

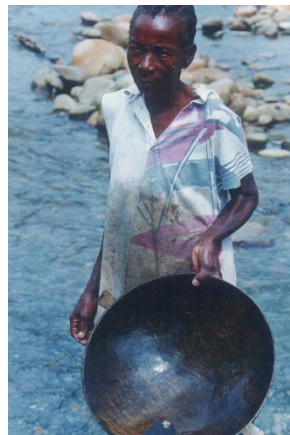
Design and Implementation Challenges

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- Panning in the river. This is the simplest method of mining and is usually practiced by women and children.
- In this method of mining the impact area is very small usually 1-2 meters in diameter. .
- This method does not employ any mechanical operation. The place of operation moves frequently often daily. The impact on the benthic ecosystems does not exceed natural events. The panning is done in the river within the high water lentic boundaries.



- Flow water method. Here rainwater or water from a small stream that is dammed up temporarily is used. The gold containing sediment is extracted from the streambed and washed using the stored water. Today a motorized pump may be used to assist with the washing.
- This method of mining impacts an area about 100-sq. m in area, usually within the forest itself. The excavated hole is about 1-4 m deep. The impacted area does not exceed the area impacted by the fall of a dominant canopy tree. The excavated gold bearing gravel is washed by using the dam that has been created in the stream. The washing process takes about two to three days.



- The Hoyadero method. Here holes up to 18meters are excavated by hand. The holes are usually dug till the bedrock is reached. The gold bearing stratum is then brought out to be washed in ponds constructed close to the hole being excavated or it may be passed through a screen using a water jet from a motorized pump.
- This is the most intensive artesinal mining technique usually employing a group of twenty or more individuals from the local community. The group works on a co-operative basis, no salaries are paid. The reward is their share of any Gold or Platinum. As this is a community venture on community land there are strict rules on the refilling of the hole. In the hoyadero method the hole is dug manually in approximately 25 - 30 days, and in the washing process that takes 5 to 8 days



- There should be no massive ecological disruption. This state being defined by changes to an ecosystem that places it beyond a possibility of recovery.



- This criterion acknowledges the fact that ecosystems change with time. It also sees sustainability in ecosystems as the ability to recover from perturbation and stress. Ecosystems are affected by many natural regular or stochastic changes of the environment. The criterion recognizes the fact that there is natural disturbance in any ecosystem and seeks to contain the size or the impact of the proposed activity that ecosystem.



- Indicators to measure conformity are drawn from an ecosystemic level

1. There should be no toxic chemicals used in the extraction or refinement process.

This criterion recognizes the fact that extraction of gold on an industrial basis has yielded many techniques that use toxic chemicals with a very large potential for environmental and ecosystem damage. The two most common toxins are Mercury and Cyanide.

The indicators used are at the species level and public health based data.

- The mined areas should gain ecological stability within three years.

This criterion recognizes the process of seral succession and the fact that the mining process will not reduce the seral succession to a very early stage

The indicators used are communities of species.



- . Topsoil removed from the site should be replaced after filling up the mine.
- This criterion recognizes the value of living topsoil to the re-establishment of a healthy, sustainable ecosystem after the mining process
- The indicators used are soil depth, soil maturity and vegetation species.



- Tailings and pooling must not exceed the local ecosystem capacity for rehabilitation

This criterion recognizes the dangers to human health from the habitat for vectors of disease from mine pools

The indicators used are aquatic organisms and water quality



- The silt load into stream, river or lake systems will be controlled in quantity and frequency, such that the native aquatic ecosystem is not disrupted.

- This criterion recognizes the damage to native aquatic ecosystems through high intensity or frequency of negative impact events

The indicators used are aquatic organisms and chemical/physical measures



- **The mining operations must be conducted with the agreement of the local community councils.**

- **This criterion recognizes the right of the local community to determine land management in their region**
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The indicators used are written documents indicating community agreement



- The statement of origin of the gold produced should include the name of the corresponding municipality

This criterion recognizes the value of local government and reduces the outward flow of local resources when gold or platinum is declared in municipalities other than where the material originated.

- The indicators used are tax receipts.



- Biodiversity indicators of the ecosystems will be established as part of the certification process

This criterion recognizes the need to have indicators based on science but amenable to be recognized by the local community

The indicators used are at the local species level.



- Extraction areas shall not exceed 10% of a hectare in rotation periods of 2 years.
- This criterion recognizes the need of the rainforest to maintain a robust ecosystem around the intervened area so that the restoration is automatic.
- The indicators used are mature forest species.



1. Ground rent to owner of the land	20 per cent
2. Financier's share	35 per cent
3. Workers share	35 per cent
4. Licence holders share	10 per cent

1. The placer method. This is most often practiced when the gem bearing gravel is found in surface soil deposits usually 2-3 meters deep. After removal of the organic soil horizon the land is worked as open cast mines. The material obtained is then washed in running water or in simple sluices.
2. The pit method, when the gem gravel is located at depths over 3 meters, the miners sink pits of 2-15 meters to reach the gem gravel. The pit is usually divided into two sections with a partition. One section is used for ore extraction, the other to facilitate the de-watering of the sump. Side tunnels are usually dug off the bottom of the shafts to collect more gem-gravel. The mineshafts rarely exceed 15 meters and side tunnels may run to 10 meters. The shafts and tunnels are shored up and panelled with water resistant timber. Washing is often done in a small reservoir created at the mine site with water pumped from the mines. This can also be done in a river if there is one located close by.
3. River bed mining. Experienced miners usually adopt this method. Mining is done by creating obstructions to divert the flow of the river and long handled shovels; often-exceeding 10 meters in length are used to clear the riverbed and expose gem bearing gravel. The diverted water helps to clean and concentrate the gem gravel, which is removed and washed again in baskets to sort out the stones.

