Smith, E, Gillieson, D and Kiernan, K, (1997) Guidelines for Cave and Karst Protection, IUCN, Gland, <https://www.iucn.org/content/guidelines-cave-and-karst-protection-0>



Left—laciated karst near Torre de Cerredo, in the Picos de Europa World Heritage Area, Spain



Right—Polygonal karst at Waitomo, New Zealand