

In brief, I was shocked by the extent of lampenflora (and the lack of understanding of it) and the seeming disregard for in-cave conservation management. Adding to the lampenflora impacts is littering by both visitors and staff and includes rusting light fittings, spent lamps, decayed walkway materials cunningly hidden out of view and under walkways. And in Thien Cung Cave, there was the stench of a site for urination adjacent to where an in-cave attendant was positioned.

Then I reflected back some 20 years previous to a conversation I had had with the late Elery Hamilton-Smith who had just completed the second stage World Heritage Area assessment process. Elery expressed his admiration of the caves and the management's regard for the resource conservation. He was confident that new developments of the show caves were well executed and that management had a good focus on their stewardship of the resource and the visitor experience. In Elery's words - "I feel confident those caves are in good hands".

So in 2015 - just two decades later, I am being accompanied through these caves by the same management person who accompanied Elery during his assessment work. In Thien Cung Cave, this person

commented to me that when the cave was discovered and then opened for showing that much of the cave surfaces were white, and now those once white surfaces are variously mid brown-grey tones. I was asked why this was so - my reply was that it is air-borne visitor detritus settled onto every surface.

Lampenflora was similarly ubiquitous and seemingly equally not identified as an unacceptable show cave impact requiring active cave management. I bought locally in Ha Long City some sodium hypochlorite and a pump sprayer, and made up the approved solution to spray on a test site to demonstrate one possible method of control.

From this experience I returned to Australia quite stunned in my thinking that such wondrous karst resources - in less than 3 decades - could be so degraded, and possibly irretrievably so. I was about to turn 65 in a few months and thought that maybe retirement from being involved in show cave development is possibly the next best thing for me. Experiencing show caves so degraded and mis-managed in such a short time scale under World Heritage Area oversight was disturbing.

Further adventures in Seongryugul, Uljin, South Korea

Andy Spate

Neil Kell and I have been working in Seongryu Cave for many years - mainly in 2006. I visited the cave during the Samcheok City World Cave Expo in 2002 - on a very, very wet day in Samcheok - but dryish in Uljin. That day elements of the Expo were washed away. A few days later Lana Little visited Seongryugul (gul = cave) and had to swim through parts of the show cave!



Seongryugul Ticket Office. Somewhat classier than ours!

The cave, designated Korean Natural Monument No. 155, was the first show cave to open in Korea - in 1963.

But, it has a much longer history as the use of Korean caves as refuges during times of invasion stretches back a millennium or more. Seongryugul, near the east coast city of Uljin, is mentioned in a book written by a Gok Lee in 1349. There are two examples of Chinese script engraved in the rock at the cave entrance which are said to date from this time.

The cave was initially called Seonyugul because it was a beautiful site for mountain gods to stay and rest. Its current name originated during the Japanese Invasions of Korea (1592-1598). During the wars, Buddhist statues housed in the nearby temple were relocated to the cave; hence the name, Seongryugul (Cave Where Buddha Stays).

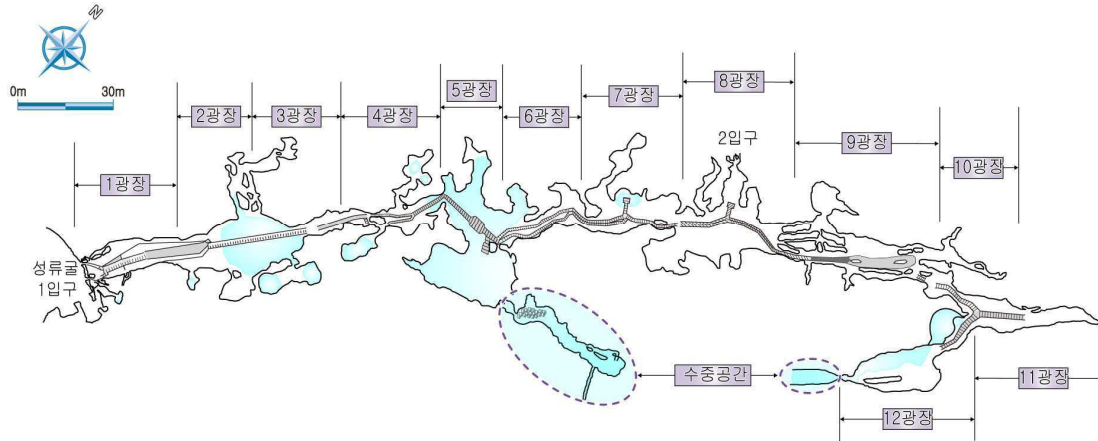
Ancient Chinese characters are engraved in the limestone just at the entrance to the cave and a short distance inside. I am unable to find what they spell out. They are said to be recording a public officer's visiting the cave on March 8 in 544 CE (Silla Dynasty, 57 BCE- 935 CE). There are 38 characters carved on the limestone near the exit of the cave each are approximately three centimetres wide and four centimetres in height. Only 30 of them are recognizable.

Seongryu cave has long been an inspiration for many artists during history including a travel journal during the Goryeo Dynasty (918-1392) and in poems and paintings during the Joseon Dynasty (1392-1897).

Tragically, as happened in other Korean show caves that Neil and I have worked in, during either (or both?) of the Japanese occupations, Koreans took refuge in Seongryugul which was then blocked by the Japanese - scores of men, women and children starved to death.

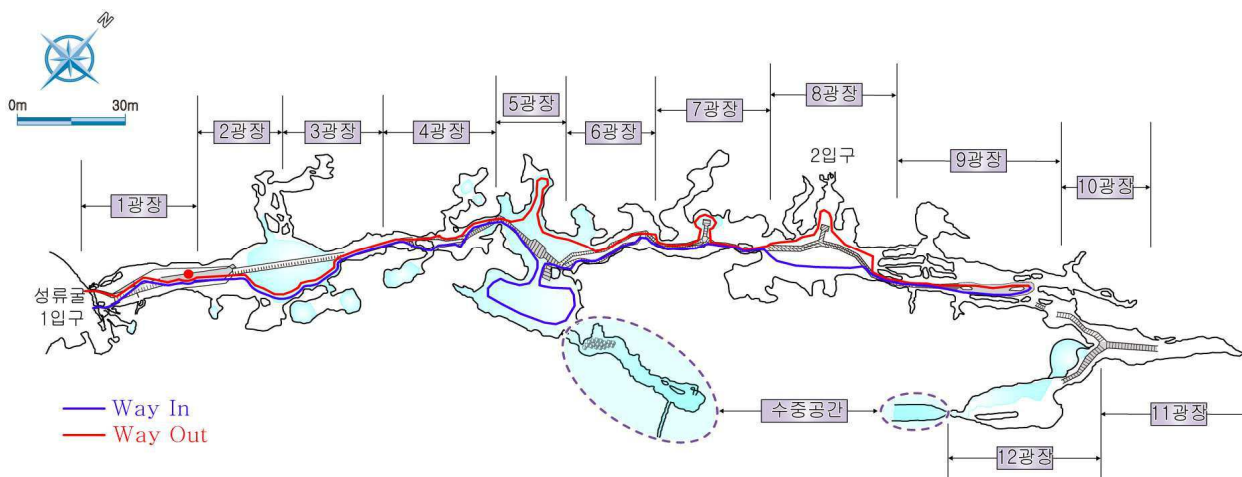
Anyway, Neil and I were retained in 2006 by the Korean Cave Research Institute (KCRI) to provide advice on relighting and infrastructure refurbishment. Some of our recommendations were accepted, some weren't, as one would expect. A number of lessons arose – for example; don't drill through waterproof housings to mount your new lights ... Don't buy cheap LEDs.

We have been provided with figures that suggest the maximum daily visitation is about 8,000; the daily minimum 50 with about 300,000 annually. The maximum figure may be a considerable under estimate. And this in a show cave only about 540 m in path length (in and out). There is one section where one has to get down on (low) hands and knees!



Existing route. Number 1 on the left hand side is the entrance. The long rectangles with the cross-hatching are stainless steel pathways or stairs. The grey is concrete – with the paving stones in Section 9. Blue is lakes – oval dashed circles are dived connections. Point 2 in Section 8 is the proposed second entrance site (already somewhat open to the outside.) Only Sections 1 to 10 are currently used by visitors. The high levels of carbon dioxide occur in Section 9 and 10.

So Neil and I were invited back by Dr Kim Lyoun of KCRI to provide further advice on recent redevelopment projects. The projects involve removal of much of the existing infrastructure and re-routing the elevated pathways over the lakes to provide a better two-way cave experience. There is a possibility of a second entrance for use in busy times allowing for one-way access to the cave. My memory told me, vividly, I had been through the cave and down the exit pathway to the village. Alas, it was a dream.



Proposed route. Note how the new route hugs the walls rather than dividing the chambers. In Section 5 in particular the in and out routes are well separated. And again, to a lesser extent, in Section 8.

Whenever I am in Korea I tell any Western companions that 'each day in Korea you will see something different!' I have been to Korea 25 times with an aggregate of over two years' time there. One day, I saw a shop that sold only eggs – that is specialization! Another difference this time was that I had a twelve-year old young man – Dr Kim Lyoun's son - as our interpreter. Master Kim Jihun was fabulous – great English, helpful, etc. Just great. He may come to Australia in the near future and I hope all Australian cave sites will make him welcome and support his visit if it happens.



Captain Lee Jong Hee and Master Translator Kim Jihun go recreational boating on the first lake.

KCRI had a number of concerns – chief of which is elevated levels of CO₂ in the back sections of the cave – 8,000+ ppm (0.8%) which occur in the summer months. The accepted work safety level is 5,000 ppm (0.5%) for a working day exposure so this should not be a problem for the self-guided visitors - except possibly for the elderly or respirational impaired people. Ventilation has been suggested ... there may be pluses and probably minuses from such an approach. There has been research into the ventilation of this cave using radon-222. More on that later.

Seongryugul is infested with stainless steel which dominates much of the within-cave viewscape.



A stainless steel highway. Note that the effect is augmented by the flash but I am sure you get the picture



Note the variation in handrail height and the horizontal bars

**Have you noted the dates
on Page 3 yet?**

It is very difficult to overcome the Koreans' wish to have ornate designs in their infrastructure. Neil and I have been recommending, for years, horizontal wires beneath hand rails. We have worked on a number of show caves in Korea and had no success. The response is that kids will stand and climb on them – but many of the caves we have worked on have horizontal bars (figure 2). Even easier to climb! Reduction of stainless steel is a must. Another issue is the variation in handrail height and diameter in many Korean show caves. And abrupt handrail transitions at steps.



Handrail transition at a step. Neil and I each witnessed several stumbles as a result of the 'vanishing' handrail (above)

Great idea for concrete pathways – lots of work but very effective in breaking up the bleakness of plain concrete (below)

