

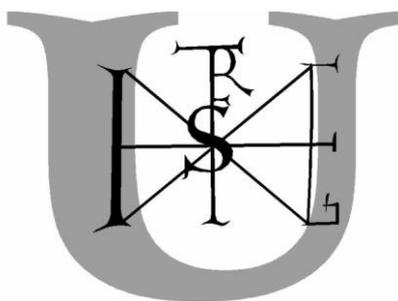
Doctoral (PhD) Theses

András Nyíró

Gödöllő

2020





SZENT ISTVÁN EGYETEM

## **KARSTWATER DISASTER**

Interactions of Anthropogenic and Natural Processes

Transdanubian Mountains, 1949-1989

András Nyíró

Gödöllő

2020

**Doctoral school**

**Name:** Enyedi György Doctoral School of Regional Studies

**discipline:** Regional science

**Secretary:** Dr. Tamás Tóth  
professor, PhD  
Szent István University  
Faculty of Economics and Social Sciences,  
Institute of Regional Economics and Rural  
Development

**Supervisor:** Dr. Tamás Tóth  
professor, PhD  
Szent István University  
Faculty of Economics and Social Sciences,  
Institute of Regional Economics and Rural  
Development

.....

A doktori iskola titkárának  
jóváhagyása

.....

A témavezető jóváhagyása



# CONTENT

<b>CONTENT.....</b>	<b>1</b>
<b>1 WORK HISTORY, OBJECTIVES.....</b>	<b>3</b>
<b>1.1 SIGNIFICANCE OF THE TOPIC .....</b>	<b>4</b>
1.2 PURPOSE OF THE RESEARCH.....	5
1.3 HYPOTHESES .....	6
<b>2 MATERIALS AND METHODS.....</b>	<b>8</b>
<b>3 RESULTS .....</b>	<b>10</b>
3.1 HYPOTHESIS TESTING .....	11
3.2 NEW SCIENTIFIC RESULTS .....	12
<b>4. CONCLUSIONS AND PROPOSITIONS .....</b>	<b>13</b>
4.1 CONCLUSIONS .....	13
4.2 PROPOSITIONS .....	14
<b>LIST OF PUBLICATIONS RELATED TO THE TOPIC.....</b>	<b>17</b>



## 1 WORK HISTORY, OBJECTIVES

I had to rethink my research objectives several times. My initial approach was to study the regional relations of my village, Keszölc. My first international publication application was rejected: *"to be published in the French geographical review of the paper needs to deal with the broader question"*. I expanded the research focus. I investigated, how our neighbor city, Dorog could escape a deeper social and economic crisis after 1989. I explored, that in the 1960s several mines were closed in the area and an industrial restructuring was executed. This study was classified as outdated and thus rejected by a prestigious Hungarian journal. I reacted to the criticisms as Sándor Schmidt, once director of the Dorog mine: *"this was the driving force, the energy source, which made me more and more work instead of being defeated."* (SCHMIDT 1932, p. 107)

When I was researching mine closures, I found an interesting report from György Moldova, with this title: *Dorog sea*. This passionate writing was about the abandoned mines flooded by karstwater from the surrounding caves. My friend Sándor Kochnyák told me about the huge caves in the neighborhood that was so large according to the ancients, that even a horse-drawn carriage could travel to Buda. I thought this was just part of the legend of Keszölc, an exaggeration of folk tales. But I found out, that it was true. I found this entry among Sándor Schmidt writings: *"we were frightened of the giant ratios of the cave, (...) this huge underground network could connect Budapest with Győr via a 1x2m profile tunnel which could give shelter to 190,000 people"*. (Schmidt 1942, p. 293) I reported this discovery to Kristóf Dankó, chief architect of Dorog. He was not surprised and noted that when a liter of water was pumped out in the Dorog mine, Lake Hévíz sank one centimeter. I thought he was kidding, but he encouraged me to just see about. That night I found the first article about the existence of a connected karst system under the Transdanubian Mountains. I also came across the astonishing equation mentioned by the Dorog chief architect: *"raising one cubic meter of karst water in Nyirad*

*will cause the Hévíz Lake to be reduced by one liter every second".* (MARÓTHY 1988, p. 2183)

After that, I started to study the hydrogeological and mining literature, and articles on water scarcity and water restrictions. The dimensions of the karst water disaster have unfolded. Thus, it was no longer difficult for me to formulate the significance of the topic of my dissertation.

## 1.1 SIGNIFICANCE OF THE TOPIC

**One of the greatest environmental catastrophes of Hungary** occurred in the Transdanubian Mountains between 1949 and 1989. To secure mining, huge amount of groundwater was extracted and discharged across the Danube into the sea. This was Europe's largest regional water extraction. It threatened the water supply of the population for forty years, causing invaluable damage to the karstwater system and associated surface water habitats. The importance of the topic is highlighted by the fact that the causes of the climate crisis are clearly attributable to anthropogenic factors. The UN climate reports are at the heart of the scientific and public debate. The importance of the topic of environmental pollution is illustrated by the fact that the cost of neutralizing environmental damage is estimated at HUF 1,000 billion. Water extraction was shut off in 1989, during the political transition period but those responsible for the environmental damage were not convicted. In order to prevent such destruction in the future, we need to name those who were responsible for the damage. The legal apparatus for environmental protection has evolved since the collapse of the Soviet empire, but its weaknesses are illustrated by the fact that only 9 years after the deadly 2010 red mud disaster, a court ruling was issued and leaders of the licensing authorities were absolved.

**Groundwater is the primary source of drinking water for 1.5-1.8 billion people.** Groundwater is the basis of water consumption in cities over 10 million inhabitants. In China, 400 major cities use groundwater for drinking water supply. A new phenomenon is that the depletion of

groundwater is leading to civil wars and wars. It goes without saying that people cannot be deterred by any armed violence or dictatorship from using their natural water sources. In 2010, the UN included access to clean water as a fundamental human right. This declaration was made after the shutdown of the Hungarian water abstraction, but it retrospectively highlights the importance of water scarcity problems. The domestic actuality of the topic is underlined by the Deputy Commissioner for the Protection of Future Generations who stressed on the priority of groundwater protection in the debate on well registration.

**The global significance of the topic** is that today, water scarcity due to groundwater extraction is directly threatening the lives of millions and threatening the future of 2 billion people in the Middle East, North Africa, the Arabian Peninsula, India over the next decades. Water scarcity due to overuse of groundwater is one of the causes of the Syrian and Yemeni civil war. In the US, California and the Great Plains, as well as in Western Australia, water scarcity has occurred due to overuse of groundwater, causing severe economic problems and drought contributing to massive forest fires.

## 1.2 PURPOSE OF THE RESEARCH

The interactions between anthropogenic and environmental processes are summarized in Figure 1. Excessive mining required intensive karstwater extraction, as indicated by the arrow between the two processes. The intensive karstwater extraction resulted catastrophic water shortage, as indicated by the arrow. In my research, I look for explanations as to why there was no feedback, which would have led to the slow-down of excessive mining. The answers should also explain why water abstraction was stopped in 1989. Therefore, the arrow between catastrophic water scarcity and excessive mining is empty and denoted by x.

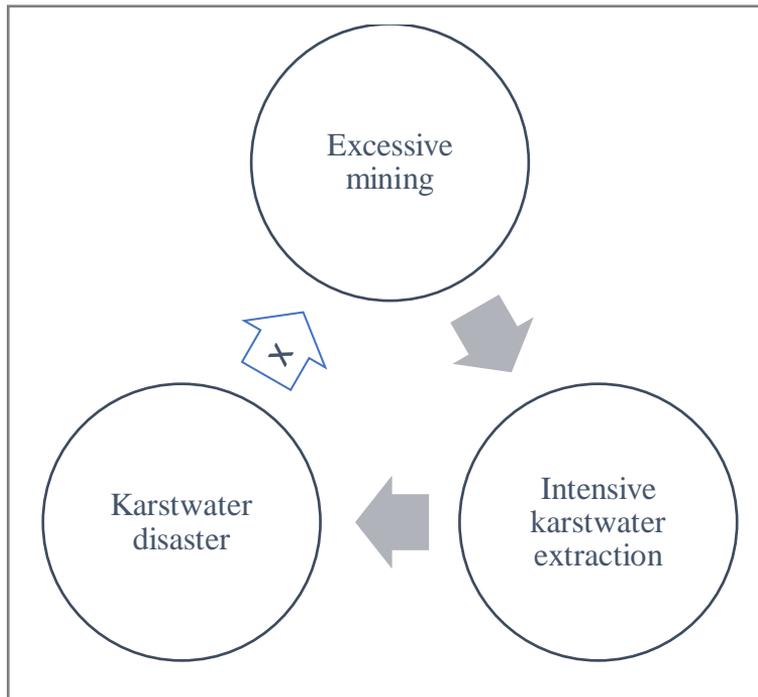


Figure 1: Interactions between anthropogenic and environmental processes  
Source: the authors editing

The purpose of the research is to answer this question: **Why was maintained excessive mining and intensive karstwater extraction despite the environmental damage?** The explanation should be valid for the reverse question: Why was excessive mining and water extraction shut off in 1989?

### 1.3 HYPOTHESES

**I test the hypotheses from two sides.** In my hypotheses, I have to determine the circumstances contributed to the maintenance of water extraction. I also have to prove that the disappearance of these circumstances played a role in shutting down the water extraction. I set up four hypotheses to examine the problem posed by the research.

**H1 The environmental consequences of the water extraction were considered catastrophic.** Water scarcity and water restrictions also affected the county centers and surrounding settlements. The ecological damage was also significant, and it was evaluated by people as a serious loss. This circumstance **ceased** when the karstwater system was regenerated, and those concerned quickly recaptured these renewable wetlands, springs and lakes.

**H2 There was a consensus on mining goals.** The objectives of mining production were excessive and did not consider the environmental consequences of associated water extraction. Stakeholders were interested in the goals. When the consensus **was broken**, people saw more value in water than in coal.

**H3 The decisions were externally imposed.** The decision-makers were ready to make strategic decisions on mining in the form of an unalterable command in favor of the occupying Soviet Union. The goals were enforced by state terror at the beginning of the era, and later more gentle forms of coercion were applied. Due to the lack of subsidiarity, stakeholders were not able to assert their interests in relation to the catastrophic consequences. When external pressures were removed, stakeholders could act against water extraction, and stopping water extraction became a realistic alternative for decision makers.

**H4** The problems caused by karstwater extraction were hidden by the authorities and stopping of mining was procrastinated. The resulting losses were recognized too late because of the macroeconomic approach of the communist system. The catastrophic water shortage was alleviated by symptomatic treatment. When problems could no longer be hidden, the cost factors appeared at macroeconomic level, and environmental problems became visible and experienceable.

## 2 MATERIALS AND METHODS

The theoretical background of the dissertation is the approach of methodological individualism. In the words of István Bibó: "I do not believe in the 100% necessity of history, but within certain broad lines I believe in more or less opportunities that can be messed up or directed to lucky tracks." (BIBÓ 2012) Continuing Bibó's metaphor, we can explain historical decision-making through the example of the railway network. The train goes on the open track for a long time, then reaches the relays. The good leader accepts that the direction is bound and notices when he can make the decision. The bad leader wants to make changes even if there are no options or she doesn't recognize the alternatives in other situations. There were decision points and alternatives in the karstwater disaster. It follows from methodological individualism that I must examine the responsibility of decision makers. At the heart of this concept is that social processes are made up of individual actions. Understanding the processes requires understanding individual actions. From a methodological point of view, my aim is to explain the facts revealed during the research and to answer these questions:

- Who, when and how made decisions?
- What information was available on the expected and actual environmental consequences of water extraction?
- What were the environmental consequences of the decisions? What were the external influences?
- How did the environmental consequences affect residents?
- What factors influenced decision makers?
- What economic, legal and technological constraints did decision-makers face?
- What were the opportunities for environmental damage victims to assert their interests?

**The first step in the research was the exploration of sources.** The literature is available on the Internet. The full contents of local papers,

hydrogeological and mining journals are available in Arcanum's database. Doctoral dissertations on the topic are also public. The great advantage of electronic document management is the ability to search texts effectively. When compiling the bibliography for the Dorog mining literature, I was helped to consult Judit Solymár, a former associate of the Dorog Coal Mine Trust Design Office, the town's local historian.

**I treated the sources with strong criticism.** Personal consultations with former mining executives and workers have helped me to understand the sources and guide research. The retired leaders of the Lencsehegy mine (Ede Sziklai, Ernő Fehér, Judit Solymár and István Vöröskői) reminded me that contemporary mine planning documents can only be used with strong source criticism, because the figures have been formulated to the management's expectations and contain false data. Subjective elements of recollections had to be filtered out. My father and grandfather were miners in Dorog, I keep family stories about mining between the two wars, this helped me in the interpretation.

**I visited the most important locations.** I visited the ruined abandoned building of the Lencsehegy mine and the huge water mine. I visited Dorog at the Reimann Altar and the mining universe that has just opened. I went to the Tokod water mine, where I could travel underground for three-quarters of an hour with the narrow electric train which was carrying miners in those years. I visited Tata and watched the Bright Spring Nature Trail, where the returning karst water feeds special aquatic life. I wandered around the world of Pilis springs and streams. I visited the largest mining center in the historical Hungary, Banská Štiavnica. I looked at the building that once housed the Mining Academy, where Sándor Schmidt, a major figure in mining and urban development in Dorog, also studied. I went through the mining museums in Selmec and visited the artificial lakes that Samuel Mikoviny had built in the mid-1700s to power the mining pumps with water.

**The lack of secondary literature caused difficulties.** There was no comprehensive economic history work concerning the period that would investigate the evolution and significance of coal mining.

**The definition of disaster:** water scarcity or environmental consequences that contemporaries or posterity considered to be catastrophic. The definition of catastrophe used in this dissertation is in line with the current legal definition. Article 3 (5) of the CXXVIII Disaster Management Act 2011 states: “a disaster is a situation when emergency must be declared, or a situation, which affects the life, health, material values, endangers the natural environment, the natural values in a way that beyond the capabilities of the designated organizations to cooperate in the prescribed procedures, and special measures must be introduced and requires strictly coordinated cooperation and international assistance. ” (PARLIAMENT 2011, p. 4) Applying this definition, the karstwater catastrophe endangered, damaged the basic supply of the population, the natural environment and natural values, and necessitated the concerted action of local governments and government bodies.

**The methods of regional analysis are summarized in Tamás Tóth's textbook.** The volume covers territorial databases, economic and social indicators, and describes the statistical procedures most used in regional analyzes. (TÓTH 2010) Tamás Tóth's book *Territorial Planning and Programming* presents the issues, tools and methods of regional development and regional policy. (TÓTH 2008) As there were no comprehensive analyzes and statistics available, I prepared case studies. I linked the case study data with the regional information and made general statements for the whole area.

### 3 RESULTS

The research question was: **Why was maintained excessive mining and intensive karstwater extraction despite the environmental damage?** I formulated four hypotheses for the question.

### 3.1 HYPOTHESIS TESTING

**H1** The environmental consequences of the karstwater extraction were considered catastrophic. I proved that the press reported water scarcity and water restrictions in the area since the early 1960s. To support the argument, I quoted several opinions that water shortages were considered catastrophic. I confirmed that the National Environmental Remediation Program determined the amount needed to neutralize the environmental pollution of the pre-regime era, but did not identify the causes of the pollution, so the amount of damage caused by karstwater extraction could not be quantified. I pointed out that after the water extraction was stopped, residents recaptured the wetlands, springs and lakes.

**H2 There was a consensus in mining purposes.** I have proved that four of the five decisions determining mining production were forcible and served the Russian interests. I confirmed that the decisions did not take into account the environmental consequences and proved that they did not carry out an environmental study during the preparation of the Eocene program. I proved the hypothesis that, the last decision of the period to close the Nyirád mine was based on the consideration of environmental effects. I proved that there was a wide interest groups around mining, and stakeholders were interested in increasing production. I proved that when this circumstance ceased, there were signs of a breakdown of consensus at the end of the period, which I proved in the narrative of the coal-water relationship.

**H3 There was external pressure in decisions.** I proved that the starting point of the first four decisions determining mining production was in Moscow. I proved, that in the lawsuit against the mining engineers, the charges were based on karstwater extraction issues. I proved that state terror prevailed in the professional issues affecting our subject in the early 1950s. I have proved by several examples that the complaints of the population were treated arrogantly, with the superiority of power. I proved that when the pressure eased, demonstrations were organized to protect

Lake Hévíz, and the relaxation of the violence proves that they were successful.

**H4 The problems caused by karstwater extraction were hidden by the authorities and stopping of mining was procrastinated.** I proved that scientific knowledge about the environmental effects of mining water extraction was available in this era. I proved that in the bargain of miners and hydrogeologists, professional arguments were overruled, and the authorities ignored the cost of water extraction. I proved that the catastrophic drinking water shortage was ameliorated by symptomatic treatment: sacheted water, water transported via trucks in the affected areas, and adapted to the declining karstwater level by building regional waterworks. I proved that at the end of the period the problems of Lake Hévíz appeared in a visible and perceptible form for everyone.

### **3.2 NEW SCIENTIFIC RESULTS**

1. I analyzed the interaction of anthropogenic and environmental processes as a complex system. I was the first in Hungary to analyze the anthropogenic factors of the karst water disaster.
2. I proved that mining-related water extraction had disastrous consequences. I proved that the consequences were well known to decision makers, and yet they continued their excessive mining. I proved that mining necessitating increased water extraction could be continued because its goals were consensual, there was coercion, and problems were obscured and solutions were postponed.
3. I proved that mining water extraction was stopped only when the consensus around intensive mining development broke down, decision-making constraints weakened, and the problems caused by water extraction became apparent.
4. I compared the processes of the karst water disaster with international examples of groundwater overuse. A new result is that I have pointed out the reasons for stopping water extraction and the anthropogenic and environmental processes of regenerating nature.

## 4. CONCLUSIONS AND PROPOSITIONS

The karst water disaster can be traced back to the increasing need for coal and energy since the late 19th century.

### 4.1 CONCLUSIONS

**Growth and development are such an inherent part of our value system that we can hardly imagine our lives without it.** The energy hunger of the modern economy is dictated by growth. There is a broad interest behind persistent anthropogenic pollution. For example, the automotive industry's profit interest is intertwined with a broad supplier ecosystem and the needs of motorists looking for comfort. In these cases, the short-term benefits outweigh the long-term losses.

**Activities supported by a broad community of interests can only be restricted or stopped once the underlying profit or political interests are weakening.** The efforts provided to handle the climate crises are treating only the symptoms, like in the history of the Hungarian karstwater disaster, when the authorities tried to reduce the thirst of cities and villages with temporary solutions instead of closing the mines. Today, the example of France shows that it is not easy for governments to do the job. President Emmanuel Macron is committed to meeting the requirements of the Paris Climate Convention. The aim was to reduce carbon emissions by 40% by 2030 and to ban petrol and diesel cars by 2040. He therefore wanted to charge an environmental tax of EUR 0.029 on the price of petrol. There was a huge nationwide protest and eventually the tax was withdrawn.

**The karstwater catastrophe of the Transdanubian Mountains was a reversible process.** Thirty years after the cessation of water extraction, the balance of the water balance restored slowly. Similarly, the expansion of the ozone hole was reversible and could be reversed by the worldwide abandonment of the use of freon-containing gases. One of the first major chemical environmental degradations, DDT, was possible to handle by withdrawing the chemical from the market.

**Scientific results, however straightforward, do not automatically inspire political action.** Hydrogeologists have signaled the consequences of water extraction, but decision-makers have not taken the steps that were considered scientifically necessary. One of the starting points of action theory is Marx's theorem "*They don't know, but they do it*", suggesting that collective action may be non-intentional. In our case, the reverse was the case, decision-makers had all the information that water abstraction had disastrous consequences. (*They know, but they do it.*)

**Decisions on groundwater have long-term effects through complex systems.** Groundwater itself is a very complex system that scientists do not see in its entirety. This complex system responds to anthropogenic interventions with a very long reaction time, each decision having a 15-20-year impact.

## 4.2 PROPOSITIONS

**Over-consumption is at the root of environmental problems.** There is a need for research that examines this context and analyzes cases where attempts have been made to limit or reduce overconsumption by legal, economic or social means.

**Decision-makers should act in conformity with the results of scientific research,** and they must be accountable for this. One of the most widely read scientific articles today is Jem Bendell's Deep Adaptation. (BENDELL 2018) Bendell graduated from Cambridge and ran a sustainable development institute at a university in England. In 2018, he studied the results of climate research and concluded that development is no longer sustainable, the only chance for mankind to adapt to the consequences of the climate crisis. Extinction Rebellion, a new international movement, was organized to control the environmental decisions and accountability of politicians.

**Those who caused the damage must be named.** There was a consensus in the change of regime that there was no accountability. However, we have

to say whose legal liability should be investigated for major environmental damage in Hungary. Here I will highlight only three actors responsible for the karstwater disaster.

- **Zoltán Ajtay**, a mining engineer, participated in compiling the false accusations against the innocent mining engineers in the early 1950's. He gave arguments to the state authorities to continue and even increase water extraction in the water-endangered areas of Dorog and Tatabánya. After serving for the communist secret terror police, he became head of the Mining Research Institute. Although he attended hydrogeological conferences, he had to be aware of the consequences of water extraction, he ignored this fact in his extensive monograph on water extraction. Ajtay received state honors. At my suggestion, the name was removed from the Komárom County Value Depository.
- **Ferenc Havasi** initiated the excessive mining program, called Eocene program from county and national positions. Irresponsible, driven by his bureaucratic games, he lobbied for mining development after leading party center analysts showed that coal mining was loss-making. In the 1970s and 1980s, nearly half of all karstwater extractions were made by the Havasi-initiated Eocene program. The program was financed by loans, which significantly contributed to Hungary's indebtedness during the political transition in 1989.
- Under the leadership of the **Hungarian Aluminum Industry Trust**, the largest water extraction took place in Nyirád in the 1980s. Scientific research has shown a link between karstwater extraction and the lack of drinking water, and natural damage, the company has been fully aware of the consequences. They did not stop the water extraction; they falsified the research results. They refrained from cooperating in community forums with those whose water was taken away and in an irresponsible test they destroyed the water lily fauna of Lake Hévíz.

**Strengthening subsidiarity helps to reduce environmental damage.** The best example of this is the history of the Yanacocha mining company, which has moved its headquarters in Peru to the village where it is mining. The company encourages its employees to participate in local public life and to bring their children to local schools. Once this is realized, they will make more balanced decisions on long-term issues.

**LIST OF PUBLICATIONS RELATED TO THE TOPIC**

- Nyíró, András:** *A wifi falu* In: Csegődi, Tibor László (szerk.) "...elemezni, tervezni, dönteni kell..." Tanulmánykötet Prof. Dr. Enyedi György emlékére Gödöllő, Magyarország: Szent István Egyetemi Kiadó, (2019) pp. 66-78., 13 p.
- Nyíró, András:** *Kesztölc: Lakosságszám és településmorfológia* STUDIA MUNDI - ECONOMICA 6: 1 pp. 83-92., 10 p. (2019)
- Nyíró, András:** *Kesztölc bekapcsolása a pilisi és a dunai turizmusba* In: Bálint, Csaba; Borbély, András; Földi, Péter; Fodor-Borsos, Eszter; Gódor, Amelita Kata; Gubacsi, Franciska (szerk.) A TURIZMUSFEJLESZTÉS AKTUÁLIS KIHÍVÁSAI MAGYARORSZÁGON Kesztölc, Magyarország: Doktoranduszok Országos Szövetsége, Közgazdaságtudományi Osztály, (2017) pp. 33-39, 6 p.
- Nyíró, András:** *The leading bodies of the party in the mirror of their resolutions* JOURNAL OF COMMUNIST STUDIES 8: 3 pp. 62-7, 14 p. (1992)
- Radovics, Istvánné; **Nyíró, András (szerk.)** *Kesztölc története* Kesztölc, Magyarország: Kesztölc Község Önkormányzata (2018)
- Nyíró, András:** *Nemzedékek közötti felelősség a pilisi erdőirtás és kopárfásítás példáján.* GAZDÁLKODÁS, 64. évfolyam, 1. szám, 24-35.pp. (2020)
- Nyíró, András;** Szakadát, István; Szakadát, László; Kelemen, Gábor; **Nyíró, András (szerk.)** *Segédkönyv a Politikai Bizottság tanulmányozásához* Budapest, Magyarország: Interart Stúdió (1989), 419 p. ISBN: 9630273519 OSZK
- Nyíró, András:** *Rugalmasság és fenntarthatóság a vidékfejlesztésben – Kesztölc* ÚJ MAGYAR KÖZIGAZGATÁS 12: 3 pp. 11-18., 8 p. (2019)