Proceedings of the International Conference on Natural Resources Management and Conservation in Chinese Tropical and Subtropical Regions

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Organized by
China Society of Natural Resources
Chinese Natural Commission for MAB
Shaoguan Municipal Government

China Science and Technology Press
Beijing, China

1993

ZEOLITES AND ANIMAL WASTES: A POTENTIAL FOR IMPROVING WATER QUALITY AND SOIL FERTILITY IN THE HOT, WET PARTS OF CHINA

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Improper disposal of farm-animal wastes can cause water pollution. Applying mineralogy to this waste disposal problem holds promise for converting animal wastes into an agricultural opportunity.

Potential exists for applying certain zeolite minerals to improve handling of swine wastes, and combining the use of zeolites and organic wastes to improve fertility of heavily weathered soils. Agricultural lands of south China and Hong Kong combined with the zeolite resources of China are used to illustrate a potential natural resource management scheme that may fit other geographic regions of the wet tropics as well.

Water pollution in Hong Kong from washing swine manure into streams causes adverse impacts to the water's chemistry and ecology. Although swine manure is recognized as a rich fertilizer, farmers increasingly avoid its use because of its undesirable handling properties and odor and the increasing availability of commercial fertilizers. Organic wastes produce similar problems with China's streams and rivers.

Zeolites are a group of naturally occurring, fine-grained, hydrated aluminosilicate minerals having well developed small pores within their framework structures and significant ion exchange properties. Commonly, they are associated with altered volcanic rocks, like those found in the Upper Jurassic/Lower Cretaceous strats of east-central China. Crushed and screened light-weight zeolitic (clinoptilolite) rocks, when mixed with animal wastes, can trap ammonium (NH_{4+}) and water from the wastes thus reducing malodor, accelerating the drying rate, and improving handling characteristics. Processing and application of the zeolitic rock is not a complicated process.

Because of their improved handling characteristics, the end products–ammonium-charged zeolites and dried manure–can be used to fertilize crop lands. The zeolites will act as slow release fertilizer and ultimately enhance the weathered soil's ion-exchange properties; the dried manure provides nutrients and organic matter to the soil as well. Consequently, a beneficial impact on the region's water resources might be expected alongwith an anticipated improvement in some of the region's agricultural soils.

Application of such a scheme would require careful monitoring and adaption to local conditions. If successful, it might find application on similar agricultural sites in the hot, wet tropics proximate to the needed zeolite resources. Little exploration for zeolites, though, has occurred throughout the wet tropics to date. A need exists for expanded geological mapping and mineral identification to locate such useful materials.