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Inter-Mountain resource extraction: A comparative study of Gold Mining in Appalachia and Carpathia

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In regions such as Appalachia and Carpathia, gold mining has existed for centuries. However, the lucrative cost of gold in the regions has also produced a devastating environmental impact which deeply shaped the sociocultural and economic development of the regions. Utilizing case studies in Dahlonega, Georgia and Rosia Montana, Romania, I illuminate the closely tied human-geography of the regions. Through my research, I draw direct connections between the exploitation of human labor, culture, and the environment. By detailing how intrinsically connected people are to place, I examine the importance of vigilant politics, locally-oriented economics, and the need for cultural and environmental preservation.

Key-words: *Environmental Change, Structural Power, Disempowerment*

As historians, we study more than dates and facts. We study ideas, places, and people. And, we study each of these interconnected facets of humanity in order to better understand our species. In this paper, I will explain how profoundly connected people are to place, and likewise how this connection illuminates a further understanding of our individual and collective roles in the creation of the future.

In particular, I will illuminate the influence of place on the development of modern civilizations by comparing the economic, political, and social responses to mineral extraction in Appalachia and Carpathia. By specifically analyzing the conditions created from gold mining in Dahlonega, Georgia and Roșia Montană, Romania, I will show that there is a deep connection between the environment and civilization in mountain communities. By comparing Dahlonega and Roșia Montană, it becomes clear that the history of mineral exploitation, and subsequent

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environmental destruction, in the regions is deeply linked to the development of an external economy, a sense of disillusionment of polity, and cultural erasure.

I will examine the exploitation of human labor, capital, and resources by external mining organizations in both regions to illustrate that each economic facet is closely linked to the degradation of a sustainable local economy. Likewise, these economic facets are bolstered by a lack of political representation, support, or activism. In combination with the degradation of the environment through acid mine drainage, topographical erasure, and the lessening of biodiversity, it becomes clear that the human-geography of the peoples living in these regions are deeply tied to the land on which they live. When the environment is destroyed, alongside the economy and a sense of political autonomy, the society as a whole exhibits physical displacement and the erasure of cultural identity. I will interpret these facets in an ethical perspective on gold extraction which asks: if we know the historic devastation of resource extraction in Appalachia, then what can we do to prevent future devastation in regions like Carpathia?

But, before I pose this question, we must first examine why gold extraction was popular in both Dahlonega and Roșia Montană. Firstly, gold is valued as a precious metal due to its malleability, low-oxidization rate, and rarity. In both Appalachia and Carpathia this lucrative resource was abundant.

In Appalachia, the first reordered discoveries of gold are often debated[2]. Commonly, Dahlonega is known to be the location of the first 'gold-rush' in Appalachia. But, gold was first reportedly discovered in 1799 in the pediment of North Carolina[3]. However, as the search continued in Northern America for gold by white settlers, these settlers further encroached southwestward into Indigenous Cherokee territory[4]. Auraria, a small town located on the outskirt of modern day Dahlonega, became the site of the original 'gold-rush' in Georgia during the early 19th century. But, the town shifted towards the economic hub of modern-day Dahlonega as gold was discovered further along the Yahoola River via diving bell[5]. Although it is deeply debated who first found the gold in Dahlonega[6], the town of Dahlonega would nonetheless boom as gold extraction established a massive

[2] David Williams, "Miners: African-Americans and the Georgia Gold Rush," *The Georgia Historical Quarterly* 75, no. 1 (1991): 77.

[3] T. Conn Bryan, "The Gold Rush in Georgia," *The Georgia Review* 9, no. 4 (1955): 398.

[4] Ibid.

[5] D. Swanson, "From Georgia to California and Back: The Rise, Fall, and Rebirth of Southern Gold Mining," *The Georgia Historical Quarterly* 100 (2): 168.

[6] David Williams, "Miners: African-Americans and the Georgia Gold Rush," *The Georgia Historical Quarterly* 75, no. 1 (1991): 77.

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industry which produced an upwards of 20,000,000 dwts. (grams) of gold between 1829 – 1849[7].

The first mining process utilized in Dahlonega was placer mining, in which individuals panned through rock waste in order to separate the bits of gold from quartz rock[8]. Following placer mining, mercury plate "saprophyte" washing became a more commercialized form of mining as crushed rock was washed over mercury plates to catch loose gold[9]. By the 1870's, a dam was built on the Yahoola Creek/ River which pushed thousands of gallons of water from the mines into a reservoir in the lower Yahoola[10]. The stamp mill then used this energy to produce over 50,000 ton of gold ore by 1900[11]. Hydraulic mining then became popular in the late nineteenth-century[12]. During hydraulic mining, a torrential force of water is shot by canon against soft rock to clear debris for mercury treatment[13]. Donald Davis use the term, "The Dahlonega Method" in his book *Where There are Mountains: An Environmental History of the Southern Appalachians* to describe the specific type of mining developed in Dahlonega. The hydraulic mining technique of Dahlonega became famously known around the region as it greatly aided the removal of gold from the ore. In this process topsoil is removed with water cannons as dirt flowed down flumes which caught the gold and sent it to the mill to be crushed. The dam on the Yahoola Creek / River eventually became part of an extensive 33 mile long aqueduct system[14]. However, once Dahlonega gold became harder to mine as the ores were developed, news of the California gold rush quickly removed a mass of the working miners in Dahlonega[15]. Although the Dahlonega Method was still seen as effective, it was no longer used due to a lack of workers and easily accessible seems of gold[16]. That is, until, a second gold-rush in Dahlonega occurred around 1900 (once gold-fever in California died off). The newly established Crown Mountain Gold Mining Company began to mine gold through the process of the cyanide of potassium[17]. During this process, gold is leeched from the rock through

[7] Wilber Colvin, "Gold Mining in Georgia," *Scientific American* 83, no. 1 (July 1900): 10.
[8] Ibid.
[9] Ibid.
[10] T. Conn Bryan, "The Gold Rush in Georgia," *The Georgia Review* 9, no. 4 (1955): 402.
[11] Wilber Colvin, "Gold Mining in Georgia," Scientific American 83, no. 1 (July 1900): 11.
[12] T. Conn Bryan, "The Gold Rush in Georgia," The Georgia Review 9, no. 4 (1955): 401.
[13] Ibid., 402.
[14] D. E. Davis, *Where There are Mountains: An Environmental History of the Southern Appalachians* (Athens: University of Georgia Press, 2005), 156.
[15] Janice Hume and Naoh Arceneaux, "Glittering Dust, Dormant Treasure: Press, Public Memory and Georgia's 'Forgotten' Gold Rush," *American Journalism* 23, no. 4 (n.d.): 12.
[16] T. Conn Bryan, "The Gold Rush in Georgia," *The Georgia Review* 9, no. 4 (1955): 402.
[17] Wilber Colvin, "Gold Mining in Georgia," *Scientific American* 83, no. 1 (July 1900): 11.

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the application of cyanide. Mining in Dahlonega finally halted during the Second World War[18].

But unlike Dahlonega, the mine at Roșia Montană has had much more longevity. Roșia Montană first became an epicenter for a mineral extraction in the 1st century B.C.[19]. The mining region of Roșia Montană was originally named 'Alburnus Maior' by the Romans who first developed the mine[20]. Archaeological evidence suggests that the first mining practices in the region consisted of a 'fire and water' method that shattered gold-bearing rock with a thermal shock[21]. Evidence of these first mining practices can still be found within the underground structures of the mountain[22]. Much of the cultural history of Roșia Montană consists of vastly changing ownership and increased industrial extraction[23]. But, after the Romans, mining on an industrial level would not return until the 13th century when the Apuseni Mountains were annexed by Hungary[24]. In the early 16th century, the mines were divided between noble families of the Duchy of Bavaria, and the development of stamp mills helped industrialize the region[25]. In 1699, under the supervision of Austrian authority in Transylvanian, Roșia Montană was designated as a mining district[26]. In the 18th century there were three types of mine ownership: state mines, private mines, and companies / small enterprise mines[27]. Private industry boomed until 1948 when the Communists government nationalized the mines[28]. In the 1970's the government used hydraulic "strip" mining to expose deeper gold-bearing seems[29]. The state continued to maintain ownership of the mines until 1999[30]. Private companies now speculate the

[18] T. Conn Bryan, "The Gold Rush in Georgia," *The Georgia Review* 9, no. 4 (1955): 403.

[19] Merciu Florentina-Cristina, Cercleux Andreea-Loreta, and Peptenatu Daniel, "Roşia Montană, Romania: Industrial Heritagein Situ, Between Preservation, Controversy And Cultural Recognition," *Industrial Archaeology Review* 37, no. 1 (2015): 17.

[20] Ibid., 9.

[21] Ibid., 7.

[22] Ibid., 8.

[23] Ibid., 17.

[24] Ibid., 8.

[25] Ibid.

[26] Florian Olteanu, "Alburnus Maijor / Rosia Montana- A Historiographical Analysis ," *Analele Universității din Craiova*, Istorie XXIV, no. 1 (n.d.): 133.

[27] Merciu Florentina-Cristina, Cercleux Andreea-Loreta, and Peptenatu Daniel, "Roşia Montană, Romania: Industrial Heritagein Situ, Between Preservation, Controversy And Cultural Recognition," *Industrial Archaeology Review* 37, no. 1 (2015): 9.

[28] Dimiter Kenarov and Nadia Shira Cohen, "Mountains of Gold: The Rosia Montana Mine," *The Virginia Quarterly Review* 88, no. 1 (2012): 184.

[29] Ibid.

[30] Florian Olteanu, "Alburnus Maijor / Rosia Montana- A Historiographical Analysis ," *Analele Universității din Craiova*, Istorie XXIV, no. 1 (n.d.): 136.

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remaining mineral value of Roșia Montană[31]. Like Dahlonega, pulverized rock at Roșia Montană is now treated with cyanide to exhume gold from rocks[32].The mine is estimated to have produced over 1,700 tons of gold throughout its history, and it is estimated to have between 14.6 to 64.9 million ounces remaining[33].

So, now the question stands: do we continue to try to extract the remaining gold in these regions? And, to that I raise: Who would benefit from the mines if we do?

To answer that, it is first important to analyze who has had direct ownership of the mines. Although mining in Dahlonega did begin as an individual activity led by placer-miners, the trade of gold was quickly privatized by external companies. The local economy was developed by external capital and labor[34]. In Dahlonega, the proliferation of external resource companies was profound, and there was little room for individual miners to collect most of the wealth produced from the mines. According to Jonathan Sarris in his book, *A Separate Civil War*, the quick economic development of the region was a direct result of hard-money democrats and capitalists who agitated for the creation of the Dahlonega Mint. In particular, Sarris notes the political influence of John C. Calhoun, former Vice President of the United States, who owned an incredibly profitable mine in the Blue Ridge Mountains and deeply supported mineral extraction in the region[35]. I believe that the influence of external industry is best embodied by the use of slaves in Dahlonega mines. Slaves consisted of approximately half of the mining workforce in North Georgia by 1830[36]. John C. Calhoun went to Dahlonega each summer to work his slaves in the mine, which exemplifies the use of outside labor to accrue wealth for an external entity[37]. Furthermore, the slaves could not keep their wages nor product. So, this process illuminated the ability of these private, external companies to extract 100% profit from the mines. By the 1870's, a majority of the mines in Dahlonega were owned by corporations or private capitalists who did not reside in Dahlonega[38]. In 1898, the Dahlonega Consolidated Gold Mining Company, one of last large mining

[31] Ibid.

[32] G. Vogel, "ROMANIA: Unexpected Riches From a Fabled Gold Mine," *Science*, New Series. 300, no. 5621 (September 2003): 890.

[33] Dimiter Kenarov and Nadia Shira Cohen, "Mountains of Gold: The Rosia Montana Mine," *The Virginia Quarterly Review* 88, no. 1 (2012): 184.

[34] D. Swanson, "From Georgia to California and Back: The Rise, Fall, and Rebirth of Southern Gold Mining," 169.

[35] J.D. Sarris, *A Separate Civil War: Communities in Conflict in the Mountain South*, 16.

[36] J.D. Sarris, *A Separate Civil War: Communities in Conflict in the Mountain South*, 10.

[37] T. Conn Bryan, "The Gold Rush in Georgia," *The Georgia Review* 9, no. 4 (1955): 399.

[38] T. Conn Bryan, "The Gold Rush in Georgia," *The Georgia Review* 9, no. 4 (1955): 401.

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organizations in the region, was established by predominantly Ohio Capitalist who owned up to 7,000 acres of gold ore and magnate iron in Dahlonega[39].

Similarly, in Romania, there has been a historic lack of direct ownership of the mines by the peoples of the region[40]. And, now, because of the 1998 Mining Law, further foreign establishment in the mining district was approved[41]. Gabriel Resources, and their faction Roșia Montană Gold Corporation, has proposed re-opening the gold ores in a 2,800 hectare open-pit mine[42]. The company intends to own 80% of the project, with the remaining 20% owned by private Romanian government enterprises[43].

In 2002, $400 million was obtained to support the re-development of the mines at Roșia Montană by the RMGC. Other than the stake in the project held by the Romanian private government enterprises, the benefits to external resource extraction is limited personal tax relief and a two percent production royalty[44]. Although Gabriel Resources promises to bring a renewed economy to the region, this will not be sustainable unless the money is invested in the development of the region, not solely the mine[45] The RMGC proposed the extraction of the remaining 14.8 million prospected ounces of gold in Rosia Montana would take 16 years[46]. Gabriel Resources pledged to invest $35 million to renew mining projects[47]. And although that sounds inviting, none of this money can be directly linked to providing the mechanisms needed to create a sustainable local economy. Gold is known for its booms and bust, and Gabriel Resources is intending to boom the

[39] Wilber Colvin, "Gold Mining in Georgia," *Scientific American* 83, no. 1 (July 1900): 10.

[40] Merciu Florentina-Cristina, Cercleux Andreea-Loreta, and Peptenatu Daniel, "Roşia Montană, Romania: Industrial Heritagein Situ, Between Preservation, Controversy And Cultural Recognition," Industrial Archaeology Review 37, no. 1 (2015): pp. 17.

[41] Mircea Buza et al., "Environmental Protection in the Apuseni Mountains: The Role of Environmental Non-Government Organizations," GeoJournal 55, no. 2/4 (2001): pp. 635.

[42] G. Vogel, "ROMANIA: Unexpected Riches From a Fabled Gold Mine," Science, New Series. 300, no. 5621 (September 2003): pp. 890.

[43] Dimiter Kenarov and Nadia Shira Cohen, "Mountains of Gold: The Rosia Montana Mine," The Virginia Quarterly Review 88, no. 1 (2012): pp. 184.

[44] Mircea Buza et al., "Environmental Protection in the Apuseni Mountains: The Role of Environmental Non-Government Organizations," GeoJournal 55, no. 2/4 (2001): pp. 635.

[45] G. Vogel, "ROMANIA: Unexpected Riches From a Fabled Gold Mine," Science, New Series. 300, no. 5621 (September 2003): pp. 890.

[46] Merciu Florentina-Cristina, Cercleux Andreea-Loreta, and Peptenatu Daniel, "Roşia Montană, Romania: Industrial Heritagein Situ, Between Preservation, Controversy And Cultural Recognition," Industrial Archaeology Review 37, no. 1 (2015): pp. 891.

[47] Dimiter Kenarov and Nadia Shira Cohen, "Mountains of Gold: The Rosia Montana Mine," The Virginia Quarterly Review 88, no. 1 (2012): pp. 193.

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economy and leave it for bust, as there has not yet been an establishment of alternative industries in the region[48].

In Dahlonega, this cycle of boom and bust deeply influenced the local economic development of the region as the workforce continually shifted to follow the gold. Economic development boomed to a gross $35 million from surface and underground mining from the initial start of the gold rush until the discovery of California gold in 1848[49].When the boom ended during the 1840's the local economy was devastated by an extreme loss in the work force. So much so, that Dr. Matthew Stephenson, a geologist and assayer at the Dahlonega Mint, called for a meeting at the town square in attempt to keep the miners in Georgia[50]. The push of working citizens was later stabilized much more by the investment in local tourism and education. And, although the primary working force is still largely external workers from the local college, the economic pull of the regional tourism ensures that this stream of workers is permanent[51].

However, in Romania, there is less job assurance in previously mined areas like Roșia Montană. Predominately, there is a lack of jobs due to the lack of establishment of other industries or economic investments other than mining in the region. Even now, Gabriel Resources does not require a significant number of local employees to work the new mines[52]. And, even though Gabriel Resources estimated that 3,500 jobs were to be created at the onset of the project, as of 2012 only 200 of the 500 actually created jobs are held by natives of the area[53]. Although Gabriel Resources estimated originally that only 500 jobs at the mine would go to foreign experts[54], barely a quarter of the estimated 1,200 citizens remain in the area as of 2012 due to a lack of job assurance[55]. Therefore, more citizens have been removed for the creation of the mine than employed, as 200-800 families have had

[48] Lucian Vesalon and Remus Creţan, "'Cyanide Kills!' Environmental Movements and the Construction of Environmental Risk at Roşia Montană, Romania," Area 45, no. 4 (2013): pp. 446.

[49] T. Conn Bryan, "The Gold Rush in Georgia," The Georgia Review 9, no. 4 (1955): p. 400.

[50] David Williams, "Miners: Arifcan-Americans and the Georgia Gold Rush," The Georgia Historical Quarterly 75, no. 1 (1991), 86.

[51] T. Conn Bryan, "The Gold Rush in Georgia," The Georgia Review 9, no. 4 (1955): p. 402.

[52] Merciu Florentina-Cristina, Cercleux Andreea-Loreta, and Peptenatu Daniel, "Roşia Montană, Romania: Industrial Heritagein Situ, Between Preservation, Controversy and Cultural Recognition," Industrial Archaeology Review 37, no. 1 (2015): pp. 16.

[53] Mircea Buza et al., "Environmental Protection in the Apuseni Mountains: The Role of Environmental Non-Government Organizations," GeoJournal 55, no. 2/4 (2001): pp. 637.

[54] G. Vogel, "ROMANIA: Unexpected Riches from a Fabled Gold Mine," Science, New Series. 300, no. 5621 (September 2003): pp. 891.

[55] Dimiter Kenarov and Nadia Shira Cohen, "Mountains of Gold: The Rosia Montana Mine," The Virginia Quarterly Review 88, no. 1 (2012): pp. 189.

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to be relocated to create the open-pit mines[56]. Gabriel Resources has even gone so far as to reject the cultural heritage of the local population, as they have proposed re-burying the family cemeteries in Roșia Montană[57].

So if gold extraction by external organizations benefits largely only those organizations, why does the polity allow for it?

Gold mining is politically endowed by limited local representation in the national government and a lack of support for activism by the government. In both regions, this is exemplified by the crossing of territorial borders and overt economic manipulation by the government. From the outset, Dahlonega miners were allowed to evade restrictions on their activities, ignoring federal decrees and hiding from U.S. troops sent to expel trespassers in 1830 from Cherokee land[58]. In a famous example, Tennesseans were chased out of Battle Creek near Auraria because they had supposedly crossed into Georgian borders, however; this skirmish over 'undisputed' land directly usurped the land from the Cherokee[59]. Furthermore, during the Civil War, when Georgia was no longer a part of the United States of America, state officials appropriated gold from the (federal) Dahlonega Mint to fund the Confederate cause[60].Thus, by continually crossing borders within the region, the search for gold quickly became viewed as more profitable than the socio-political allegiances of the government.

In Romania, the lengthy history of the shifting borders in the region exemplifies the value of the land as a political tool[61]. From the Romans, to the Bavarians, Austrian-Hungarians, Communists, and Revolutionaries, the mine has been a focal point of battles and political debate. After the fall of the Austrian-Hungarian Empire, Transylvania was assimilated by Romania and many of the mining galleries in Roșia Montană were given out to locals as cuxe, fixed-length concessions[62]. And, in 2000 cyanide spilled into the Tisa and River Danube, which illuminated the new possibility of biologically crossing borders[63]. And, even further, Gabriel Resources, despite being a Canadian company, planned to resettle roughly

[56] Ibid

[57] Dimiter Kenarov and Nadia Shira Cohen, "Mountains of Gold: The Rosia Montana Mine," The Virginia Quarterly Review 88, no. 1 (2012): pp. 187.

[58] J.D. Sarris, A Separate Civil War: Communities in Conflict in the Mountain South, 17.

[59] T. Conn Bryan, "The Gold Rush in Georgia," The Georgia Review 9, no. 4 (1955): p. 400.

[60] T. Conn Bryan, "The Gold Rush in Georgia," The Georgia Review 9, no. 4 (1955): p. 401.

[61] Historigraphy, 137

[62] Dimiter Kenarov and Nadia Shira Cohen, "Mountains of Gold: The Rosia Montana Mine," The Virginia Quarterly Review 88, no. 1 (2012): pp. 183.

[63] Lucian Vesalon and Remus Creţan, "'Cyanide Kills!' Environmental Movements and the Construction of Environmental Risk at Roşia Montană, Romania," Area 45, no. 4 (2013): pp. 447.

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1,200 local residents in 2003[64]. The lack of citizens only makes greater the struggle for a political voice by the local population[65]. As exemplified in the stories and activism of the people of Roșia Montană including Arad Palffi and Eugen Cornea who each refuse to sell their land to the government[66]; the people no longer have a voice and instead only the land under their feet. But as honorable as their stance is, it unfortunately should not have to occur. The government has offered to buy the land with the understanding that most of the citizens of Roșia Montană cannot afford to say no to their purchase due to the state of the fractured economy, therefore illuminating that the polity cares more for the bolstering of the external economy rather than sustaining a local economy.

But, what then is the true cost of economic and political suppression in these regions? Greatly, it will be the degradation of the local environment and culture.

In Dahlonega, Acid Mine Drainage still affects the region. Acid mine drainage is caused by the opening of mineralized magmatic bodies by mining works, the process of extracting of ore, and lack of regulation after the cessation of operation which allows intrusive water to interact with reactive materials[67]. When the ph of AMD is increased, the previously soluble iron percipates of iron hydroxide (Fe (OH)3) settle in the bottoms of streams as a substance known as "yellow boy"[68]. It is estimated that over 50 to 90 percent of the gold in the Dahlonega ores were extracted via old style mercury plates[69]. Because most gold resides in quartz, and was mixed with compounds of sulfur and iron, the formed "sulphurite" protects the gold from amalgamation with mercury[70]. The by-product of mercury and iron is thus released back into the environment at the cessation of mining works. By 1900, 1.5 x 10^4 to 3.2 x 10^4 (15,000 to 32,000) kg of Hg were lost to the environment in the Dahlonega Mining District[71]. And, although mining ended after the Second World War, studies such as that produced by James A. Mastrine, show that the

[64] G. Vogel, "ROMANIA: Unexpected Riches From a Fabled Gold Mine," Science, New Series. 300, no. 5621 (September 2003): pp. 891.

[65] Lucian Vesalon and Remus Creţan, "'Cyanide Kills!' Environmental Movements and the Construction of Environmental Risk at Roşia Montană, Romania," *Area 45*, no. 4 (2013): pp. 448.

[66] Dimiter Kenarov and Nadia Shira Cohen, "Mountains of Gold: The Rosia Montana Mine," The Virginia Quarterly Review 88, no. 1 (2012): pp. 185.

[67] Delia Cristina Papp et al., "Origin and Geochemistry of Mine Water and Its Impact on the Groundwater and Surface Running Water in Post-Mining Environments: Zlatna Gold Mining Area (Romania)," Aquatic Geochemistry 23, no. 4 (2017): pp. 248.

[68] Ibid

[69] Wilber Colvin, "Gold Mining in Georgia," Scientific American 83, no. 1 (July 1900): pp. 10.

[70] Ibid

[71] Delia Cristina Papp et al., "Origin and Geochemistry of Mine Water and Its Impact on the Groundwater and Surface Running Water in Post-Mining Environments: Zlatna Gold Mining Area (Romania)," Aquatic Geochemistry 23, no. 4 (2017): pp. 156.

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historic mining is still contributing to mercury pollution in the region[72]. Specifically, the Chestatee River experiences high levels of mercury in the water because of the erosion of rock during hydraulic mining coupled with the use of mercury during processioning. Biomagnifying in the fish, the mercury pollution in the waters of Lumpkin County has been linked to higher mortality rates and cancer in mining areas compared to non-mining areas[73]. Likewise, gold mining can affect the air as the mercury once used to amalgamate the gold from its rock can produce mercury rain, which poisons the environments' natural water cycle[74]. Total-HG concentrations in samples collected from the Dahlonega Mining District ranged from .93 ng 1-1 to 13.o ng 1-1 in the Chestatee river[75]. Mercury levels in Dahlonega exceed the range of worldwide background values (.1 to 3.5 ng 1^-1)[76]. And, Hg from the Chestatee river is entering Lake Lanier, a popular former Olympic Water Park, however in a manageable amount[77].

In Romania, centuries of mining have made the areas rivers red with iron and highly acidic[78]. The Roșia Montană mining district is located by the headwaters of Corna Valley watershed, as well as the Săliște and Roșia streams. These streams flow into the Abrud River, which is a tributary of Arieș River[79]. Roșia Valley also collects water from the underground hydraulic tunnels created during mining[80]. Waste-draining waters are the main contamination of the Roșia stream. It is highly acidic and also has elevated contents of As (arsenic), Cd (cadmium), Al (aluminum),Cr (chromium), Se (selenium), and So (sulfate) 4 ^2-[81].The acidic

[72] Delia Cristina Papp et al., "Origin and Geochemistry of Mine Water and Its Impact on the Groundwater and Surface Running Water in Post-Mining Environments: Zlatna Gold Mining Area (Romania)," Aquatic Geochemistry 23, no. 4 (2017).

[73] L. Esch & M. Hendryx, Chronic Cardiovascular Disease Mortality in Mountaintop Mining Areas of Central Appalachian States (2011, February)

[74] Ibid.

[75] Delia Cristina Papp et al., "Origin and Geochemistry of Mine Water and Its Impact on the Groundwater and Surface Running Water in Post-Mining Environments: Zlatna Gold Mining Area (Romania)," Aquatic Geochemistry 23, no. 4 (2017): pp. 152.

[76] Delia Cristina Papp et al., "Origin and Geochemistry of Mine Water and Its Impact on the Groundwater and Surface Running Water in Post-Mining Environments: Zlatna Gold Mining Area (Romania)," Aquatic Geochemistry 23, no. 4 (2017): pp. 157.

[77] Delia Cristina Papp et al., "Origin and Geochemistry of Mine Water and Its Impact on the Groundwater and Surface Running Water in Post-Mining Environments: Zlatna Gold Mining Area (Romania)," Aquatic Geochemistry 23, no. 4 (2017): pp. 154.

[78] G. Vogel, "ROMANIA: Unexpected Riches From a Fabled Gold Mine," Science, New Series. 300, no. 5621 (September 2003): pp. 891.

[79] Diego Servida et al., "Waste Rock Dump Investigation at Roşia Montană Gold Mine (Romania): a Geostatistical Approach," Environmental Earth Sciences 70, no. 1 (2012): pp. 16.

[80] Ibid

[81] Ibid

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solutions are iron-rich, and fill voids such as intragranular species, intraclast fractures and other porous objects[82]. Acid rain containing heavy metals such as cadmium, chromium, copper, iron, lead, and zinc, also emanate from the areas around the Abrud river[83]. There are As (arsenic) concentrations up to 10x higher than allowed by law[84]. And, as of April 2012, the AMD process is still intensely active in the mining area of Roșia Montană[85]. Likewise, in Roșia Montană, as a result of cyanide draining into the Abrud river, many fish have died at Turda. Additionally, the water is no longer naturally drinkable[86].

Moreover, the topographical landscape was vastly changed by mining. In Dahlonega, the remaining sand from the stamp mill was washed down the Yahoola Creek / River therefore raising the river bed and decreasing its depths[87]. Likewise, in Romania, Gabriel Mines intends to create four open pits (100 hectares each), with the pulverized rock piling up on a 1,200-hectare plot of land. The cyanide laced water from the extraction of the gold is expected to be stored in a 500-hectare reservoir held back by a dam made by waste rock from the mine[88]. The old state mining companies greatly scarred the landscape with their strip mining techniques in the Cetate and Carnic mountains, which left the mountains looking like terraced caves[89].

But, if it is not enough to care about the destruction of the environment for the sake of the well-being of the ecosystems or topography, then once again, it is important to remember that the mountains are intrinsically valuable for the communities around them. The landscape has deeply shaped the development of the societies in these regions, and has become a focal point of cultural identity and memory. In both Dahlonega and Roșia Montană, mining was the foundation of

[82] Diego Servida et al., "Waste Rock Dump Investigation at Roşia Montană Gold Mine (Romania): a Geostatistical Approach," Environmental Earth Sciences 70, no. 1 (2012): pp. 21.

[83] Mircea Buza et al., "Environmental Protection in the Apuseni Mountains: The Role of Environmental Non-Government Organizations," GeoJournal 55, no. 2/4 (2001): pp. 634.

[84] Diego Servida et al., "Waste Rock Dump Investigation at Roşia Montană Gold Mine (Romania): a Geostatistical Approach," Environmental Earth Sciences 70, no. 1 (2012): pp. 28.

[85] Diego Servida et al., "Waste Rock Dump Investigation at Roşia Montană Gold Mine (Romania): a Geostatistical Approach," Environmental Earth Sciences 70, no. 1 (2012): pp. 17.

[86] Mircea Buza et al., "Environmental Protection in the Apuseni Mountains: The Role of Environmental Non-Government Organizations," GeoJournal 55, no. 2/4 (2001): pp. 634.

[87] Wilber Colvin, "Gold Mining in Georgia," Scientific American 83, no. 1 (July 1900): pp. 10.

[88] G. Vogel, "ROMANIA: Unexpected Riches From a Fabled Gold Mine," Science, New Series. 300, no. 5621 (September 2003): pp. 891.

[89] Dimiter Kenarov and Nadia Shira Cohen, "Mountains of Gold: The Rosia Montana Mine," The Virginia Quarterly Review 88, no. 1 (2012): pp. 193.

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society. Therefore, it is important to remember that the industrial heritage of these places were integral to the development of the cultural heritage of its peoples[90].

Thus, when land is exchanged as nothing more than a commodity, the cultural heritage too is weighed for its profitability. However, in Dahlonega, it seems as if the cultural heritage of the land has now become what makes the place so valuable. After the Consolidated Gold Mines closed in 1906, the local economy was bolstered by the development of the local university, as well as investment in agriculture and tourism[91]. And now, the local economy deeply benefits from culturally influenced activities and locations, such as apple-picking and leaf-viewing in the fall. The old consolidated gold mines became a tourist attraction which includes tours of the old mine, individual placer mining, and a gift shop. Furthermore, starting in October of 1954, "Gold Rush Day" became an annual holiday in Dahlonega which celebrates its cultural heritage through traditional storytelling, crafting, music, food, and a 'homecoming' event at the college. The cultural history of the college has also become deeply entwined in the history of mining in the region, as the site of the modern Price Memorial building was formerly the first United States stamp mill. To honor this history, the school boasts gold and blue as their colors, and the steeple of Price Memorial Hall is coated in authentic Dahlonega gold. The town now also has many spots for tourism including wineries, meaderies, a Gold Museum on town square, and restaurants such as the Smith House which seek to replicate the cultural heritage of the mining era. The Smith House itself is so incredibly interesting because it was created over an old mine shaft which is still viewable from the restaurant today. So, even though the economy is still fueled by outside capital, it is now sustained by local investment.

In Romania, there is also a profound cultural heritage connected to the historic mines. Excavations in Roșia Montană uncovered temples and a stone quarried Roman mausoleum near Alba Iulia[92]. This is a great pride for this area due to the mines massive infrastructural feats[93]. So much so, that they have been tentatively added to the UNESCO (The United Nations Educational, Scientific and

[90] Merciu Florentina-Cristina, Cercleux Andreea-Loreta, and Peptenatu Daniel, "Roşia Montană, Romania: Industrial Heritagein Situ, between Preservation, Controversy and Cultural Recognition," Industrial Archaeology Review 37, no. 1 (2015): pp. 5.

[91] T. Conn Bryan, "The Gold Rush in Georgia," The Georgia Review 9, no. 4 (1955): p. 402.

[92] G. Vogel, "ROMANIA: Unexpected Riches From a Fabled Gold Mine," Science, New Series. 300, no. 5621 (September 2003): pp. 891.

[93] Florian Olteanu, "Alburnus Maijor / Rosia Montana- A Historiographical Analysis ," Analele Universitatii Din Craiova, Istorie XXIV, no. 1 (n.d.), pp. 129.

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Cultural Organization) list[94]. Therefore, the ancient underground mines of Roșia Montană could possibly also be opened to tourism[95]. Likewise, the area could be rejuvenated for hiking, agricultural tourism, and artisanal mining[96]. Andrei Gruber even theorized that motocross competitions could occur in remaining old mine-pits in a similar fashion to competitions occurring in Austria's old mine pits[97].

However, each of these potential economic investments in the local economy of Roșia Montană are directly affected by the project proposed by Gabriel Resources. There have been no clear measures issued by Gabriel Resources to alleviate the effects of the vibrations on the historic Roman mining cites even though their destruction would be illegal[98]. Likewise, there is no law which will inflict a penalty on any damage created to the Roman structures ranked as historic markers[99]. Furthermore, the mining will destroy key farmland for agricultural tourism and human settlements as Gabriel Resources intends to mine through the open-pit extraction of 2,800 hectares of land[100].

Cultural destruction is further heightened by lost discourses in mass media. In Dahlonega, this was exemplified by Georgia's inability to compete with the Californian gold rush due to rampant media publications[101]. As Janice Hume states, "regional memory is shaped by national identity,"[102] and, Dahlonega's gold rush was easily overshadowed by the Californian gold rush because of this.

[94] Merciu Florentina-Cristina, Cercleux Andreea-Loreta, and Peptenatu Daniel, "Roşia Montană, Romania: Industrial Heritagein Situ, between Preservation, Controversy and Cultural Recognition," Industrial Archaeology Review 37, no. 1 (2015): pp. 16.

[95] Dimiter Kenarov and Nadia Shira Cohen, "Mountains of Gold: The Rosia Montana Mine," The Virginia Quarterly Review 88, no. 1 (2012): pp. 192.

[96] Dimiter Kenarov and Nadia Shira Cohen, "Mountains of Gold: The Rosia Montana Mine," The Virginia Quarterly Review 88, no. 1 (2012): pp. 190.

[97] Dimiter Kenarov and Nadia Shira Cohen, "Mountains of Gold: The Rosia Montana Mine," The Virginia Quarterly Review 88, no. 1 (2012): pp. 191.

[98] Merciu Florentina-Cristina, Cercleux Andreea-Loreta, and Peptenatu Daniel, "Roşia Montană, Romania: Industrial Heritagein Situ, Between Preservation, Controversy And Cultural Recognition," Industrial Archaeology Review 37, no. 1 (2015): pp. 15.

[99] Merciu Florentina-Cristina, Cercleux Andreea-Loreta, and Peptenatu Daniel, "Roşia Montană, Romania: Industrial Heritagein Situ, Between Preservation, Controversy And Cultural Recognition," Industrial Archaeology Review 37, no. 1 (2015): pp. 16.

[100] G. Vogel, "ROMANIA: Unexpected Riches From a Fabled Gold Mine," Science, New Series. 300, no. 5621 (September 2003): pp. 890.

[101] Janice Hume and Naoh Arceneaux, "Glittering Dust, Dormant Treasure: Press, Public Memory and Georgia's 'Forgotten' Gold Rush," American Journalism 23, no. 4 (n.d.): pp. 25.

[102] Ibid

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In Romania, there is a large amount of environmental information which is not shared with the citizens[103]. And, most of the mass media is divided on how to react to the potential new mining projects[104]. Furthermore, there has been a push of 'expert' and 'counter-expert' publications which only further the divide[105].

So what can we do to mitigate these profound issues in Romania? Well, that requires a four-pronged response to potential mining opportunities.

If we are following by example, then Dahlonega serves to show how gold mining can be made into a sustainable local economy. But, this requires firstly economic investment in local businesses, investment in tourism, and investment in cultural heritage. This can only occur, however; if the voices of the local population are elevated in the economic decision making processes. Although political activism has always been somewhat mitigated in Dahlonega by what B. Behringer and G.H. Friedell, states is an "unenviable dilemma" of the citizens to either face the repercussions of environmental degradation or accept the mining jobs which allowed them to stay their culturally significant region[106]. It does not mean that the citizens of Dahlonega did not still protest the degradation of their environment. And, to this day, there is still massive environmental activism in the region. The greatest example I have experienced, is the annual Hemlock Festival which advocates for the re-population of the endangered hemlock of North Georgia through culturally stimulating events such as music, food, and art. Furthermore, the introduction of kudzu, moss, and trees has considerably aided in mitigating the overall amount of soil erosion caused by mining[107].

In Romania, the process starts with expelling Gabriel Resources from Roșia Montană. Political activists led the movement in 2007 by pushing national mining enterprises to comply with EU standards of environmental protection[108] in accordance to the law created in 1979 which bans cyanide discharge into

[103] Lucian Vesalon and Remus Creţan, "'Cyanide Kills!' Environmental Movements and the Construction of Environmental Risk at Roşia Montană, Romania," Area 45, no. 4 (2013): pp. 449.

[104] Lucian Vesalon and Remus Creţan, "'Cyanide Kills!' Environmental Movements and the Construction of Environmental Risk at Roşia Montană, Romania," Area 45, no. 4 (2013): pp. 447.

[105] Lucian Vesalon and Remus Creţan, "'Cyanide Kills!' Environmental Movements and the Construction of Environmental Risk at Roşia Montană, Romania," Area 45, no. 4 (2013): pp. 448.

[106] B. Behringer & G.H. Friedell, Appalachia: Where Place Matters in Health (2006, September 26)

[107] Delia Cristina Papp et al., "Origin and Geochemistry of Mine Water and Its Impact on the Groundwater and Surface Running Water in Post-Mining Environments: Zlatna Gold Mining Area (Romania)," Aquatic Geochemistry 23, no. 4 (2017): pp. 115.

[108] Merciu Florentina-Cristina, Cercleux Andreea-Loreta, and Peptenatu Daniel, "Roşia Montană, Romania: Industrial Heritagein Situ, Between Preservation, Controversy And Cultural Recognition," Industrial Archaeology Review 37, no. 1 (2015): pp. 9.

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groundwater[109]. The activists gained a strong foothold in 2010, when 70 Environmental Non-Government Organizations issued declarations which exposed the government's direct support of the mining projects[110]. However, Gabriel Resources still remains a threat, and is in fact, currently in the process of suing the Romanian government for not allowing the project to begin thus far[111].

Thus, as we proceed into the future, it is of the utmost importance that we remember how profoundly connected people are to place. By examining the economic, political, and social responses to mineral extraction Dahlonega, Georgia and Roșia Montană, Romania, it becomes clear that the history of these mountain communities is deeply linked to the development of an externally sustained economy, a weakened local government, and environmental and social erasure. However, we also know that gold mining can be made into a key industry which bolsters the local economy through tourism, while remaining monitored for environmental decay. These investments can likewise revitalize the cultural history of mining regions and strengthen the local sense of community. But, we must remain politically vigilant, locally-oriented, and focused on cultural and environmental preservation. In order to do that, we must seek to find the connections between the development of our civilizations and the natural world, understanding that place deeply influences both the individual and collective lives of communities.

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[109] G. Vogel, "ROMANIA: Unexpected Riches From a Fabled Gold Mine," Science, New Series. 300, no. 5621 (September 2003): pp. 891.

[110] Lucian Vesalon and Remus Creţan, "'Cyanide Kills!' Environmental Movements and the Construction of Environmental Risk at Roşia Montană, Romania," Area 45, no. 4 (2013): pp. 447.

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