The Gem Industry in Sri Lanka and its Environmental Impacts

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Gems can be identified as a resource which occupies a foremost position among the natural resources found in Sri Lanka. By the term gem mining is meant the process of extracting this natural resource. It is considered that the gemming industry in Sri Lanka has a history of about 3000 years. However, this traditional industry may have a beginning running into a longer period.

When compared with other countries in the world engaged in the gemming industry, Sri Lanka appears to be a country employing dominantly the traditional mining technologies, though at present mechanical and semi-technological methods are used in addition to traditional technology for mining. These mining methods range from digging deep mines and adrift to shallow open mining and river bed mining.

In Sri Lanka traditional gem mining is mainly found in Balangoda, Ratnapura, Opanayake, Deniyaya, Rakwana, Elahera and Matale areas.

Although the mining industry is economically very profitable, it is associated with a considerable number of environmentally adverse effects. The environmental problems that arise can be briefly stated as follows:

- Damage to vegetational cover, plantations and paddy fields
- Damage to land and geomorphology
- Damage to man-made structures
- Impacts on human health
- Damage to streams and river banks
- Sedimentation and water pollution
- Damage to fauna

Damage to natural vegetation cover, plantations Paddy fields and soil erosion

The natural vegetation cover is directly affected due to complete uprooting of the vegetation associated with the mining operation in the gem gravel layer in areas anticipated to contain gems.

For the purpose of 'Construction' or reinforcement of the walls of mines in the inhabited areas, arecanut trees are used while during illicit gem

mining in the forested areas , various rare local trees are being utilized instead. Balangoda, Kalthota, Baduludena, the Sri Pada Forest Reserve and areas associated with the Sinharaja Man and the Biosphere reserve are some of the examples. For purposes of placing dredges between the horizontal and vertical squares (enclosures) in the mines in the inhabited areas a plant named Kekilla – *Gleichenia linearis* – which is an introduced species is used. However, in the forested areas valuable indigenous species are used as substitutes for this purpose. Both these practices have detrimental effects on biodiversity. Another adverse environmental effect of the mining industry is acute soil erosion during the rainy season resulting from the removal of the vegetational cover.

In forested areas illicit gemming is usually carried out in areas associated with the catchment areas of rivers. Therefore, such situations have adverse effects on the sustainability of water resources.

Gems are found as deposits chiefly in low lands. They are brought down to these areas from mountainous areas through the water that flows in streams. These gem deposits get separate as individual gems due to the disintegration of rocks. As a consequence paddy fields in the lowland areas in Ratnapura and the Southern Province have become gem bearing lands, and are subjected to mining. As a result of gem mining direct damage is caused to the paddy fields and other crops in those areas. Also the infertile soil thrown out of the mines mixes with the fertile top soil leading to changes in the soil characteristics, and the quality of the soil is diminished.

Damage to land and geomorphology

Large pits and many huge mountains of soil that have been dug out are a common sight in gem mining areas. Polwatte area in Matale can be shown as a very good example for this type of geomorphological damage.

The mountains of soil comprising infertile sub soil dug up during mining are physically unstable. They are subjected to erosion by rain water causing damage to the surrounding vegetation. The Raththota area in Matale is a good example for this type of situation. Mining and the heaps of soil dug out have completely changed the original geomorphology of the area.

Damage to man made structures

Digging of adits under roads, houses, irrigation channels, culverts etc. cause damage to this kind of constructions and buildings. A large number of examples for this kind of damage can be seen in a number of places including Ratnapura, Elahera, Matale and where other gem mining activities are carried out. Since the digging of adits can lead to sinking of the land surface, greater care must be taken when gem mining is carried out near such constructions.

Impacts on human health

Because rehabilitation (refilling of the pits) after the mining is not carried out in the proper manner, carriers of diseases such as mosquitoes increase in numbers. The spread of

malaria due t o the increase in numbers of mosquitoes in the abandoned water filled mines is a major health problem associated with this industry. The water that gets collected in these pits is responsible for the foul smell in the environment.

The risk of mammals, reptiles and also human beings falling into these unfilled pits is another problem.

Damage to streams and river banks

The destruction of vegetation along the river banks, and the resultant collapse of river banks into the water, is caused by the digging of alluvial deposits for gems. An example of this type of dangerous destruction could be seen at Amban-Ganga and Elahera areas. Illicit gemming may have caused this situation in the Elahera area, where aggravation due to the use of 'Caterpillar' machines and dredges for digging the river bed can be seen.

Another adverse effect of mining in the river bed is the damage caused to the unique biodiversity of organisms living in the fresh water river bed systems. Their habitats may be subjected to unsuitable changes due to changes in the environment, and thereby threatening the existence of certain sensitive species.

Sedimentation and water pollution

Gem mining in rivers cause disturbances of silt and erosion of river banks, which in turn release suspended solids in large quantities into the water.

Increase in suspended solids lead to an increase in turbidity of the water and a decrease in light penetration. Both these adversely affect the biodiversity of plants and animals. The decrease in light penetration leads to a decrease in photosynthesis and thereby inactivates the food relationships in rivers and streams. Similarly since most of the species of fish found in streams and rivers of Sri Lanka are adapted to live in clear water, when the concentration of floating particles increases their spiracles get blocked threatening their existence. Increase in the addition of soil particles to water by various ways due to gem mining has aggravated the already existing problem of siltation caused by clearing of forests, cultivation activities etc. This has also acutely reduced the carrying capacity of waterways and dams. In addition to the above mentioned effects water pollution is also a major environmental effect associated with gem mining; when the amount of silt increases the amount of potable water decreases. In addition, the lack of adequate sanitary facilities for the temporarily resident labourers in gemming areas also leads to the pollution of water.

Damage to fauna

Large scale addition of very fine clay particles to water increases the turbidity of the water, and this leads to less

light penetration causing an environmental imbalance in the rivers and steams. The effect of this was discussed under adverse effects of sedimentation and water pollution.

Damage to environment due to gem mining

The present situation in Sri Lanka regarding the gem mining industry and environmental effects

National Gem and Jewellery Act Number 50 of 1993 has also identified the necessity of minimizing the environmental effects associated with the gem mining industry. No person is permitted to carry out gem mining without a license from the National Gem and Jewellery Authority. In addition no machinery other then water pumps are permitted to be used in gemming carried out in rivers and paddy fields.

According to the gazette notification 722/22 of 24 June 1993 of the National Environmental Act, an Environmental Impact Assessment report is required for mining within a distance of 60 meters from the bank of a public water way which exceeds a width of 25 meters.

The National Environmental Action Plan of 1998-2001 has also identified gem mines and the mining of river beds for gems as problems associated with gem industry. In addition recommendations such as the re-examination of the regulatory framework of mining and mineral sectors, and making provisions for the rehabilitation of mining pits, were included in the above action plan.

Recommendations to minimize environmental damage

Gem mining is economically important for Sri Lanka because it is a major source of foreign exchange, and is also a source of employment for the rural population. At the same time it is essential to take steps to minimize environmental damage due to such mining activities. In addition to the steps presently implemented, the following recommendations are also proposed.

- Setting up of a section within the Central Environmental Authority to provide advice regarding the environmental problems arising from gem mining, and through this section the provision of knowledge to gem miners on the latest mining technology, and how they can be carried out.
- Prohibition in the use of heavy machinery for gemming on land
- Allowing the process known as Ganga Aderma (River Dredging) using mammoties only after very careful consideration of the adverse environmental effects that may be caused
- Looking into the refilling of adits at the end of the gem mining activity. (If extra payments are necessary for such investigations, the Advisor Authority must increase the license fee to cover the additional expenses).
- The Advisory Authority should take the necessary steps to completely prohibit illicit mining
- If a license has not been obtained from the licensing authority steps must be taken to prohibit the digging of horizontal adits from the gem mine and the mined areas. If permission has been granted earlier steps must be taken to fill up the adits at the end of the mining activity.
- The Advisory Authority must take the necessary steps to provide the latest instructions/advice to those who plan to start gem mining as well as to those who are already engaged in the industry.

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