

Supplementary Materials S2

Table S2. List and definitions of the terms involved in the proposed framework. The list of the references supporting the definition are detailed in [84].

Term	Definition
Accident	Failure of a system, due to unexpected conditions.
Accidental (or abnormal) conditions	Unexpected and extraordinary operating conditions of a system deviating from normal conditions and resulting in a potential failure, a malfunction
Consequence	Outcome of an event positively or negatively affecting the objectives. Initial consequences can also escalate through cascading and cumulative effects. Consequences can be direct when they occur on the short term immediately after the risk event, or indirect when they are generated by direct consequences
Ecosystem service	Conditions and processes through which natural ecosystems - and the species that make them up - sustain and fulfill human life through the production of ecosystem goods the harvest and trade of which represent an important and familiar part of the human economy.
Failure	Event that negatively alter the achievement of the functions of a system.
Impacted Area	Geographical space that is influenced by the occurrence of a risk event.
Indicator	Variable that represent a specific quantity, a state, or interactions that are not directly accessible or may be difficult to estimate.
Mining project (or “mine”)	Temporary set of coordinated and controlled activities – with start and finish dates, conforming to specific requirements, including the constraints of time, cost and resources – that undertakes a process to exploit a geological deposit.
Ordinary (or normal) conditions	Operating conditions of a system that represents as closely as possible the range of performance, use, activity that can reasonably be expected.
Performance	Capability of a structure, a component or a system to perform the functions for which it was designed.
Probability	Measure of the chance of occurrence expressed as a number between 0 and 1, where 0 is impossibility and 1 is absolute certainty.
Risk	Effect of uncertainty on objectives. Risk equals the product of probability and consequences. It can be positive , when it enhances the expected objectives and negative , when it worsens them.

Risk aggregation	Process to combine individual risks to obtain a more complete understanding of risk.
Risk assessment	Overall process of risk identification, risk analysis and risk evaluation.
Risk event	Occurrence or change of a particular set of circumstance.
Risk management process	Systematic procedure consisting in communicating, consulting, establishing the context, identifying, analyzing, evaluating, treating, monitoring and reviewing risk.
Risk perception	Stakeholder's view on a risk.
Risk scenario	Result of a simulation that foresees some possible alternatives and future realities involving the occurrence of a series of risk events during normal (RS ₀) or accidental (RS _a) operating conditions.
Socio-Ecological System	A system composed of biogeophysical components and human actors (individual and collective) in mutual interaction. They provide ecosystem services that satisfy societal needs and support human well-being.
Stakeholders	Any person or organization that can affect, be affected by, or perceive themselves to be affected by a decision or activity.
System	Any set of connected, interacting, interdependent processes and group of units forming an integrated whole which drives itself or is driven to achieve one or several specific goals, in a dynamic and active environment, through the performance of specific functions.
System component	Characteristic element part of a specific system which assures the achievement of the performances and the functions of the whole system.
System function	Characteristic purpose of a system as well as the values provided by it.
Territorial Mining Scenario (TMS)	Territorial strategy designed to meet specific pre-defined territorial objectives according to stakeholders (e.g. increase in employment or royalties related to mining, increase in mining production, reduction of land consumption). The TMSs are composed of a set of one or multiple mining projects in different number and/or types (i.e. the mine system), distributed across the area (i.e. the territory system, such as Mana river basin). A TMS represents a simulation that foresees some possible alternatives and future realities involving different land-planning strategies for the development of mining activities at the territory level.

Territory

Integrative space of physical phenomena and human and societal relationships, a conformation of morphological characteristics and heterogeneous distribution of its resources. The territory is a Socio-Ecological System.

Vulnerability

Intrinsic properties of something that create susceptibility to a source of risk that can lead to a consequence. See Table.