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MINING EXPLOITATION IMPACT ON ENVIRONMENT

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MINING EXPLOITATION IMPACT ON ENVIRONMENT

- Serbia has mineral resources (coal, oil and gas , and Cu, Pb, Zn, Ni, Sb, Au, Ag, Bi, Cd, Pt, Se, Mo, Ti, Ra)
- The raw material base, although insufficiently researched followed by long-term production, participates in the total mineral raw material potential of Serbia with 6%.
- The paper analyzes the chemical risk from the ore deposit in the „Lece“ mine in the South of Serbia.

MINING EXPLOITATION IMPACT ON ENVIRONMENT

- Exploitation of ores and coal is in the first place
- Mining plants is still danger– land, water and air
- The land is degraded due to surface and underground exploitation, tailings disposal, deposition of harmful substances from the air in the vicinity of the mine.
- Pollution watercourses with harmful substances that occur in the process of exploitation and preparation of primary processing of mineral raw materials is very significant.
- One of the most severe consequences of mining is pollution of rivers in the basins

EXPLOITATION AND POLLUTION

- Highly polluted ecosystems - mercury up to 1000 to 5000 years. Heavy metals can slow down growth and poison plants and cause enormous damage to human health.
- Cupper and zinc are one of the most dangerous heavy metals that damage the liver, kidneys, central nervous system, copper lead to depression or lung cancer.

• Land endagerment

- In the process of flotation of ores as tailings by hydraulic means (special dams, most often from the same tailings by hydro cycling).
- Flotation tailings represent poorer part of the excavation a significant amount of heavy metals (Pb,Zn,Cd,As,etc.)
- Accidents - torrents, cracks in protective dams due to erosion aren‘t common, but damage is reflected in the long-term consequences.
- Mining waste depends from raw material and technology in exploitation, storage and preparation of ore and tailings disposal.
- Inadequate storage leads to disturbance of the ecosystem, because it wasn‘t delayed as planned.

Water endangerment

- More than 70% of mines in Serbia are located near rivers.
- Ibar, Timok,Pek, Drina, Kolubara, Juzna Morava (Jablanica)
- Direct discharge

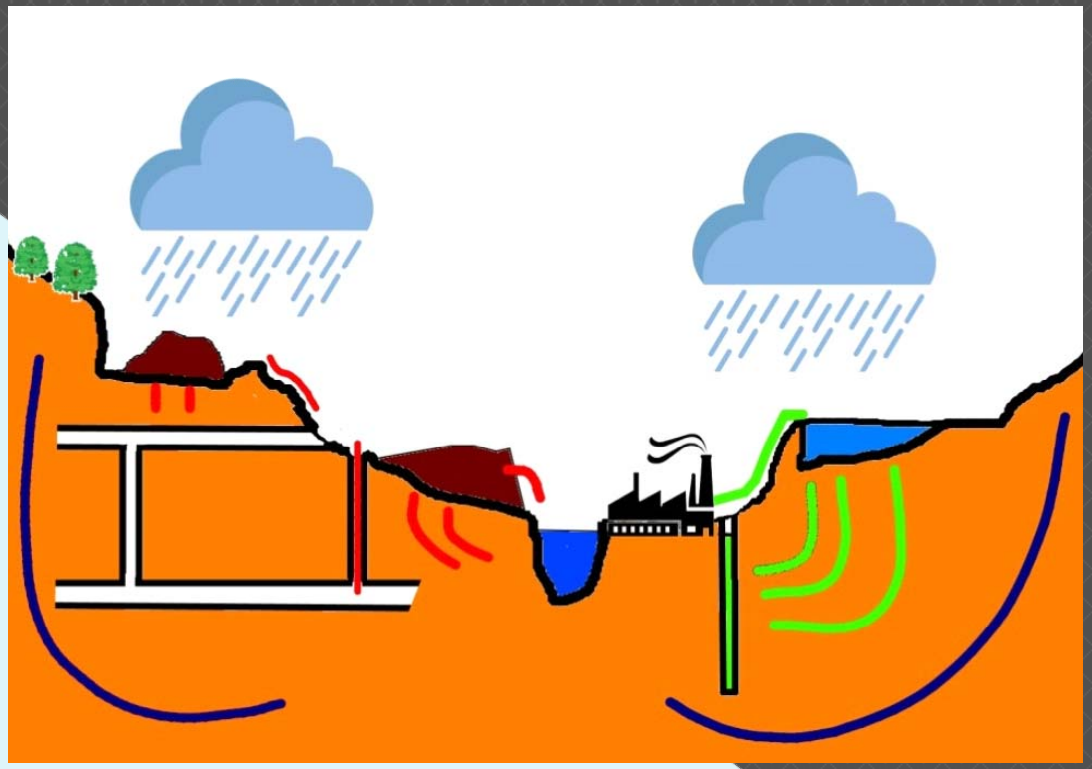
  -inadequate control,

  -noncompliance with prescribed measures,

  -preparation / processing of mineral raw materials endangered by direct discharge of wastewater from mining plants, polluted waters and ore flotation processes,

  -filtration of water from sedimentary flotation lakes, erosion of active and unsecured tailings dumps emergency protective dams,

  -unauthorized deliberate discharge of harmful substances into watercourses.

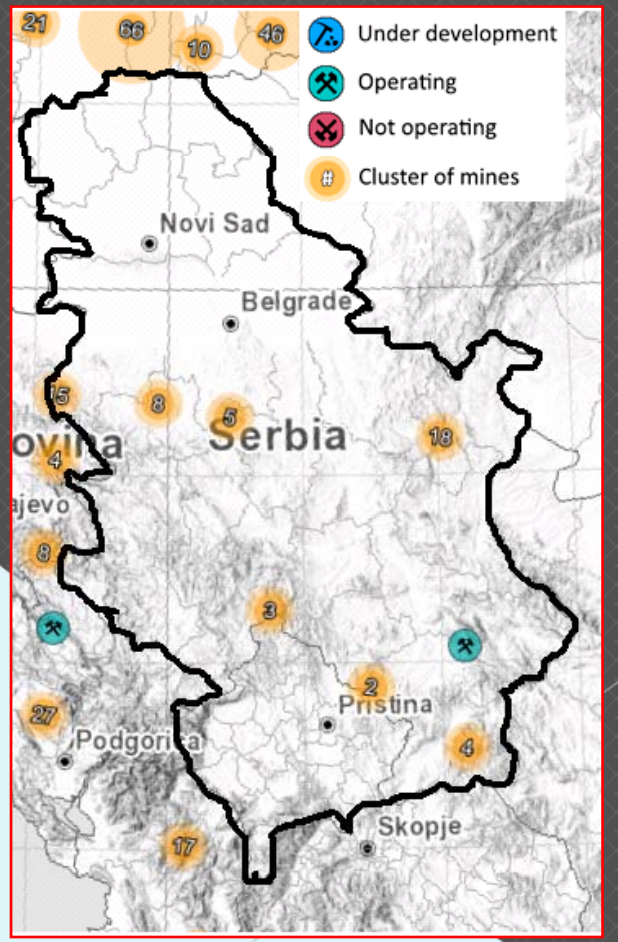


Pollution flows during ore exploitation and processing

- Environmental quality management through parameters in:
  - Chemical composition of water and soil
  - Biological diversity and
  - Aesthetic appearance of the landscape

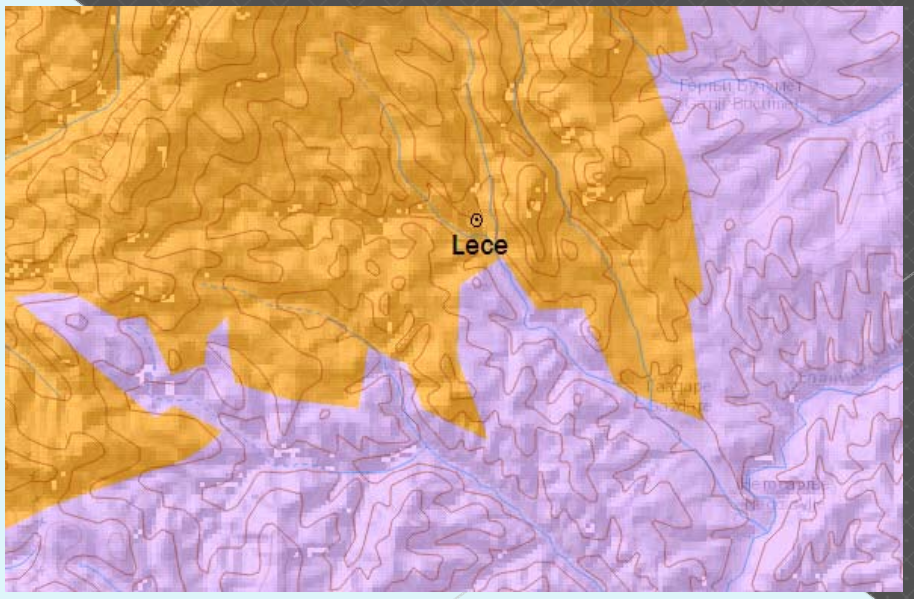
MINES IN SERBIA

- Serbia's geological resources in Au,Cu,Zn and Pb, have been exploited for several centuries
- ~100 exploration sites, and 1/2 are in metal exploitation
- Map of mines (left) and a map of locations (right) where exploration/ exploitation are performed in Serbia



Study case: LECE MINE

- Located in Municipality of Medvedja.
- The first production in ancient Romans time.
- The mine officially opened in 1931,by „British Pacific“. The mine exploits and processes lead-galvanized ore with a higher content of silver and gold, and the ore flotation plant is nearby. By flotation ore is extracted from stone, earth-tailings, with the use of cyanide, which is one on the biggest poisons.



- In Figures is a part of the mine location with a geological map and orthophoto.

- The factory in Lece mine dismantled in 1948. and a new factory-Flotation and cyanization was built in Gazdare.
- 2,143,163 tons of waste ore were deposited in the tailings dams, and in the first years of production the outflow of gold into the tailings was higher by 3-4g/t.
- Although the mining of ore was done manually, special attention was paid to preserves and calculations around production standards, because the goal was long-term exploitation.
- After a standstill in 1997-2007, the Lece mine resumed operations in 2010, when it was purchased by the „Farmacom“ Concern from Sabac.

EXPLOITATION OF MINERAL RESOURCES

- The area of the Lece mine has degradation of the primary relief due to the exploitation of Cu,Pb,Zn,Au ore and disposal of ore and flotation tailings. All these processes directly or indirectly affect the change of the general water balance and quality of groundwater and surface water in the wider and vicinity of the reservoir.
- During the exploitation of mineral deposits has the drainage of deposits:
  - Hydro geological
  - Hydrological
  - Morphological and
  - Biological conditions.
- Worldwide trend of developing new technologies with minimizing pollution in active abandonee mines, since pollution doesn‘t end with the cessation of exploitation.

Safety risk and occupational safety in the mine

- In the mines, everything must be carefully planned, but also workers in different departments must be trained.
- Casses of mass accidents have occurred. The most common unforeseen situations are related to the excavation and blasting of ore, where some mines were with a faulty, wick and the ignitation was done electrically 2013.,
- 2 miners were injured in the explosion in the mine, one was killed in 2016., and in 2017.,
- 2 miners and the death of one miner happened in 2018.

CHEMICAL RISK ASSESSMENT

- Environment is most endangered by pollution that has short-term or long-term consequences even after extinction.
- Today, these dams have millions of tons of tailings with a huge content (CN^-), which is discharged.
- The Lecka River flows through, which drains wastewater from Lece mine into the Jablanica River and into the South Morava.
- All facillities is outdated, flotation is also disrupting the environment.
- Below these facilities is the settlement *„Colonia“,* where locals have agricultural land, cultivate and put the products in the food chain.
- Workers have problems with respiratory organs, lungs, blood count, and these are especially pronounced in workers who work on ore extraction and flotation.

Impact of production on the environment

- Life cycle of metallic mineral raw materials, has influence in the processes of flotation and melting of metals.
- Pollutants are mainly caused by heavy metals found in ore and used during flotation, smelting and processing, as well as polluting gasses primarily sulfur-dioxide, which is released into the atmosphere and has a detrimental effects on flora and fauna.
- The waste gases of the smelter, which are processed, have a special treatment, with the utilization of sulfur from the smelter gases being about 50-55%, while in the world this % is around 70%.
- The final results of the assessment include statistics of different levels of risk in each settlement, which can identify the distribution of pollution areas, and effectively promote the management of heavy metals in the soil.

CONCLUSION

- The main problems arise from the leaching of hazardous elements when reach watercourses.
- A physical and chemically treated minerals contain various types of harmful elements, exposed to the atmosphere. The consequences can be catastrophic, and the damage too expensive and often irreparable.
- „Lece“ mine will be accompanied by strengthening of environmental awareness, prevention of the consequences of risk and implementation of increasing stringent environmental standards.
- The constant increase in the costs of projection to this days is a consequence of the constant improvement of both legal regulations and general environmental awareness.

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Thank you for your attention!

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