

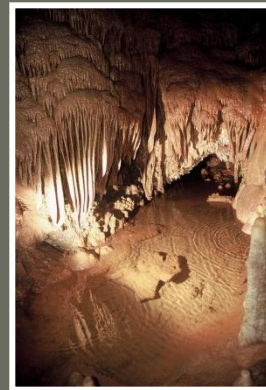


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# Waste in Caves and Potholes

Risks and legal / administrative treatment in Greece

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For several decades, many caves, and particularly potholes, have become recipients of large amounts of waste.

Illegal dumping was common at "conveniently" located spaces

- 
- **Solid waste management framework**
  - **Legislation of cave protection**
  - **Administrative practice**
  - **Impact**

## **Case Study : Agias Anna's pothole in Viotia**

*Foto: Th. Tsalikoglou*

OVER  
10000  
CAVES

# Lets talk about Karst

**Karstification** mainly occurs in carbonate rocks and is a result of water's erosive force → Carbonate rocks (limestone, dolomite etc) constitute more than **35%** of Greece surface.

Caves are part of the environment

*Geological, paleontological, biological, archaeological, historical, folkloric and aesthetic value.*

*Developmental potential & maintenance of life quality of residents*

# MSW Management Legislation

Uncontrolled Waste Disposal Site =

systematic dumping + region's municipal waste

- **Article 11 of Law 4042/12** (Compliance with Directive 2008/99 / EC - Article 3.1) *defines waste as “any substance or object which the holder discards or intends to or is required to discard”*
- **JMD 50910/2727/2003**: *Banned uncontrolled solid waste disposal*
- **Law 3536/2007**: *Both the State and the Municipalities, are obliged to pay fines in case they use Uncontrolled Waste Disposal Sites*





- **2003:** *National Solid Waste Management Plan declares that all Uncontrolled Waste Disposal Sites should have been restored until 31-12-2008.*
- **February 2004:** *1.125 uncontrolled waste disposal sites remained operational*
- **2005 :** *The Court of Justice declared that Greece had infringed the directive 75/442/EC*
- **2009 & 2010:** *Commission sent formal notices, as Greece had insufficiently complied with the judgment*
- **May 2014:** *70 out of a total of 293 illegal landfills remained operational and 223 had not yet been cleaned up*
- **2014:** *Lump sum of €10 million*
- **During 2015:** *State aims to restore all remaining uncontrolled and open dump sites during 2015. Otherwise, for every six months of non-compliance Greece should be paying a further €14.52 million*

# What happens when limited volume of waste is observed?

- ✓ The owner of the area **from which the waste originates**, is responsible for their collection and storage (Article 7 1st par., JMD 50910/2727/2003)...**However, it's obvious that the polluter's detection is extremely difficult and sites remain polluted.**
- ✓ Municipality is responsible to undertake the task according to its broad jurisdictional responsibilities for the environmental quality (Article 75 of the Municipality Code)
- ✓ Intervention in private property should be carefully considered as Article 1001 of Civil Code **reclaims that the owner of the ground surface is the owner of the underground as well.**
- ✓ According to the majority of Municipalities' Waste Regulations, **owners are responsible for their property's cleaning**, even when others have illegally discarded waste. Otherwise municipalities intervene and undertake cleaning, charging the owners for the expenses.

# Institutional Protection of Caves



- Caves and paleontological remains are included to ancient monuments **only if they can be related to human history** (Law 3028/02 Article 2)
- Caves can **be protected through 1650/86** (amended by law 3937/11) but an administrative act is required
- Ministry of Environment does not deals sufficiently with landforms sustainability
- Paleoanthropology – Speleology Service (Ministry of Culture) has tried to protect **ALL** caves





## Case Study : Agias Anna's pothole in Viotia



Hellenic Speleological Society, in 2013,  
has asked Greek Ombudsman's' help

Illegal open dumping in a pothole of 35 m.  
depth. It was the old dumpsite of the  
village. 25 meters tall volume waste

GO had made pertinent requests to all  
responsible Public Services

- Immediate activation of services
- Inspection with the participation of Paleanthropology - Speleology Service who descended in the cave – Mainly MSW but agricultural and CD & E waste are also found
- Road truncation, pothole fencing, waste identification, collection and appropriate waste disposal, restoration study submission
- The restoration cost has already been included to Municipality's budget
- Auction has been made ....



# Impact



Λέκκας 1999, Ozimen 2011

## ❑ Environmental

### ✓ Geoenvironment and Biodiversity Degradation

(Speleogenesis' interruption and damages of speleothems - side effects to the cave fauna which, usually, is endemic and institutionally protected)

### ✓ Pollution

(epidemics, air, groundwater & surface water pollution and creation of unsightly sites arises by waste dumping)

### ✓ Landscape degradation & Impairment of cultural value

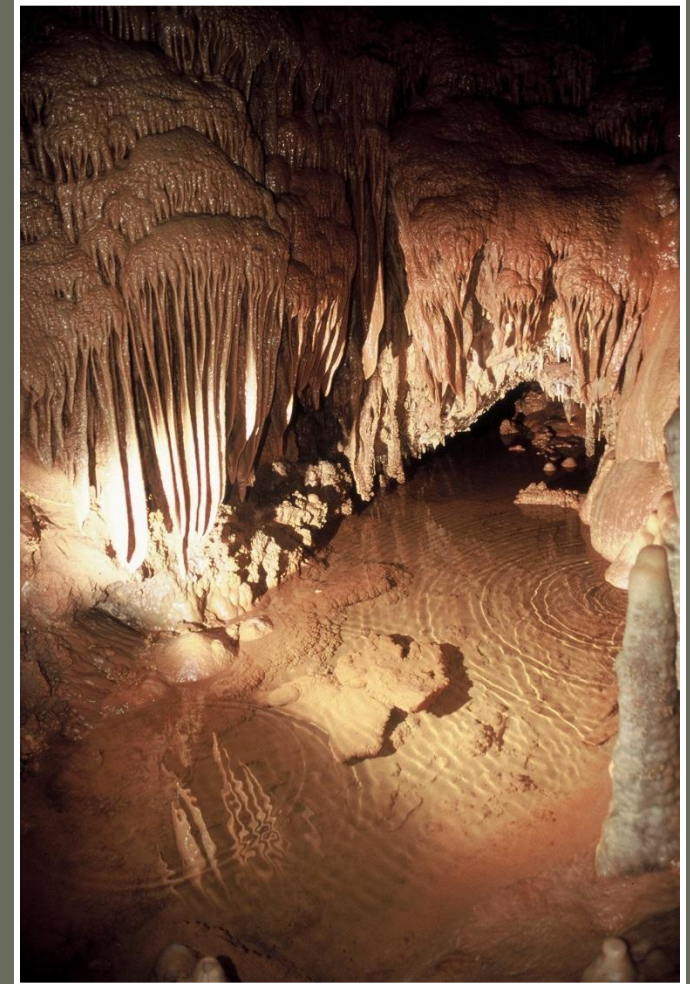
## ❑ Human health risk

(Water pollution : carcinogens and toxic chemicals & microbiological contamination + Air pollution)

## ❑ Economic Impact

# Groundwater pollution

- Pollutants communicate directly to the aquifer (Karst is open at surface to the pollutants disposal)
- Some common depollution mechanisms do not apply at all or appear rudimentarily in karstic aquifers
- Runoff water in limestone sinks, shafts, sink holes etc. is also moving underground in a direct way (and at high speed), by-passing the process of infiltration
- The movement of karst aquifers is greatly unpredictable, as well as the movement of pollutants
- Fracture flow and karst aquifers are difficult and expensive to adequately characterize



# Economic Impact

- ✓ EU fines
- ✓ Direct cost of future restoration and proper water purification
- ✓ Externalities of uncontrolled dumping for the environment and health (Increased greenhouse gas emissions, water pollution, reduction in land prices)
- ✓ Loss of community revenue from possible development of caves and potholes & Cultural value degradation.



*Tolidis 2010, Lalas 2007*

# CONCLUSIONS



- ✓ Invisibility of the underground waste disposal makes their identification and restoration difficult
- ✓ The institutional framework of caves protection is insufficient
- ✓ Main consequences :
  - Groundwater pollution
  - Human health risks
  - Destruction of geoenvironment
  - Financial impact

# IMPLICATIONS



- ✓ Proper implementation of the institutional framework for waste management and environmental protection is obligatory
- ✓ Dump sites should be recorded as underground polluted sites
- ✓ Technical restoration studies should focus on assessing the pollution of aquifers
- ✓ Establishment of comprehensive institutional framework for geotopes' protection
- ✓ Training of personnel
- ✓ Cooperation of public services & clarification of their responsibilities

# Thank you for your attention





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