

Optimistic observers point out that there is to-day no serious or general shortage of any essential metallic or non-metallic mineral product. They recall the way in which discovery has kept abreast of increasing demand in the past, and argue that new discoveries, combined with increased efficiency in methods of processing and utilization, will be adequate to meet any foreseeable future needs.

Those who take the more pessimistic views rightly emphasize that mineral resources, as contrasted with those of the animal and vegetable kingdoms, are wasting assets; they are not replaceable. Nature has supplied a certain amount of metal and mineral content in the crust of the earth and when the utilizable portions of this are exhausted, either by waste or by beneficial use, it cannot be restored. The current rates of consumption present an altogether new problem for which past experience gives no assurance of a solution.

Scientists and industrialists agree on the necessity of maintaining an ample supply of minerals and metals if contemporary forms of civilization are to be maintained or if further progress is to be achieved along lines already defined. Iron, copper, lead, zinc, nickel, aluminum, magnesium and other base metals are by definition fundamental to our way of life. Almost equally important are such alloying metals as manganese, chromium, molybdenum and tungsten, which are essential to the steel industry. The industrial minerals - limestone, sulphur, salt and fluorspar - supply the raw materials for much of the world's chemical industry, while the mineral fertilizers, phosphate rock and potash, are of growing importance in agriculture. Without these, or effective substitutes, large segments of the prospective population of the earth will be condemned to lives of misery and degradation.

The implications of these facts raise a problem so vast and of such universal incidence that in a sane world they would be made the immediate subject of common study and co-operative planning. Unfortunately, the society in which we live is, as yet, very far from having reached that degree of sanity. It is true that some measure of co-operative activity does exist among scientists and that this could readily be expanded if international political and social conditions would permit. Unfortunately, the current trend would seem to be in the opposite direction. Of this the clearest example is to be found in the difficulties that are being experienced in adapting atomic energy to beneficial rather than to destructive uses. In the race between education and catastrophe, education is falling farther and farther behind.

Unhappy as the situation is, we can derive some meagre satisfaction from such gatherings as that upon which we are presently engaged. Whatever the ultimate results of this Conference, we will at least know that here a co-operative international effort has been made to look at the whole problem of world resources in terms of the general welfare. This Conference may not represent a long step forward but at least it is not an illustration of the contemporary international practice of walking backwards.

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Before commencing a more detailed examination of the problem with which we are faced it would, I think, be well to spend a moment in defining terms. For the purpose of this discussion it is assumed that a "critical shortage" means a shortage of such proportions that the essential needs of the world cannot be met and that the material progress of humanity must, in consequence, be slowed down or directed towards new objectives. I