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Topic 2: The environmental impact of the exploitation of mineral resources such as the Amazon Rainforest ecoregions

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I. INTRODUCTION

Gold, copper, diamonds, and other precious metals and gemstones are important resources that are found in rainforests around the world. Extracting these natural resources is frequently a destructive activity that damages the rainforest ecosystem and causes problems for people living nearby and downstream from mining operations. An example can be found by the Amazon Rainforest, in which most mining today revolves around alluvial gold deposits.

While Amazon mining may not cause deforestation on the same scale as logging and mass agriculture, it has a wide range of effects that can affect the environment in the vicinity of the mining site and downstream from extractive operations.

The Amazon is considered to have great potential for mineral assets, namely copper, tin, nickel, bauxite, manganese, iron ore and gold. As a result, governments are providing tax incentives for large-scale projects, in order to boost development. As extractive technologies improve, it is likely that the scale of Amazon mining will increase.

Mining can impact the area's water drainage, pollute water with run-off from the mine, and threaten local communities, including indigenous people, by affecting the quality of the food supply.

II. Definition of Key Terms

Mining: Mining is the extraction of valuable minerals or other geological materials from the earth usually from an orebody, lode, vein, seam, reef or placer deposits. These deposits form a mineralized package that is of economic interest to the miner.

Mining operations: Mining operations usually create a negative environmental impact, both during the mining activity and after the mine has closed. Hence, most of the world's nations have passed regulations to decrease the impact. Work safety has long been a concern as well, and modern practices have significantly improved safety in mines.

Alluvial Gold (Deposited by water movement) and **Eluvial gold** (disintegration of rock at the site where it originates - not there through water movement) are essentially primary gold broken down by weathering and erosion and transported by gravity or water movement over many millenia of geological time.

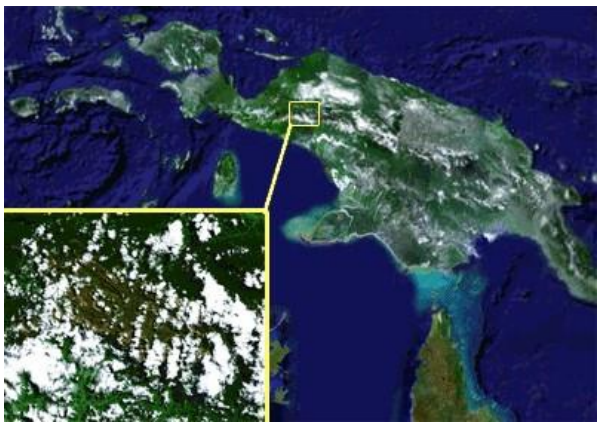
Floodplain: A floodplain, or flood plain, is flat or nearly flat land adjacent to a stream or river that experiences occasional flooding.

Small-scale: Small-scale refers to world maps or maps of large regions such as continents or large nations. Here the representative fraction is relatively small..

Food chain: A food chain shows how each living thing gets food, and how nutrients and energy are passed from creature to creature.

III. Background Information

In the Amazon rainforest most mining today revolves around alluvial gold deposits. Gold is found in river channels and on the floodplains, where rivers once ran, thanks to the meandering nature of Amazon rivers. These deposits are actively mined by large-scale operators and informal, small-scale miners. Both operators use hydraulic mining techniques. This is made by blasting away at river banks, clearing floodplain forests, and using heavy machinery to expose potential gold-yielding gravel deposits. Gold is usually extracted from this gravel



using a sluice box to separate heavier sediment and mercury in order to amalgamate the precious metal. While most of the mercury is removed for reuse or burned off, some may end up in rivers. Studies have found that small-scale miners are less efficient with their use of mercury than industrial miners.

Even though there is no scientific consensus on mercury contamination in the Amazon there is evidence of mercury causing problems in other ecosystems. Elemental or inorganic mercury can be transformed (methylated) into organic forms by biological systems and enter food chains. Methylated mercury are toxic compounds and highly bioaccumulative, which means that mercury concentrations increase up the food chain. Top predators, including otters, birds of prey, and humans, will have the highest levels of mercury in their systems. Those who eat large amounts of fish are at the greatest risk.

During the mining process there are also other toxic compounds that are used and generated. Mining exposes previously buried metal sulfides to atmospheric oxygen causing their conversion to strong sulfuric acid and metal oxides, which run off into local waterways. Oxides tend to more soluble in water and contaminate local rivers with heavy metals.

Cyanide, a highly toxic compound, is also often used to separate gold from sediment and rock. Cyanide is supposed to be carefully monitored to prevent its escape into the surround environment, but its spills do occur, especially when there's no one around to enforce mining regulations. The effects of poisoning can be widespread, especially when a waste-holding pool overflows or breaks, as it did in Guyana in August 1995.

The Guyana spill made international headlines for its magnitude—over one billion gallons (four billion liters) of cyanide-laced waste water was released into a tributary of the Essequibo— and its effects, causing widespread die-offs of aquatic and terrestrial plant and animal life, poisoning floodplain soils used for agriculture, polluting the main source of drinking water for thousands of people, and striking a blow to the emerging eco-tourism industry on the river. The mine, run by Golden Star Resources of Denver and Cambior of Montreal, at first tried to cover up the spill by burying fish carcasses. Six days after this founding locals dead wildlife, the mine reported the accident to the Guyana government. Despite the damage inflicted by the spill, the government granted additional mining concessions on the New River shortly thereafter.

Large-scale mining operations, especially those using open-pit mining techniques, can result in significant deforestation through forest clearing and the construction of roads, which open remote forest areas to transient settlers, land speculators, and small-scale miners. These settlers and miners are probably a greater threat to the tropical rainforest environment than industrial mining operations. Wildcat miners enter regions rumored to have gold deposits and clear forest in search of riches. They hunt wildlife, cut trees for building material and fuelwood, and trigger erosion by clearing hillsides and detonating explosives. Miners can bring diseases to local indigenous populations (where they still exist) and battles over land rights, too. An example is the conflict between the Yanomani Indians of Northern Brazil and Venezuela and garimpeiros—illegal Brazilian miners. Reports indicated that Yanomani populations have fallen significantly since the first incursion of miners in the 1980s.

While deforestation and chemical pollution from mining can impact the rainforest environment, downstream aquatic habitats fare worse. Increased sediment loads and reduced water flows can seriously affect local fish populations.

IV. Key Information

Observing the major large rivers of the globe, the Amazon River and its tributaries are facing aquatic ecosystem disruption that is affecting freshwater habitats and their associated biodiversity, including trends for decline in fishery resources. The Amazon's aquatic ecosystems, linked natural resources, and human communities that depend on them are increasingly at risk from a number of identified threats, including expansion of agriculture; cattle pastures; infrastructure such as hydroelectric dams, logging, mining; and overfishing. The forest, which regulates the hydrological pulse, guaranteeing the distribution of rainfall and stabilizing seasonal flooding, has been affected by deforestation. Flooding dynamics of the Amazon Rivers are a major factor in regulating the intensity and timing of aquatic organisms. This study's objective was to identify threats to the integrity of freshwater ecosystems, and to seek instruments for conservation and sustainable use, taking principally fish diversity and fisheries as factors for analysis.

V. Major Countries Involved

Namibia, Malawi and Tanzania: uranium

Malawi and Mozambique: rare earths

Mozambique: mineral sands South

Africa and Zimbabwe: platinum

VI. UN Involvement

It is not surprising that the increasing awareness of environmental problems, led to the United Nation Conference on Human Environment in Stockholm where the action on plan for the human environment was adopted though it was to alert people, create awareness about deterioration of the environment and proffer solution that will reduce further degradation of the environment. One product of the conference was the concept of sustainable development as a direct human activity so as not to endanger the future and ability of our generations in meeting the future need in the environment. The conference also initiated the United Nations Environmental Programme (UNEP) in 1992 that led to the United Nation (UN) Conference on environment and development held in Rio-de-Janeiro, Brazil. This time it was to create awareness and set out principle on environmental sustainability. The conference was to set agenda for sustainable development into the 21st century.

There are over 500 Multilateral Environmental Agreements (MEAs) including 45 global geographic scopes with at least 72 signatory countries. Worthy of note is the fact that the MEAs represent

International Environmental Law and the governance structure consists of following chain of phases.

- Assessment of environmental status
- International policy development
- Formulation of MEAs
- Policy implementation
- Policy Assessment
- Enforcement
- Sustainable development

VII. USEFUL LINKS

http://www.europarl.europa.eu/intcoop/acp/2012_lusaka/pdf/worldbank_pres_en.pdf

https://kids.mongabay.com/elementary/505b.html

http://www1.uneca.org/Portals/atpc/CrossArticle/1/WorkinProgress/79.pdf

http://www.gold-prospecting-wa.com/alluvial-gold.html

https://www.sciencedaily.com/terms/floodplain.htm