Jay Anderson searches for subterranean fauna during a research trip in Calgardup Cave. Photo: Ross Anderson.

SOME REFLECTIONS ON DISAPPEARING AND REAPPEARING H_2O IN KARST

– Jay Anderson

The case of the drying caves – climate change? Human impacts? One, none or all, of the above? Or is it the case for integrated land management, environmental education, greater communication and community collaboration?

We've all seen or heard how the caves in the south-west of Western Australia (WA) are slowly drying up. Those who came to WA for the 2003 ASF Conference or the 2009 ACKMA conference would have visited Yanchep and Margaret River – both of these karst areas have experienced significant declines in the amount of water that usually flows in the caves.

Those involved in speleology and caving, who have been around for more than ten years are constantly surprised at how things have changed and we wonder 'where has the water gone'? And if you've seen any photos of the water levels in the Leeuwin Naturalise Ridge caves from the 1950-60s you understand what I am referring to – there have been drops in subterranean water levels of over 1m. Just how does that happen? Being aware of the differing geology, hydrology and climatic conditions is one consideration. Whether there are appropriate environmental controls on the use of water in karst areas, or the karst catchments is another consideration. I am astounded at how councils and shires can have karst in their area and just not understand its management needs. So I ponder this – How are land use decisions in our karst areas made? How are planning of urbanisation and developments determined? Not to mention the human impacts on the catchments – extensive bore use, dams installed, plantations: a little here, a little there – all leads to significant cumulative impacts on the subterranean environment that may not be realised until it is too late.

Back in 2006, I was involved in advocating for speleological groups concerns and in seeking legal advice regarding a proposed eucalypt plantation that was planned adjacent to the Easter-Jewel Cave karst system. For those who remember, this site is one of four significant TEC (Threatened Ecological Communities) cave sites in WA – protected under the EPBC Act. However, at the time, it appears that the authorities responsible were not fully aware of potential impacts and threatening decisions on the karst system. In that case we were able to use the support and advice of the Environmental Defender's Office to obtain a successful outcome (that plantation did not go ahead) and to facilitate some effective consultation with the local Shire. But think about this – how many other plantations are in the area – how many other decisions are made that may impact on caves.....decisions that may go unnoticed – but that add to the impacts underground?

Over the last ten years, some speleologists have been concerned at the decisions being made in relation to the caves north of Perth – where the caves were artificially supplemented in an attempt to maintain the survival of another TEC site. Many speleologists still wonder why there was not serious consideration of the impacts of pine plantations and altered land use in the karst catchment. However, after some interesting adaptive management techniques, and a lack of karst hydrological knowledge, water was pumped into sensitive sites – whether the outcomes were achieved is yet to be determined. Several years

later and some people wonder where the millions of dollars went? During the fieldtrip of the 2008 ISSB Conference (International Symposium of Subterranean Biology) a workshop was held at Yanchep – where the ethics of artificial water supplementation were pondered in an afternoon seminar facilitated by Dr Brenton Knott. There was a lot of discussion and interest in this issue and some of the complexities were pondered further.

I think about the IUCN Guidelines for Cave and Karst Protection (Watson et al 1997):

2. 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.
3. 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.
6. All other human uses of karst areas should be planned to minimise undesirable impacts, & monitored in order to provide information for future decision-making.

Many of us know that caves are a part of a karst system that has existed through time. We humans, worry about things on our time scale and ponder what seems like significant differences in one human generation - without thinking of how long the cave or the geology itself has been in existence – or how long that species lived there or what previous conditions it has survived. Some local speleologists get concerned when 'bandaid' approaches of 'water supplementation' are used without looking at the bigger picture. Like – where does the water actually come from, and what are the upstream/catchment components in this system? Why is the water declining? Has it really declined as much as you think? What we need in our environmental planning and karst management is well designed research – well funded projects that address the serious questions – rather than focussing on short-term inventions.

We all know that karst hydrology is complex. We realise that the geology of each karst area and its inter-relationships is unique. But who is talking with the agencies responsible for land management and urban planning. Do they know and understand about the complex geology and hydrology? Do they realise the impacts of their land use decisions on the land, and sensitive ecosystems? Who is involved in educating communities and people about what it means to live on karst – to live with karst? Do the local communities in karst areas know how their land use and water use will impact on sensitive cave and karst environments? When we think about all of this, it is something that we as individuals and as an organisation need to consider more seriously. That is – what impact can 'we' have? Yes – 'you' and 'me'.....because we can be involved – it needs a combination of education, communication and collaboration.

Recent water in the streamway of a cave in the Leeuwin Naturaliste National Park. Photo: Ross Anderson.

And now for some good news. Water returns to south-west caves...

Speleologists visiting caves on the Leeuwin Naturaliste Ridge recently discovered that the water is returning to a few of the local caves. Many ACKMA members have seen that a number of caves in the area once had active streams flowing in them, but over the last decade had declined, and many completely dried out.

Now, after one of the driest winters on record, two caves containing significant streamways have recorded significant rises in water levels. We realise that the hydrology of caves is complex and it is very interesting to see the water in these caves after such a dry winter. It certainly shows that more research is required and that our community just doesn't know enough about our environment. One restricted access cave in the Leeuwin-Naturaliste National Park has been dry for over seven years. Speleologists who visited the cave recently were extremely surprised to find the usually dry streambed was full of water and the above photo shows us that amazing things can happen underground!!

One other cave that still contains water is Calgardup Cave – a well-known self-guided tourist cave – managed by the Department of Environment and Conservation. It contains a Threatened Ecological Community and significant subterranean fauna that rely on the water in the cave. Over the last few years, Calgardup Cave has been suffering a decrease in water levels. However this year the cave has had higher water levels – unseen in over a decade. Speleologists understand that the hydrology of the caves is complex and more research is needed to determine the specific circumstances for each individual cave.

As we reflect on the beauty in these caves, let's also reflect on the sensitive but complex environments and how it is so important for thorough environmental assessment, research and monitoring. Human impacts on karst including urbanisation, land use and tourism all contribute to the future of sensitive karst ecosystems. I'd like to see more environmental education, greater communication, consultation and community collaboration in our karst areas!!