

Extraction and Biodiversity in Limestone Areas



This paper has been
jointly produced by:



Extraction of limestone, including for cement, aggregates and lime production, is one of the main threats to limestone-restricted biodiversity.^{1,2,3} Moreover, in contrast to wider good work on biodiversity by some in the extractives sector⁴ (e.g. the rehabilitation of some wetlands/grasslands), limestone-restricted biodiversity, and impacts upon it, are often overlooked, including by governments, companies and scientists.⁵ In order to address this pressing conservation issue,² this briefing paper has been produced by WWF International, IUCN, BirdLife International and Fauna & Flora International, aimed at regulators, associations and operators in the extractives sector. Firstly, it describes the unique biodiversity, as well as important ecosystem services, supported and provided by limestone areas. Secondly, it explains why limestone-restricted biodiversity is particularly vulnerable to extraction. Thirdly, it provides practical solutions for how extraction can be made more compatible with conserving biodiversity in limestone areas, including general good biodiversity management, as well as limestone-specific recommendations.

Biodiversity and Ecosystem Services in Limestone Areas

Limestone's particular chemistry, hydrology and geology, and associated micro-climates, has led to the evolution of a unique biodiversity, including, particular species of bats, snails, orchids, fish and beetles.⁶ For example, some cave species are so highly adapted to life in darkness that they are unable to live outside. Moreover, this biodiversity can be rich, with, for example, 80% of the 1000+ land snail species in Malaysia confined to the 1% of the country that is karst limestone.¹ Similarly, the fact that limestone areas are often less impacted than surrounding areas by agriculture and other development, has led some limestone areas to become important refuges for species which were once more widespread, e.g. certain primates. Moreover, many limestone species, and their habitats, can provide important ecosystem services. For example, cave swiftlets and bats can control pests and provide guano for fertilizers, whilst limestone stores rain and filters water supplies, and caves and other karst landforms can be important cultural and/or sacred sites for local communities,³ and are also often prized for their aesthetic value.⁷ Finally, whilst tropical limestone areas are particularly important, limestone areas in non-tropical areas (e.g. in Europe⁸) can also support very rich biodiversity, and provide valuable ecosystem services.

Vulnerabilities from Extraction

Beyond being important for biodiversity and ecosystem services, limestone areas are also vital for extractive industries, including cement, aggregates and lime production. However, limestone-restricted biodiversity is particularly vulnerable to impacts from extraction, due to the following three factors:

1 Habitats difficult/impossible to restore

Key limestone habitats (e.g. caves) can be intricate and complex, having taken millions of years to form by natural processes, such that, unlike some other natural habitats (e.g. grasslands) they are very difficult, or even impossible, to restore once damaged.

2 Species confined to a small area

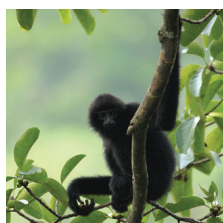
The history and geography of limestone areas often means that a particular species may be restricted to a very small area (e.g. an individual cave or hill) such that even a single extractive operation or quarry can lead to a global extinction, as has already been documented.⁹

3 Species challenging to detect and survey

Limestone habitats are often hidden and hard to access, and limestone-restricted species may be unusual and unfamiliar, such that biodiversity in limestone areas is often harder to detect and study than in some other areas, and is thus often overlooked, including in regional/national surveys and legal designations, and site-level surveys and impact assessments.⁵

Recommended Conservation Solutions

Limestone-restricted biodiversity creates both risks and opportunities for the extractives sector. If it is not adequately addressed, significant damage may be caused to global biodiversity, as well as to the reputation, stakeholder relations and long-term viability of a particular company, and the sector as a whole. Conversely, by helping to conserve limestone-restricted biodiversity, there are opportunities for operators, associations and regulators in the extractives sector to make valuable and high profile contributions to conservation, whilst also helping to safeguard their own licence to operate. This requires implementing general good biodiversity management, as well as a number of limestone-specific recommendations, as detailed on the next pages.



General Good Biodiversity Management

- 1 All new sites, as well as extensions of existing sites, should be subject to an independent and robust Environmental Impact Assessment (EIA), which includes consideration of the full range of species and habitats present on site, as well as in the surrounding area, and the impacts upon them – including direct and indirect impacts, as well as cumulative impacts caused in combination with other local developments. The resulting documents should then be robustly reviewed by regulators.
- 2 Sites that are subsequently developed, as well as all existing sites, should be overseen by a robust Environmental Management System (EMS; ideally ISO 14001 certified), linked with a dedicated Biodiversity Action Plan, as well as a Rehabilitation Plan, each of which needs to consider and address the full range of biodiversity risks and opportunities created across the site's life-cycle. Where such plans do not yet exist, initial priority should be given to developing them for sites in more sensitive areas.
- 3 Biodiversity risks that are identified from new or existing sites should be addressed in accordance with the mitigation hierarchy, i.e: (i) avoid risks as much as possible (e.g. by re-locating or re-designing sites/activities); (ii) minimise unavoidable risks (e.g. by altering specific operations); (iii) remedy remaining risks (e.g. restore damaged habitats), and; (iv) only as a last resort – offset residual impacts.¹⁰
- 4 Biodiversity surveys need to be carried out as early as possible in the life-cycle of an extraction site (ideally before decisions have been made about site location or design), and regularly thereafter, by appropriately-qualified personnel, and focusing on the most relevant species and/or groups (e.g. in limestone areas this might include: snails, spiders, reptiles, amphibians, fish and certain plants).
- 5 Where such surveys were not carried out at the outset, they should be done retrospectively, ideally referencing the pre-site situation, so as to understand overall site impacts (e.g. by referencing: aerial photographs; surrounding habitats; existing external information; and/or local expert testimony).
- 6 Biodiversity assessments should include consideration of the wider region in which a site is located, so as to appropriately identify rare and/or endemic species, as well as areas containing relatively high biodiversity. Assessments should also refer to external information sources including: [IBAT](#); [IUCN](#) and/or [National Red Lists](#); and National/Regional habitats and species designations, where available.
- 7 Where rare, protected and/or previously unknown species are detected, disturbance and damage of their habitats should be avoided. Where this is not possible, impacts should be mitigated, e.g. by altering operations. As a last resort, translocation may be possible, for certain species in certain situations, under supervision from experts and authorities, and in accordance with [IUCN Guidance](#).
- 8 At each stage, biodiversity management should include appropriate consultation and involvement of relevant experts and stakeholders, as well as consideration of relevant local, national and/or international biodiversity regulations, policies, plans and programmes, whilst also being prepared to go beyond current regulatory and policy requirements, where possible and appropriate.
- 9 The importance of, and impacts upon, biodiversity should be widely communicated, both internally within companies, and externally with suppliers, customers, competitors and the local community, so as to better understand, and co-ordinate an effective response to, the conservation challenge.



Limestone-Specific Recommendations

- 1 New limestone extraction sites, and extensions of existing sites, should – where possible – avoid impacting limestone caves, isolated limestone hills, limestone bodies with many small voids and limestone areas with underground water and/or springs, due to the particular biodiversity importance and sensitivity of these features, and because they often cannot be restored. This can be achieved by making use of surveys, and external maps (e.g. of caves¹¹), in strategic decisions.
- 2 Limestone extraction sites should be restricted, consolidated and/or grouped into one part of a large continuous limestone area, rather than being extended across the whole area or impacting many small areas, so as to reduce the likelihood of causing species extinctions, given that site-endemic species are unlikely to be restricted to just one part of a large continuous limestone area.
- 3 Where significant new risks to limestone-restricted biodiversity are detected at existing sites, which were not identified when the site was planned – due to weaker regulations and/or lower awareness at the time – operators should be encouraged by regulators to alter their existing extraction plans, including – where appropriate – by being offered alternative, less damaging, sites for their activities.
- 4 Operators of existing, or newly-proposed, extraction sites should support wider efforts to increase knowledge about limestone-restricted biodiversity, particularly regarding taxonomic groups that may be impacted by their activities. This should include: supporting IUCN and/or National Red List assessments of species not yet adequately assessed; supporting regional surveys (e.g. atlases) of species and habitats; and sharing the results of their own surveys/assessments in limestone areas.
- 5 Regulators should ensure that regional/national legal designations adequately include limestone-restricted species and habitats, and that operators are made to take responsibility for subterranean habitats – as well as surface habitats – on their sites, including mitigating any impacts upon them.
- 6 Industry associations and regulators should support the creation of regional maps of critical areas for preserving limestone-restricted biodiversity, to better inform the strategic planning of individual companies, as well as to better co-ordinate the location/management of sites operated by different companies, focusing initially on those areas where quarrying is ongoing, or likely to occur in future.

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