

MINERAL INDICATORS OF SUSTAINABILITY: REVIEW AND SYSTEMIZATION

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In this paper we demonstrate the need for an over-arching organizational framework for indicators of sustainability for mineral resources. We begin by introducing the concepts associated with nonrenewable earth resource, and in particular mineral resource, sustainability. Different complexities, such as the multiple aspects (e.g., environmental impacts and economic integration) and the multiple scales (e.g., deposit, region, nation) of the minerals sustainability problem are described. The development of mineral indicators capable of measuring the various aspects at multiple scales has not been completed because of the difficulties associated with capturing all the complexities described above. Moreover, there are multiple definitions of sustainable development; some of which have a “strong sustainability” focus and others a “weak sustainability” focus. How the environmental and socio-economic aspects of mineral resource-related activities are dealt with in the indicator set is dependent in part upon the underlying perspective taken. We review the Montreal and Helsinki Processes, both of which concern forestry resources, to illustrate an indicator development procedure that may be applicable to mineral resources. We then consider the status and results to date of several ongoing efforts to develop mineral resource indicators, including those from different governments and international organizations. A framework for this extensive and disparate collection of indicators is presented and it is shown that once the indicators are organized in this manner, duplications and omissions are more easily identified.