Living with Caves and Karst: the 14th NCKM Symposium at Chattanooga, Tennessee (USA) – October 1999

- Arthur Clarke

Those ACKMA members who attended the last ACKMA Conference at Mt. Gambier will well remember our American visitors, including the "bubbly" Cheryl Jones who eagerly invited any or all of us to attend their National Cave and Karst Management (NCKM) Symposium at Chattanooga (Tennessee) from 19 – 22 October 1999. Following on from the success of their 13th NCKM Symposium at Bellingham, in Washington (USA) – where the theme was: "*Forest Karst Ecosystems*" – the 14th symposium at Chattanooga was an equal success, following the broader theme of "*Living with Caves and Karst*".

Two ACKMA members from Australia attended the Chattanooga symposium, Neville Michie and myself. Neville had flown direct from Sydney to L.A. and Knoxville in Tennessee (TN), prior to attending the symposium where he delivered a paper titled: "*An Instrument and Method for Measurement of Dust Fall in Caves*". Following the symposium, Neville wanted to talk with cave managers and scientists about dust in show caves and cave climate/physics, especially at *Carlsbad Caverns* and *Mammoth Cave*. At both these sites (*Carlsbad* and *Mammoth*), Neville was also keen to demonstrate some recently built miniature instruments that enabled him to perform cave climate analyses "on the run".

After flying a similar route to TN but landing in Nashville, I had spent four days prior to the NCKM symposium, in the neighbouring State of Kentucky based near the small Amish tobacco growing town of Horse Cave – built above *Hidden River Cave* (the former town dump and source of hydro-power supply). Horse Cave is also renown as the home base of the American Cave Conservation Association (ACCA)'s museum, which aims to educate the public about the problems of karst and provide some solutions, as well as developing specific plans and projects for conserving and protecting karst and aquifers. Tom Aley (who delivered the opening address at the Mt. Gambier ACKMA Conference) had pre-arranged a home-stay arrangement for me at the nearby *Kentucky Down Under* (*KDY*) - an Australian theme park - enabling him to get underground into different parts of the 570km long *Mammoth Cave* system on three separate occasions. I also visited the ACCA museum at Horse Cave and the adjoining *Hidden River Cave*, plus two other commercial caves: *Kentucky Caverns* (*Mammoth Onyx Cave*) at *KDY* and *Diamond Caverns* near Cave City, recently re-opened to the public by a management team of NSS members. Following this, I motored south along various Interstate Highways with George Huppert (from the University of Wisconsin) to attend the NCKM symposium, where I delivered a paper: "*Surface disturbance threats to karst faunas in Tasmania, Australia*".

Hosted by the South Eastern Cave Conservancy Inc., the 14th NCKM symposium was held in the plush surrounds of the downtown Clarion Hotel in what is known as the Riverfront District of Chattanooga, not far from the impressive Tennessee Aquarium. Referred to as "*NCKM 99*", the symposium was run by an organising committee composed of representatives from three main bodies: the National Speleological Society (NSS), the NSS Conservation and (cave/ karst) Management section and members of the South Eastern Cave Conservancy including local cavers from the Tennessee/Alabama/Georgia region: commonly known as TAG cavers. The NCKM symposium had its own web site (www.caves.org/ncms99) with links from this home page "url" to the 22 sub-sections dealing with the different aspects of this 1999 symposium, along with links to the homepages of the three organisational bodies and links to the homepages of the previous 1995 and 1997 NCKM symposiums (NCKMS).

Located beside the Tennessee River, the NCKMS host city (Chattanooga) is found in the southeast of the State of Tennessee (TN), where it borders with the State of Georgia (immediately south), and Alabama about 32km west. Chattanooga lies at the boundary between the Valley and Ridge province and the Cumberland Plateau, with more than 10,000 known caves in the surrounding Tennessee/Alabama/Georgia (or TAG) region. Chattanooga is considered as an ideal location from which to observe the impacts of natural resource consumption, industrial operations and population growth on caves and karst in a metropolitan setting – and here like many other karstic regions in North America, you know when you are near a karst aquifer by the smell and then the taste of the highly chlorinated drinking water. Although most of the karst land in North America is privately owned, there are also many large state and national forests, parks and management areas in the karst, plus some smaller cave site areas managed by the conservancies or private commercial operators. There are numerous commercial caves in the area including *Ruby Falls* on Lookout Mountain near Chattanooga: a cave which has a waterfall "turned-on" for tourists, *The Lost Sea* and more northerly located, famed *Cumberland Caverns*. With the involvement of the numerous land management interests on karst in this part of North America: the private landowners, conservation organisations, corporations and various government agencies – all separately engaged in cave and karst management – there are a wide variety of issues, goals, philosophies, strategies and techniques represented. The Tennessee Valley limestone karsts contain some of the deepest "pits" and longest caves in North America, providing abundant wildlife habitat, as well as scientific and recreational opportunities for speleologists and cavers. The rapid growth and development in the region is placing intense pressure on these important cave, karst and groundwater resources. The extent of these groundwater resources and

nature of the subterranean aquifers and are often poorly known; the groundwater and caves themselves appear to be frequently polluted by petroleum oil spills, industrial wastes and sewage.

In view of the symposium's setting with karst surrounds and the numerous problems related to pollution of aquifers, the NCKMS theme: "*Living with Caves and Karst*" was extremely apt. Appropriately, the many karst related themes for symposium sessions included: water resources in karst, environmental problems in karst and pseudokarst, measuring managing and remediation of impacts, planning for life in karst, education and karst, karst planning and education in central Texas, karst research and conservation in the *Mammoth Cave* region, as well as biological inventories in karst. In addition to the previous sessions, the themes for papers dealing with caves or cave management issues included: geographical information systems and cave management, caves and emergency management, preserving the past in caves, managing humans underground, cave management case studies from the southeast (of USA), regional cave conservation, life underground and a particularly popular session titled: caves, bats and gates.

It was an extremely well organised, albeit very intense symposium with almost 70 paper presentations scheduled into the nine lots of parallel theme sessions (in different rooms) over the three days of scheduled lectures. In addition there were the pre- and post-symposium field trips, poster sessions, another day devoted to attending either the workshops or the organised symposium field trips, plus the banquet dinner combined with a self-guided tour of the Tennessee Aquarium – a multi-storey affair, rated as the world's largest aquarium.

The pre-symposium field trip day on Monday October 18th (1999) was organised by Bill Putnam (from the South Eastern Cave Conservancy), visiting two caves in north western Georgia: *Tom Andersons Spring Cave* and *Howard's Waterfall Cave*. The trip to the first cave was lead by Allan Paggett, a State Game Warden in the local Walker County Wildlife Management Region, who joined our gathering (getting changed near the cave entrance) wearing his hip-holstered hand-gun, truncheon and mace spray! *Tom Andersons Spring Cave* (in Walker County) is a meandering vadose phreatic system, which involved considerable thigh deep wading and stooping, but enabled me to see my first American cave salamander and the solitary pipistrelle bats. Following a smorgasbord lunch for $US4.99 (plus tax) at "Larry's" in Trenton, we entered the nearby *Howard's Waterfall Cave* (in Dade County): this cave is renown as being the recipient site of a gasoline spill where an explosion occurred during a visit by scouts using carbide lights, resulting in three deaths. Although basically a dry cave (with no sign of the entrance waterfall), it was another cave that involved a lot of stooping or crawling – I soon discovered this was the norm for many wild caves in the USA.

The first day keynote opening address titled: *Conservation and Protection of Caves – A Retrospective*" was delivered by Ronal Kerbo from the US National Park Service; Ronal was formerly head of the national park service stationed at *Carlsbad Caverns*. Following the series of cave protection acts passed by US Congress and the establishment of national cave and karst institute, Ronal was asking the question whether or not these measures had achieved any greater management and protection for caves in the USA or had substantially furthered the science of speleology?

The second day of the symposium (Wednesday 20th) was devoted to the symposium field trips or a choice of either of the two workshops: *Project Underground* (educational kits for school children) or the *Introduction to Cave and Karst GIS*. I opted for the field trips instead of the workshops, but since I now had a stiff and sore back from too much stooping during the pre-symposium field trip, I excused myself from the cave fauna field trip to see the Tennessee Cave Salamander and chose the less strenuous "*Management of Caves and Karst*" excursion by bus! It became quite confusing for me during this excursion, because it was difficult to figure out when we were in either of Tennessee, Georgia or Alabama! The first cave described was *Ellison's Cave* on Pigeon Mountain (possibly in TN); we bypassed this, and went on to *Pettijohns Cave* in Georgia - a six-and-a-half mile long wild cave open to the public, known to have an annual visitation of 6,000 plus. The visitation figure is based on the visitor completion of the self-signed two-part registration cards, separately lodged in the registration box outside the cave: the first part deposited prior to entry into the cave; this is matched with the second part deposited when visitors exit the cave. (The theory being that if there is still a car parked in the car park and only one part of the card deposited in the registration box, then rangers can assume there are some lost cavers!) It is suspected that another 2-3,000 persons probably visit this cave without filling in the registration cards. The second cave visited was *Frick's Cave* on part of 514 acre property that was formerly a chicken farm; this has now been partially protected by the purchase of a 34 acre section by the South Eastern Cave Conservancy at a cost of $US105,000. Known for its bat populations, rare cave fauna and American Indian petroglyphs, *Fricks Cave* is a closed cave, with access only for genuine scientific research. After another cheap smorgasbord lunch, where I was introduced to the famed American drink: cold sweet tea with lemon and following a second visit to *Howard's Waterfall Cave* (I know we were still in Georgia there), we journeyed to the *Russell Cave National Monument* in northern Alabama (?). Although owned and operated as a ticket-paying tourist site by the National Park Service, cavers have access to this site at any time. This cave has a spectacularly large stream entrance (which cavers mainly use), plus a duck-boarded karst walk for tourists who pass sinkholes, swallets and other karst features to an upper entrance where there are the remains of an American Indian habitation site with appropriate display and interpretation signs. Our final destination was *Nickajack Cave* in Tennessee, locally renown because Johnny Cash reportedly had a religious experience inside the cave in the mid-1960's. Since then, the cave has

been partially drowned cave by the impoundment of the Tennessee River and is now a wildlife refuge and bat maternity site, containing a protected population of the American Grey Bat. *Nickajack Cave* has also been acclaimed for being the first "non-game" protection park to be declared in the State of Tennessee.

The NCKMS banquet was held at the Tennessee Aquarium on the Thursday evening of the symposium, where the noted hydrogeologist: George Veni (from Texas) was the after dinner guest speaker talking on the subject - "*Living with Caves and Karst: An historical perspective*". He presented a broad picture of the management of caves from prehistoric to modern times, describing the many uses of caves and karst areas through human history, covering topics of access, water quality (and water quantity) and protection of karst biota – postulating that the "*…experience of where we've been in karst management will be used to project where we are going*". On Friday morning, Michael Ray Taylor delivered the closing address for the NCKMS. As author of "*Cave Passages*" and "*Dark Life*", he described the vast microbial biosphere that extends deep below the Earth's crust, with microbes known to live within hot springs and in some of our deepest caves, as well as possibly on Mars and other planets in our Solar System. He detailed the role of subterranean micro-biology and bacteria in caves, particularly those associated with cave solution/ erosion processes and speleothem deposition quoting particular examples from sites such as *Lechuguilla Cave*. Following his address, I was able to catch up with Bill Elliott and a number of other representatives of the American-based *Karst Waters Institute* to discuss the re-nomination of Cape Range (in Western Australia) for listing as one of the most threatened sites in the world (though now, I suspect we might have to add the Mt. Cripps karst area in NW Tasmania).

There had been three main issues of concern for me at the symposium: apart from the lack of scheduled free-time for sight-seeing (though Neville Michie and I did get to travel on the free electric shuttle bus and see the "*Chattanooga Choo-Choo*"). The first concern was the juggling act in deciding which papers to attend in either of the parallel theme sessions, often having to walk in and out of the different sessions. The second related to an understanding of the spoken language: especially listening to those speakers with broad accents from the southern states in USA and some Canadian provinces. (Mind you, some of the symposium organisers including Jim Wilbanks and Mark Wolinsky reckoned the language accent of the two Australian visitors were pretty hard to understand as well!) The third was simply a learning curve, to understand the different and varying cave or karst terminologies, such as: sinkholes (dolines), losing streams (swallets, sinking streams or sinkholes taking water), pits (shafts), cavelets (small caves), wind (cave draughts), draws (dry gullies), selenite (gypsum), rapelling (abseiling), preserves (cave reserves) and monuments (significant privately or publicly owned natural cave features).

On the Saturday after the main NCKMS had concluded, there was an NSS Board of Governors (BOG) meeting, plus a post-symposium field trip. Having no desire to be bogged down with another talkfest, I tagged along on the field trip, this time travelling in private cars, to the Cloudland Canyon State Park in Georgia where we were joined by a cave guide from the Pigeon Mountain Grotto. Our first stop involved a walk along an ancient streambed strewn with Poison Ivy, below tall limestone cliffs. Ascending a scree slope we came to *Case Cave*, where I was introduced to the gated culvert (or conduit) – a typical method of restricting or controlling access to wild caves in the USA, including *Lechuguilla Cave*. Entry involved a horizontal wriggle through the 15-18 inch diameter conduit to a vertical shaft with a fixed steel ladder leading down to a cave system maze through a series of vadose canyon passages and phreatic tubes, some speleothems, lots of graffiti and a few invertebrate species in damp areas, particularly near pools of water. After visiting the *Scouts Room* and witnessing the remains of several old underground campfire sites, our final destination in *Case Cave* was the so-called *Big Mud Room* with spray-painted graffiti covering several walls; this is a large mud-floored chamber that leads to a side passage containing a waterfall and a very strong smell of fumes from diesel fuel oil. After exiting this cave, we traversed around the foot of the limestone cliffs to another site: *Sittons Cave,* basically a dry streambed cave with sandy floored passages, numerous speleothems, lots of bats and an adornment of speleograffiti.

The final component of the NCKMS was the Saturday evening cook-out (barbeque) in the freezing cold, outside the entrance to *Frick's Cave*, where NCKMS attendees mixed it with BOG members, viewing videos and digital camera snapshots of caves and cavers in North America. Here I was introduced to another lot of American terminologies: hot dogs (spicey sausages or cocktail wieners if small), wieners (hot dogs – if going into a bun), buns (rolls), subs or submarine sandwiches (long bread rolls), biscuits (scones), ketchup (sweet tomato sauce), tomato sauce (hot and spicey sauce) and white coffee – made with a powdered "non-dairy creamer".

Neville Michie went north to Kentucky to attend a *Mammoth Cave* Management Conference while I went northwest to Illinois, passing the huge mine adit and pillar "quarries" in limestone bluffs near Maeystown beside the Mississippi River - then west across to Missouri to spend a few days with Tom and Cathy Aley in the southern Ozarks – visiting their own *Tumbling Creek Cave* (another national monument) and having kippers for lunch in the northern Arkansas town of "Fifty-Six" en route to *Blanchard Springs Cavern*. Neville and I joined forces again at El Paso airport in west Texas, prior to a multi-cultural experience in the Greyhound Bus depot before a five-hour bus trip to Whites City and another adventure at Ca*rlsbad Caverns* and surrounds, then heading on to Albuquerque and going our separate ways.