

RADICAL REDUCTION OF CAVE IMPACTS - THE DIRECTION OF THE FUTURE

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Abstract

The past century has seen much damage done to most of the world's caves and karst areas. Attitudes that shape cave management are changing so that new techniques may be applied to cave exploration and research. The use of more artefacts in caves to aid access and protect the cave could reduce impacts by many orders of magnitude. The choice of materials, and the philosophy of sustainable exploitation are discussed.

INTRODUCTION

The last one hundred years has seen an explosive increase in the visitation of caves. Before 1900, a few intrepid explorers and scientists investigated caves, but the majority of caves had no human contact. The caves that were discovered were exploited for any economic advantage that could be found, and little or no value was placed on many of the cave values such as anthropological deposits, fauna, and mineral deposits. Caves were used as entertainment areas, shelters, storage, mines or rubbish disposal sites.

During the last century cave exploration has become so thorough that any unexplored caves that remain are probably caves with no entrances. The attitude that caves have no value if they can not be economically exploited has not yet disappeared. Urban developers and natural environment converters still treat caves and karst areas as an impediment to the building and operating of cities, roads, dams, farms and mines, and quietly try to dispose of them to continue their projects.

Even the speleologists and cave adventurers have exploited the caves as if there was an endless supply of new caves. There are very few caves that do not show the ravages of the visitors, mostly over less than fifty years of exploitation.

The practice in the last millennium was that the discoverers of the cave could do whatever they wished to the cave. Non-existent or poorly coordinated cave management usually allowed a period of frantic activity in the cave described as exploration, which usually involved more damage per person per visit than the cave would endure through its useful lifetime. At this stage the cave was considered to be in its ultimate, pristine, wild, state, a condition to be sought after by avid speleologists.

The placing of any human artefact was regarded as anathema, on the grounds that it degraded a cave or at least the aesthetics of a cave, while the visitors would walk on most of the horizontal surface and modify the cave to fit their dimensions and perceived access requirements. Often little attempt was made to investigate the contents of the cave that might be vulnerable to damage. Secrecy at the early stages of discovery was often used to ostensibly reduce the rate of degradation but also to prevent access to those who had the knowledge, skills, motivation or legal right to

prevent damage to the cave or to properly investigate the cave and assess its management needs.

The next stage of cave development was to set up, if possible, (often with minimum planning) an economically viable industry to exploit the cave. This often involved laying tracks, blasting new tunnels, installing lifts (elevators) and even building shops inside a cave. The alibi of making the cave available to the public was the usual excuse for particular actions that were really not really excusable.

If the cave had no perceived economic potential it was allowed to remain a "wild" cave, which usually resulted in a spiral of degradation by increasingly careless cavers who had lost respect for the cave as more and more damage became obvious. All of these actions apparently presupposed that other new caves would be eventually found to serve the needs of future generations so that compromise management to meet immediate goals was acceptable.

The cycle of cave exploitation has a very sad end. "Tourist" cave enterprises that did not live up to the expectations of their operators are first closed, (a large door is locked with a large padlock), then as it becomes obvious that if one operator went out of business then so would any other, the cave is neglected. The door is broken into, the cave is vandalised and becomes the site of inappropriate activity. So a cave that had many values may finish up with very few. The time of this cycle is often only a few decades.

"Lesser" caves just became more and more carelessly used as they became more and more degraded.

So we are entering this millennium with most of our caves and karst areas compromised by past use. Our modern knowledge may allow some restoration of previously damaged caves, but mainly we continue to damage the caves at a rate that will leave very little of value by the end of this millennium.

If we are not going to continue in exactly the same way what can we do that is different? The answer may be to change our attitudes and concepts and apply the results of past research and to do more research, particularly directed towards the maintenance of the full spectrum of cave values.

DISCUSSION

A recent discussion on the concept of “wilderness caves” revealed a change in attitude that has been occurring. Wilderness areas in parks are areas which show no human modification, and the area is managed to limit the numbers using the area so that natural regeneration will maintain the pristine nature of the park. A strong culture has developed of individuals who want “pristine” environment to undertake their less than pristine activities.

Cavers also seem to have a desire to have pristine caves in which to have their adventures, but except for some caves that have annual spring water flows that scour the walls and remove any signs of previous entry, the natural processes that “heal” a cave are just too slow. So each successive visit to a cave finds a cave that is a little more degraded. The desire for pristine caves has led to the resentment by cavers of any human artefact in a cave, and the assumption that artefacts spoil a cave and detract from the “wilderness experience”.

In spite of this attitude, artefacts are increasingly appearing in caves, particularly track marking, anchor points and gates. These have mainly been applied to caves to reduce the rate of damage. The idea of “wilderness” in caves is slowly changing as it becomes obvious that a wilderness cave is only pristine to the first visitor and the luxury of trampling all over the cave is not compatible with minimising damage to the cave.

Just how far could human impact on a cave be reduced? If we were not in such a hurry to destroy a cave, what is the limit of damage reduction? Could we not have some pristine caves which contained some artefacts?

I have been inspired by the elevated board walks that are being constructed in sensitive areas in national parks. rainforest, swamps and other sensitive areas are made available to visitors to admire. These eliminate the trampling of natural surfaces and constrain the visitors to one route through the area. If the walks were removed, very little permanent change would have occurred. Large number of visitors use these walks and the increment of wear on the park for each visitor is extremely small.

Studies in tourist caves [Michie 1997, 1999] have shown that with clean walking surfaces and no physical contact with the cave, the major impact on a cave by a visitor is the dust released from the visitors and their clothing. The floor of the walkway must be kept very clean. Much of the detritus dropped by visitors can be immediately removed without damaging the cave. If floors become dirty particles will be re-entrained into the air and will spread over the whole cave surface. This rate of dust release from visitors could be further reduced, but for non-tourist caves with low volume traffic it would be a small problem as it only amounts to about one microgram per second per person. The technology of clothing has a lot of potential to further reduce particulate release to the cave. Along with dust there is the problem of biological contamination, a problem with similar solutions.

So I am proposing that it is possible to reduce impacts on caves by a huge factor by installing pre-fabricated walkways to give access to the cave.

In a wild cave, temporary scaffolding could be used to build pathways through the cave that only contact very small areas of the floor at intervals. A variety of hardware artefacts could be used to place walkways and stepping points through the cave to give access to the cave. Occasionally anchor points may need to be made on roofs and walls.

The walkway should be used from the earliest possible stage of exploration. Exploration should include the study by a number of specialists of the values of the cave. Extension of the walkway should only proceed as the study proceeds. The basic philosophy is to only do what is necessary and only if it can satisfactorily be undone.

At any time in the future, the access routes could be removed leaving only a few minor marks at contact points, and a few pieces of hardware embedded at anchor points.

This access would allow access to surveyors, photographers, scientists and the curious. The main attribute of the system is that the human never contacts the cave.

A simple test of the efficiency of such a cave access scheme would be if the visitors came out as clean as when they went in. If more development is to be done for public display the same type of prefabricated structures should be used. Then maintenance can be done by replacement and decommissioning is only a reversal of the first installation process.

Modification of the cave for human access is a problem, often the removal of some rock will aid the limitation of damage to the cave in future. Enlargement for walk-through could be an investment in minimising the pollution load on the cave by the visitors. Any proposed cave modification would require considerable study to determine its effects.

The climate of a cave is often very dependent of its shape. Change of shape can do much damage (or good) depending on the values being managed. The climate of the cave is one of the values that must be managed.

The materials used for construction must be carefully selected. Wood is unsuitable as it decomposes and contributes an exotic food chain. Treated wood is much worse, as the treatments applied to wood consist of large quantities of toxic material. Plastics may release plasticisers, and, like wood, they are flammable, a fire in a cave could be catastrophic. So some select plastics, inert metals and ceramics seem to be likely materials.

There are other problems with people in caves. One that is seldom mentioned is kleptomania. A small number of people cannot resist trying to steal something from a cave if given an opportunity.

Estimates of the numbers of items stolen from major show caves are very high, it may be a nice idea to

remove the chicken wire, but the only reason that there is anything left after 100 years may have been the chicken wire. With the new system, being out of reach may be an option, but there may still need to be some physical barriers.

CONCLUSION

We must act to stop the relentless spiral of converting caves to something that in the end is less interesting than an abandoned underground railway station.

This paper has attempted to show that it could be possible to reduce human impact on caves by orders of

magnitude. This is not intended to be a blueprint for cave exploration and development but an inspiration to more investigation of techniques to get good access to caves without the relentless degradation of old access methods.

Effort also needs to be applied to finding new values for old caves and restoring old values. If protected from continued human interference, some of the abandoned show caves may be able to be rehabilitated to make them prime habitats for threatened species of cave fauna, or observatories of cave processes or biological succession. We may learn as much from fixing broken caves as from observing pristine caves.

REFERENCES

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