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The Quest for Transparent Earth: Resource Development in Africa and the Human Capacity Challenge

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The U.S. National Academy of Engineering report, *Grand Challenges of Earth Resources Engineering* presents a list of six specific challenges in Earth Resources Engineering that includes: “Make the Earth Transparent” (NAE Section 11, 2010; Anderson and Fairhurst, 2014). The report points out that, “The opaque nature of the solid Earth is a major obstacle in all aspects of Earth Resources Engineering. The challenge is to find ways to ‘see’ into the subsurface similar to the way that imaging is used in medical practice.” This echoes Feynman’s statement in his famous 1959 lecture that many believe ushered in the new era of nanoscience and nanotechnology: “The problems of chemistry and biology can be greatly helped if our ability to see what we are doing, and to do things on an atomic level, is ultimately developed – a development which I think cannot be avoided.” (Feynman, 1959).

In terms of earth resources, Africa is not a poor continent. In fact, it possesses the largest or next-to-largest world reserves of several technologically important resources, including bauxite, chromite, cobalt, diamond, gold, manganese, phosphate rock, platinum-group metals (PGM), titanium minerals (rutile and ilmenite), vanadium, vermiculite, and zirconium (USGS, 2001). Yet this continent is far behind the rest of the world when it comes to technological

advancement. In this presentation, it will be argued that *transparent* development of Africa’s mineral resources is needed in order for these natural endowments to contribute fully to the technological progress of Africa’s peoples. To achieve this transparency, in turn, requires a major commitment to human capacity development. This is an enormous challenge. By the late 1990s, less than 2.5 % of the total population of sub-Saharan African countries had received any form of tertiary education, compared with the Middle East and North Africa (7.2%), and Latin America (11%). For most sub-Saharan African countries, less than 0.05 % of population had attended tertiary technical education.

Reference

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