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Science and Technology for Development *Vol. II, Natural Resources*

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Pp. 253, \$7.50

This is Volume II of the official eight-volume report which constitutes a narrative account of the papers and discussions presented at the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas, held in Geneva, Switzerland, in 1963. Presented is an interesting "overview" of the whole problem which may exist in a country which starts today to develop her natural resources: (1) land resources, (2) water resources, (3) mineral resources, and (4) energy resources. As a first step, detailed factual knowledge is needed regarding the country and its actual and potential resources. This includes a description of the population and its distribution, and the present status of agriculture, transportation, and industry. The surveys required to gather such information will vary depending upon the need, all the way from rapid reconnaissance survey to detailed specialized surveys in depth.

It is emphasized that intelligent planning and progress demands the gathering of information in a quick, economical, and accurate fashion, so that initial project works may be started as soon as possible. Data gathering and analysis will no doubt continue at increasing pace as development of resources occurs. However, as one participant stated, "step by step approximation is the only way; appraisal of resources and needs should be made simultaneously, while putting some projects on their way as quickly as possible."¹

Separate sections of the book, containing three to four chapters each, treat each class of resources. Under the section treating water resources, man's ever-increasing need for more water for human consumption and for irrigation, industrial, and recreational uses is described. Discussions of both surface water and ground water supply are included as well as brief statements of the present art of obtaining water by more exotic means such as dew-collecting, cloud-seeding, and desalting ocean water. Multi-purpose watershed development is not overlooked. A separate chapter entitled "Making the Water Available" gives recognition to the importance of the design

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of large and complex engineering works and systems to transfer water from a locale where it is available to the areas of use and consumption. The need for reduction of water waste as well as for water pollution control is presented. Little is said regarding water law, although the statement is made that there was general agreement that the main objective of water legislation everywhere should be "the protection of the public interest, which in this matter has an absolute priority over the rights of individuals."²

Recognizing the contribution that intelligent development of mineral resources can make in raising the standard of living of the people, the text covers some of the problems of evaluation and exploitation of these resources, treated as exhaustible capital assets. Various incentives which a government can offer to interest private capital in the development of its mineral resources are described. The interesting question of mechanization of mines in countries in which there is an over-abundance of common labor is briefly discussed. A Nigerian paper comments that "the social consequences of any mass redundancy of labor in a well established industry, where alternative employment is not available and where no form of social security is in operation, can well be imagined."³ The upgrading of fuels such as lignite by drying and briquetting is one example of attention paid to the need for conservation, efficient operation, and recovery of waste products.

The material on energy resources covers the advantages and limitations of energy developed from water, fossil fuels, nuclear fuels, or other sources, in augmenting human labor and thereby increasing productivity. Coal is stated to be presently irreplaceable in metallurgical, gas, and chemical industries. Hence the development of nuclear power, as a replacement for coal, would appear to be limited to thermal power stations. The preeminence of liquid fuels in the transportation industry—aviation, highway, railway, and sea—is mentioned. As a source of energy for industrial establishments, electricity is said to be unrivaled in flexibility of control.

The need for simultaneous development of industry and energy sources in a country is well stated. For example, a modern industrial complex requires a total capital investment of about seven times the investment for power.

An interesting dilemma which these topics must have posed is the variations in approaches to planning for resource development and

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exploitation determined by differences in political structure, particularly between a capitalistic and socialistic economy. Although much of the book has the tone of planning on a grand scale, the interplay of private investment and government policy and action is recognized.

The need for developing countries to engage competent specialists to make surveys, analyze data, plan, and execute programs is recognized. Attention is also directed to the importance of creating agencies and institutions within the country which will provide the necessary technical and managerial personnel, insofar as is economically feasible, for continuing development.

This book, written in non-technical language, will be of particular value to individuals interested in reviewing the overall aspects of natural resource development, while gaining some insight into the problems and opportunities involved.

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