

10. Outlook

The description of the geology, mineralogy and application of minerals and rocks for agriculture, forestry and related fields provides an insight into the potential of utilizing indigenous agrominerals in sub-Saharan Africa. The description of details of known agrominerals in 48 countries will follow in Part 2 of this book. The account focuses only on the 'supply side' of these resources in sub-Saharan Africa. It is obvious that this study has to be complemented with a solid assessment of the 'demand side,' specifically the distribution and extent of nutrient-deficient soils. Also, the effectiveness of the agrominerals has to be assessed along with an appraisal of risks, costs and benefits of agromineral development. Prior to developing these resources, several additional sources of information on the supply and demand side have to be collected. From the demand side, it is necessary to compile agronomic and soils data, and economic, social and environmental background information. In a wider context, development strategies must address whole systems and technologies, not only commodities.

Each agromineral deposit is unique and requires individual best mining, processing techniques and management practices. No blanket recommendations can be made for the most effective, efficient and environmentally sound practices, and recommendations tailored to the individual deposits and applications are required. In most cases, more detailed geological assessments, detailed mineralogical and chemical characterization of the agrominerals have to be undertaken, as well as the selection of adapted appropriate mining and processing techniques and equipments.

The utilization of indigenous agrominerals for raising soil productivity is still a relatively narrow, input-oriented approach. Agromineral extraction and use should be incorporated into a multi-faceted integrated agro-ecological land husbandry approach in which many stakeholders participate, including farmers with their indigenous knowledge and skills. The development of agromineral resources makes up only a small fraction of a whole package of measures necessary to address the problems of the resource-poor and food-insecure population of sub-Saharan Africa.

The concept of agromineral resource development using appropriate small-scale technologies for a more integrated self-sufficient and sustainable agriculture is based on the extraction and use of a nation's minerals and rocks, a 'capital stock.' Minerals are non-renewable stocks, at least in the time range of a few hundred thousand years. Although some of the agrominerals are plentiful and can last several decades or longer, they are finite. In general, minerals are fixed stocks that don't last forever. But agromineral stocks are sharply different from other minerals, in so far as their development redistributes their value from a mineral capital stock of a point source to a much larger land base in the region. For example, the local point-source phosphate rock deposit will be transformed to P-fertilizer or P-soil amendment that will improve large areas with P-deficient soils. The value of the land has increased through the use of the local mineral capital stock. In the long run, the geological fixed mineral stock will be transformed into a renewable organic resource stock. Inorganic phosphate sources have turned into organic phosphate sources that can be recycled many times.

Agromineral development can have positive effects on the economic and social development of rural societies. It is expected that the locally available mineral capital stock will be transformed by appropriate mining and processing techniques into marketable effective products that will bring economic and social benefits to the local communities. The mineral capital stock will in part also be reinvested into human development and training. This kind of mineral extraction will provide local employment. It can enhance investment into the local infrastructure, including schools, hospitals, communication and access to water. Agrominerals are natural resources that can improve agricultural production, restore and maintain productivity of soils, and, in the long term, contribute to the self-reliance of communities and nations. Their development will be a small but significant contribution to sustainable land management.

Obviously, this approach should be part of an overall integrated land management initiative. Farmers' participation and cross-linkages with other sectors and institutions is paramount in this approach. The projects that will emerge should be developed, from the planning stage onward, together with the stakeholders, including the farmers, the community and government, non-governmental organizations and the private sector. The planning and development of local agromineral resources should not only concentrate on technical matters, but also on community-led approaches to resource management, and to the promotion of locally-adapted forms of management.

Agromineral development projects should be part of integrated, more self-reliant and sustainable land management systems that will contribute to the long-term improvement of food security in sub-Saharan Africa. By achieving the objectives of improved soil productivity in a productive and healthily balanced agro-ecosystem, these projects will ultimately contribute to the reduction of poverty.