





Aquapôle

Basins

River

of

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## Introduction

Mercury contamination from artisanal small-scale gold mining (ASGM) activities is a major environmental concern (Worldwide, 1206 tons/year of mercury are released). In the Lom basin (East Cameroon region), gold mining is practiced in artisanal and semi mechanized ways. More than 100 open pit mining sites are listed, with an estimated production of 318 Kg of gold in 2019. In this type of mining, mercury is used to extract gold by amalgamation, in equal proportions. About 5 to 45% of the used mercury is directly discharged towards rivers.

# **Study area**

- $\Box$  Watershed = 11.000 km<sup>2</sup>, Lom River = 318km (fig.1)
- $\Box$  Populations = 531.889 habitants (2019)
- Smal-cale mining > 100 open-pit mines
- □ Gold reserve = 20 tons

### **Methods**

- A raster analysis approach to create a new land use class for the representation of open pit mining sites surfaces (fig.2)
- A physically based modeling approach involving the PEGASE model, a deterministic integrated River/Basin model dedicated to predictive

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### Extraction practices = Hg amalgamation

# **Objective**

Assessment of the pressure-impact relationships of ASGM activities on the River Lom water quality using a modeling approach



- calculations of water quality related to pollutant discharges and loads (fig.3)
- A calibration method using regionalized soil input functions to characterize loads and mining releases (fig.4)



### **Results and discussions**

- Based on the European tool called SEQ-Eau (System for Evaluation of the Quality of Rivers), the alteration indices for oxidizable organic matter, nitrogenous matter, nitrates and phosphorus vary overall from Good to Very Good (60 - 100). However, near urban and mining areas, these indices sometimes vary from poor to very good (40 - 100) fig.5
- $\Box$  Mercury concentrations (0.0 < Hg < 15 mg/m3) are above the limits of the Environmental Quality Standard (EQS = 0.05µg/l) and WHO Standard (6 µg/l for drinking water) near mining areas (fig.5)
- □ The influence of mining releases on Hg concentration in surface water is high but localized in surrounding areas of mining sites
- Soil loads represent a large proportion of the quantity of mercury reaching the rivers (fig.6)



Figure 3 : PEGASE model





#### Figure 5 : water quality assessment

#### distance [km]

Figure 6 : Mercury concentrations along the Lom River

Conclusion

- Simulations provide a better description of water quality in the river Lom and helped identify areas exposed to mercury pollution
- There is a mercury pollution localized to close areas of gold mining sites that highlights the contribution of ASGM's activities as source of pollution
- Seasonal variation of hydrodynamic is also an important factor in the water quality
- Regional soil input functions give better calibration results but measurements are still to be improved

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