

## Ecological Environment Measure of Caves

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### 1. Introduction

Recently, the natural environment has been destroying by the continuous development of tourist industry, and living creature and microbes have been dying by agricultural chemicals. This gives us deep anxiety.

For instance, in Japan, recently, agricultural chemicals sprayed to kill insects inhabiting in the limestone area penetrated ground water and permeated into the underground cave stream. As a result, it exterminated living things in the cave, and also the underground cave stream flew out a valley and resulted in killing a lot of fries in the trout farm.

Also, a large quantity of water permeated into the cave through dolines or suction holes by a heavy flood and thereby the whole area of the cave was flooded. These cases sometimes happen in the Gomaru

area of Pyeongchang and south caves in Danyang Yeongchun in Korea. That is to say, many living things in the cave are mainly damaged in this season.

Artificial destroy cases occur too. A lime cave is formed by natural phenomenon. But it is often destroyed by human production activities or a quarry around the limestone area. The lime cave may be discovered during quarrying, such as Cheonho Cave in Jeonbuk Iksan and Hwaam Cave in Jeongseon. As they are developed for sightseeing, they will be destroyed and soiled little by little. A visit of many tourists will change the cave's weather, futher wastes will cause damage to living things.

As mentioned above, it is identified that the normal preservation of the natural environment is urgently required.

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## 2. Measure for Management and Operation

First, the cave must be classified into its characteristic, shape, academic and cultural values, and then separately designated by each category. And it must be operated only by the responsible person designated by academic and cultural values.

Second, a protective area must be established considering the ground situation by other classification of cave culture properties.

Third, the number of tourists in the cave must be controlled by the scale and characteristic of the cave if possible.

Forth, the number of tourists must be controlled by season and weather. This is to timely protect the cave's environment.

Fifth, cave managers as well as tourists must take any cave preservation education.

Sixth, the special management system to preserve the special ecology environment of the cave is required; cave temperature control, lighting control, and humidity control, etc.

## 3. General Measure for Cave Protection Facilities

First, the passage facility in the cave must be narrow and stable if possible. It must be installed at a place which sightseeing targets (landforms and things) can be easily visible. But the sightseeing course must be set up to prevent any damage by hands.

Second, if sightseeing targets are close to the passage, a protective mesh for them must be installed.

Third, drainage facilities must be installed to protect the cave's ecology and preserve the humid environment.

Fourth, when the opening time of cave tour is over, the manager must install a spring water pipe to clean the cave and keep its humidity at an invisible place.

Fifth, lighting facilities must be installed in the bottom or a handrail so that they cannot be easily visible except sightseeing targets.

Sixth, the illumination must be dark so that only sightseeing targets can be visible.

Lightings must be installed to mainly throw a light on the bottom of passage.

Seventh, lighting facilities for sightseeing targets or the passage must be installed by the blink light to keep the dark environment of the cave.

Eighth, spring coolers and so on must be installed to protect vegetation in the ground surface on the cave, keep the permeation action in the cave's strata, and continuously grow cave creatures.

Finally, a warning sign, and a direction board must be installed at a proper place in the cave.