INTERNATIONAL SHOW CAVES ASSOCIATION (ISCA)

RECOMMENDATIONS FOR SHOW CAVES IN RELATION TO THE SARS-CoV-2 VIRUS PANDEMIC (COVID-19)

Version 2 (30/04/2020)

1. INTRODUCTION

ISCA, representing all the tourist show caves in the world, has decided to establish a series of recommendations to help overcome the crisis, both health and economic, caused by the pandemic related to the spread of the virus called SARS-CoV-2. This document of recommendations has been prepared by a team of Spanish scientists and technicians, under the direction of the Chairman of the ISCA Scientific and Technical Committee, Dr. Juan-José Durán-Valsero, researcher at the Geological and Mining Institute of Spain (IGME). Subsequently, it has been reviewed and completed by Manuel Durán, President of the Association of Spanish Tourist Caves (ACTE), Brad Wuest, President of the International Show Cave Association (ISCA) and George Veni, President of the International Union of Speleology (UIS).

On December 31, 2019, China informed the World Health Organization (WHO) of the appearance of a new type of coronavirus, SARS-CoV-2 that cause the disease COVID-19, which causes major respiratory problems, resulting in death in a relatively high percentage elevated in older people and some health risk groups. Its origin is attributed to an animal market in the city of Wuhan, China, where around December 10 there was the jump of the virus from an animal to human (pangolin or bat, it is not yet very clear) and a chain of infections began, which has ended in a global pandemic.

As Wuhan begins to return to normal, on April 2, 2020, the number of one million infected in the world was reached, while the deaths amounted to more than 50,000. Practically, all the countries of the world have gradually entered into quarantine, establishing restrictions on all human activities, one of the results being that currently all show caves are closed to the public in practically the entire planet.

The subsoil is probably one of the most conservative environments that exist. The caves are environments without light, with few organic nutrients, an almost constant annual average temperature and high relative humidity. Studies on viruses and microbial communities in cavities are still poorly developed, and many of the factors that control their conservation and activation remain unknown. One of the best studied organisms has been bacteria, finding a wide underground bacterial diversity. The stability of the microbial communities in these habitats makes them a natural storehouse for microorganisms, some of which may be pathogens.

Viruses in underground environments are the least studied part of the group of *sensu lato* microorganisms present in caves. Most of the viruses studied are linked to animals

that live in some cave, such as some species of bats and certain types of rodents. Several cases of serious human transmission from bats have been documented in some African countries. The Ebola virus, the deadliest of all known so far, was also detected in African bats and monkeys. Despite the fact that cave chiropterans have a tendency as a group to have different types of virus, the specific potential of each type of bat is similar to that of other animal species belonging to other animal groups. In any case, the available data indicates that bats can be an important natural reservoir and source of various types of viruses, with a certain potential for contagion to humans. The WHO has warned of such a risk on occasion in African countries.

The first SARS (Severe Acute Respiratory Syndrome) virus came from a cave in China, in Yunnan province. Virologists identified a population of horseshoe bats that harbored virus strains with all identical genetic components to the one that jumped into humans in 2002, killing nearly 800 people. In late 2002, cases of a pneumonia-like illness began to occur in southeast China's Guangdong Province. The disease triggered a worldwide emergency as it spread worldwide in 2003, infecting thousands of people. Scientists identified a strain of coronavirus and found a virus genetically similar to the one being found in specific products from Guangdong animal markets. Later work suggested that the strain probably originated from bats before reaching humans. Already in 2017, a study revealed the possible appearance of another similar disease, with a risk of contagion for people.

The current SARS-CoV-2, origin of the disease called COVID-19, although still in the study phase, seems to have an origin similar to SARS, although with a higher level of transmission between people.

2. SOME RECOMMENDATIONS FOR THE SHOW CAVES

A series of recommendations are described below, which may be useful for show caves. All of them should be considered indicative and of voluntary application, based on the application of the Precautionary Principle. Most of them are general in nature and must be adapted to the local circumstances of each cave. Furthermore, they must be considered as changing recommendations, which can and should be modified depending on the evolution of the pandemic and always under the umbrella of the application of the rules and recommendations of the authorities of each country or competent administration. Advances in scientific knowledge and successive ISCA and UIS recommendations may modify these recommendations over time.

They have been separated into two types of recommendations, depending on the period of application:

a. Those that can be carried out at the present time, taking advantage of the closure of show caves to the public.

b. Those that should be implemented once its opening to the public has been authorized again, until it returns to a normal situation similar to that which existed before the start of the pandemic.

"These recommendations are not mandatory or compulsory. They are not rules, laws, or regulations. These recommendations should be interpreted as suggestions, options and best practices for each show cave to consider based on their unique circumstances."

2.1. Pre-opening actions

Taking advantage of the current closed period, the following actions are recommended, which may be carried out in whole or in part, depending on the needs:

- **Analysis and verification of the cave's environmental control devices (Relative Humidity, Temperature, CO_2, and Radon).**

- The need to implement, increase or maintain existing controls will be analysed, taking advantage to ensure their correct calibration and maintenance.

- **Analysis of needs and acquisition of materials related to disinfection, cleaning, security, and hygiene.**

- Adequate supplies of materials such as disposable coveralls, face masks, gloves and boots will be acquired for both technical cleaning staff and visitors. Sodium hypochlorite or bleach, disinfectant liquid, or gel (hand sanitizer) with an alcohol content of more than 70% and other products. It is also worth considering the acquisition of digital non-contact thermometers, to measure the temperature of employees and visitors.

- **Cleaning and disinfection actions inside the cave**

- Establish a specific protocol for cleaning and disinfection in each cave, which will include all the elements to be cleaned (walking paths, stairs, glass, railings, switches, etc. with emphasis on surfaces likely to be touched); the protocol of cleaning to be followed strictly by the technical cleaning staff and the cleaning frequency of each item, which is recommended to be at least daily.

- All cleaning and disinfection protocols should be performed in a manner that will not cause damage to the cavern environment.

- An intensive and integral cleaning and disinfection of the cave will be carried out with an adequate solution of sodium hypochlorite and water (attention to the excessive or continued use of this disinfectant, which can cause problems for the cave's biota, in the corrosion of certain elements, bleaching of visitors clothing or in the generation of unpleasant odors for visitors) in the artificial elements inside the cave, with special emphasis on all surfaces of pathways and stairs, with low-pressure equipment, taking care with corners, as well as the rest of anthropic surfaces: railings, walkways, panels, platforms, stands, stairs, ramps, doors, fire extinguishers or any particular element of the cave likely to be

contaminated. All cleaning materials and fluids should be removed from the cave after disinfection.

- As an alternative and especially recommended in cave systems with significant biota, we are recommending use of hydrogen peroxide (usually 3-4%) as a disinfectant of choice on cave infrastructure.

- **Actions to be performed outside the cave and in complementary buildings**

- In all the auxiliary external facilities, such as parking lots, lockers, cafeteria, restaurants, gift shops, interpretation centers or video rooms, a thorough initial cleaning and disinfection will be carried out. On the surfaces of these places some of the EPA-recommended disinfectants may be used (https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2).

- The possibility of establishing a greater distance between each vehicle in the area dedicated to parking will be analysed. For example, skipping every other parking slot.

- Hand sanitizer dispensers can be installed at the entrance of all buildings and exterior facilities, as well as in public toilets.

- Hand washing stations or hand sanitizer dispensers can be installed for employees and visitors to use prior to entering and upon exiting the cave.

- Hand sanitizer stations may be placed inside the cave in various locations, whenever possible. Particularly after locations where visitors are touching handrails or doors.

- Hand sanitizer should be placed in all dining areas.

- Protective screens can be installed to separate visitors from employees at ticketing, cafeteria, restaurant, gift shop and other points of sale. When this is not possible employees should wear face masks and gloves.

- Hand sanitizer should be placed in all gift shops particularly in areas where visitors may touch retail items.

- Consider installing, at the entrance to the cave, a disinfectant mat or other device that cleans shoe soles using a material impregnated in a disinfectant solution.

- -A special plan will be established for the collection and removal of disposable material for employees and visitors. For example, employees and visitors may be

required to wear personal protective equipment (PPE) such as facemasks and gloves.

- **Actions for cleaning and disinfecting personal caving equipment for the specific activities of each cave.**

- In the case of caves that offer speleo-adventure activities, all the necessary equipment, both personal and collective, will be thoroughly cleaned: helmets, ropes, flashlights, ladders, boots, and any other caving gear.

- **Actions for all employees and the guides of the cave**

- The training of personnel working in the cave facilities is recommended so that they acquire the necessary knowledge in the safety and hygiene actions of the current moment of the pandemic.

- In addition, the guides should be given specific training on safety and hygiene measures for informing and monitoring the visitors.

- **Actions to manage capacity and spacing of visitors**

- Analysis of the structure of cave tours. Consider reducing guided tour capacities or frequency to provide at least 1.5-2 m (6 feet) social distancing between individual visitors or differentiated family groups. Consider operating self-guided tours to increase social distancing with guides stationed in various locations inside the cave for safety, interpretation, and cave protection.

- Analysis of the tour stops and their duration to assess the need to carry them out, modify them or adapt them at the time considered most appropriate and in the appropriate places.

- Analysis of any points where one tour may pass in close proximity to another tour. Consider if the tour timing or passing locations can be adjusted.

- It is recommended to evaluate the possibility of putting temporary removable adhesive signs (for example, retro-reflector type or with stickers) on the ground to mark the orientation distance in those problem areas, such as in the entrance queue or in the explanatory stop areas.

2.2- Actions during the opening and operating phase

When the competent authorities authorize the opening of the caves to the public, the following groups of actions are recommended:

- **Related to the cave**

- Every day, after the last tour or before the opening of the cave, an intensive cleaning and disinfection of the cave should be carried out following the previously established cleaning protocol, paying special attention to all touch surfaces, horizontal surfaces and all metal and plastic or similar materials.

- The daily disinfection of other objects inside the cave is also recommended, such as boats, seats, or bleachers, if any.

- It is not recommended to aerate the interior of the cave through the use of fans since they could cause the possible dispersal and entry of viruses and other possible elements unrelated to the underground environment.

• **Related to external auxiliary infrastructures**

- In all the auxiliary external facilities, such as parking, ticket booths, points of sale, restaurants, gift shops, interpretation centres or video rooms, cleaning and disinfection will be carried out at least daily.

- At the entrance of each building there can be dispensers with hand sanitizer, replaced daily, and explanatory posters with the regulations on social distancing measures to be complied with both outside and inside the cave, properly marked.

- Because the most common method of transmission is airborne by coughing, breathing and even talking, it is recommended to either encourage or require visitors to wear face masks. Face masks can be provided (for no fee or sold) to visitors who do not bring their own.

- All employees of the facilities in direct contact with the public who are not able to maintain proper social distancing should wear face masks and gloves and should be placed inside or behind the protective screens that are available (payment boxes), so as not to come into contact with the public.

- All employees who will be handling visitor payments (currency, coins, and credit cards) must wear gloves.

- In areas such as the cafeteria or the restaurant, food will be prepared and served with employees wearing face masks and gloves and following the appropriate protocols of health authorities. When possible, pre-packaged food items are recommended, preventing them from being touched by employees or the public.

- In gift shops, visitors should be asked to only touch merchandise they intend to purchase. Visitors could be encouraged or required to wear face masks and gloves which could be provided. Merchandise that cannot be cleaned easily could be packaged and displayed in transparent plastic bags.

- **Related to the guides and other employees**

- Guides and other employees should not work if they are sick and exhibiting any symptoms. The health of all guides and other employees should be confirmed at the beginning of each workday. No-touch thermometers may be used and If a temperature of 37,5ºC (99,5ºF), or greater, is detected the employee should not be allowed to work and sent home. Any employees who begin to exhibit symptoms of being sick during the workday should be sent home immediately.

- The minimum protective equipment required by the guide will include the use of a face mask and gloves. The convenience and necessity of using shoe protectors and hat (or helmet) will be considered.

- The guides must offer clear and precise instructions to the public, acquired in the previous training period.

- They will explain the compulsory use of personal protective equipment that the visitors may be required to use, the social distancing measures to be complied with and the rules of behavior and the prohibition against touching beyond what is essential and in no case the natural formations.

- They will promptly report on the types of organisms present in the cave, particularly bats, highlighting their low presence in the tourist area, and that the vast majority of known species do not possess or transmit any type of virus. It will be emphasized that touch and walking surfaces in the cave are disinfected daily (or more frequently), to minimize any potential risk.

- The guide will avoid making stops in narrow or unsuitable places, limiting himself to those strictly necessary in the established places.

- The use of provided self-guide audio devices visitors carry can be a source of infection, so the evaluation of its possible temporary suspension is recommended. In case of considering its essential use, it will be cleaned and disinfected after each use. Using disposable covers may be considered.

- **Related to visitors**

- It should clearly be communicated that people who are sick and exhibiting symptoms should not visit. If a visitor, at the entrance to the premises or cave, suspects or has any symptoms of having a fever, a measurement of body temperature, verifying that the visitor does not have a fever, can be carried out with a remote digital thermometer, without contact. If a temperature of 37,5ºC (99,5ºF), or greater is detected, the visitor should not be allowed access to the cave or any of the facilities.

- It is recommended to study the possibility of considering only selling admissions tickets online or other measures to prevent or minimize contact of employees and visitors at the ticket booth. Credit card processors, ticket and receipt printers can be faced towards the visitors to minimize contact.

- It is at the discretion of the management of the cave and at the request of visitors, the possibility of having disposable facial masks, gloves, hats, and booties for visitors.

- Visitors must always respect the social distancing measures inside the cave and in the rest of the facilities.

- During this period, it is not recommended for older adults (65 years and older) and people of any age who have serious underlying medical conditions to visit.

This document has been written by Dr. Juan José Durán-Valsero, Dr. Pedro A. Robledo-Ardila and Ms. Raquel Morales-García, with contributions, suggestions, and supervision by Manuel Durán and Rafael Pagés (ACTE) Brad Wuest (ISCA) and George Veni (UIS). It is a contribution from the ISCA Scientific and Technical Committee, under the coordination of its Chairman, Dr. J.J. Durán.

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