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THE WORLD'S GROWING WATER SHORTAGE

OUR need for water is constantly increasing. Though it is difficult to calculate the exact amount, it is safe to say that in 20 years' time the demand for water will be roughly double.

Faced with such a situation it is obvious that we should search as widely as possible and with every available means for sources of fresh water that seem to be the least costly. But where do these sources exist? Only a sustained and co-ordinated programme of scientific observation and research in hydrology will tell us the answer. This is the purpose of the International Hydrological Decade, 1965-1975.

Underground water reserves are much larger those on the surface, but as they are unseen we tend to underestimate them. It is vitally important that we make use of these underground reserves, but never haphazardly. For example, where does the water come from which we find in one or another of the underground water-bearing layers ('aquifers')? How does it move? How is it renewed? And if this water is used, what effect will it have on the discharge and future level of the water table? What are the laws of hydrogeology? Despite the immense progress of recent years, all these questions have still not been fully answered.

A similar need for scientific research exists in the branch of hydrology that deals with the quality of water. In nature, there is no water like the pure water defined by chemists, made up of only hydrogen and oxygen. River water, ground-water, and even rainwater always contain other dissolved or suspended elements, and these, even when present in small quantities, play an important rôle.

In the case of irrigation farming, for instance, every drop of water brings with it a little salt: the water evaporates, but the salt remains and gradually poisons the soil and plants. In general, we now know how to remedy this problem of salinity with the help of leaching and drainage.

But many questions remain unanswered regarding the effect of irrigation and drainage on the quality of ground-water, and the possibility of maintaining the ground-water level below the zone of the plant roots while bringing to the surface the water necessary for irrigation.

What happens exactly in this thin layer of soil which preserves the moisture necessary to plant life? What form—liquid or vapour—does the water take in this zone? What forces act on the water, depending on the kind of soil present? How long will this life-giving moisture last?

Evaporation from the soil and transpiration from vegetation are responsible for the direct return to the atmosphere of more than half the water which falls on the land. How exactly do these phenomena, which represent an enormous loss of resources, occur? What part does a forest play in the water balance-sheet of a given area? Does it act merely as a water-consuming mechanism operating through the absorption and transpiration of the trees—thereby reducing the quantity of runoff which reaches the rivers—or, on the contrary, does it result in a slow seepage into the earth which can later be recovered in the form of ground-water, while at the same time preventing erosion?

These are the kinds of problems which still have to be resolved: the answers will only be found through a vast programme of scientific research.

The International Hydrological Decade is such a programme. It is making possible the global observation of hydrological events—the quantities of rain and snow that fall, the discharge of rivers and underground reserves—and a world-wide stocktaking of our water resources. It is promoting scientific research in every branch of hydrology: water run-off, soil moisture, evaporation, movement of ground-water, the dynamics of lakes, estuaries and deltas, the evolution of glaciers and the geochemistry of water. It is a unique co-operative enterprise to provide the scientific foundations for decisions that governments must take to meet the world's growing need for water.

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Palm trees seen in this striking air view of the Sahara have survived by drawing nourishment from underground water, one of man's almost untapped resources. First half mile of the earth's crust is thought to contain about one million cubic miles of water.

Photo © Magnum - Brian Brake

During long months the lands of South Asia have sweltered under the searing heat. Now, as the monsoon brings relief, a young Indian woman joyfully raises her face to greet the first drops of rain.

Many efforts have been made to find efficient and economical ways of converting salt water into fresh water, but the major obstacle is still the cost of the conversion process. Below right, a giant distillation plant on the Persian Gulf. Research has also been going on to produce rain artificially. Below, scientist produces cloud of ice fog during weather research experiments in Yellowstone Park, Wyoming (U.S.A.).

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