HYDROLOGY

Weather Bureau Services Cost Each U.S. Citizen Five Cents

Besides 300 First Order Stations, Nickel Maintains 40 Radiosonde Stations, 144 Wind Study Stations

SERVICES of the U. S. Weather Bureau cost each citizen an average of only five cents a year, Merrill Bernard, supervising hydrologist of the Bureau, told the Hydrology Conference at State College, Pa.

And John Citizen gets a big nickel's worth of weather, too. Among the agencies his five cents keeps at work for him throughout the year, Mr. Bernard listed the following:

About 40 radiosonde stations, sending up balloons carrying robot instrument kits, that automatically report by radio what the weather is like "up there."

Wind-study stations—144 of them—that send up small balloons, and by means of instrumental "tracking" obtain data on height, direction and velocity of air currents high aloft.

About 300 first-order stations in principal cities and at airports. These are the places you think of when you say "Weather Bureau." Meteorologists stationed there not only forecast tomorrow's weather; they collect data on rainfall, temperature, atmospheric pressure, wind, cloudiness, river stages and a lot of other things, needed by aviators, farmers, shippers and other persons whose lives are in constant critical contact with the weather.

VIEW FINDER

Television cameras are now provided with a view-finder, serving the same purpose as the finder on an ordinary camera, but which actually picks up the television image being recorded, and shows it to the camera-man, looking into a light-tight hood.

Automatic rainfall stations, now numbering about 2,000, where precipitation is automatically measured and recorded, with only occasional human tendance.

More than 5,000 cooperative stations, manned by volunteer observers, usually working without salary. Their records fill in the gaps between the less numerous first-order stations with government-paid staffs.

Mr. Bernard also traced the history of weather study in this country, from the first systematic record, started in 1644 by the Rev. John Campanius in the old Swedish settlement near Wilmington, Del., down to the organization of the Weather Bureau as a full-fledged research and service organization, late in the nineteenth century.

Science News Letter, July 12, 1941

Traced Through Ground

THE underground journey of water from a typical rainstorm was traced by H. S. Riesbol of the U. S. Soil Conservation Service. The fate of water sinking into the earth was learned from a study of wells sunk in the northern Appalachian region.

It took about a day, Mr. Riesbol said, for the storm water to sink into the ground. In about two and one-half days the water moved out to the drainage stream as subsurface seepage. The upper half of ground-water storage flowed into the stream in less than four days, while the remainder of the flow occupied the period between four and 45 days.

This history, of course, holds only for the locality studied. Other watersheds, in other parts of the country, would vary the story according to regional and local conditions.

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Rain Does Not Melt Snow

SNOW melts rapidly during spring rainstorms, yet contrary to popular impression the rain causes very little of the actual melting, Walter T. Wilson of the U. S. Weather Bureau told the Hydrology Conference.

During a spring rain, Mr. Wilson explained, the air near the ground is thick with water vapor, ready to condense and form dew on contact with any object only a little colder than itself. When water vapor condenses, it always gives off heat. In contact with the snow, rapid condensation takes place, with release of considerable quantities of heat, and it is this that melts the snow.

Mr. Wilson described a number of other interesting but little known phenomena to be found in melting snowbanks. As the snow partly thaws, then re-freezes at night or on colder days, the structure of the flakes within changes from fine and feathery to larger, straight-lined and coarse. Where frozen crusts were formed, then covered with later snowfall, horizontal layers of ice may be found. During thaws, these will often act as impervious strata, holding "perched water tables." Or they may melt at the top and form new ice underneath, so that they gradually sink clear through the drift and finally rest on the ground.

On the downhill edge of a melting snowdrift, the speaker continued, there will be a wet zone of soil, seldom more than ten feet wide. This is fed by water trickling out from under the snow, but evaporation prevents it from becoming wider.

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Factors in Infiltration

INFILTRATION of rainwater into the soil is governed largely by three factors, G. W. Musgrave of the U. S. Soil Conservation Service told the meeting. These factors are soil porosity, temperature, and vegetal covering. The right porous state of the soil is determined to a considerable extent by its past history. For example, a denuded soil hammered by rains may look superficially very little changed, but the pores and crevices that once welcomed the water

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may have become clogged with fine particles washed in by the pounding drops. A good cover of plants, which also encourages burrowing worms and other small animal life forms, preserves and improves the soil's porosity. Temperature is important, in that it affects the viscosity of the water, and also changes the dimensions of the crevices. Below freezing point, temperature may either increase infiltration, if the soil is dry, or decrease it, if the soil is saturated and freezes in that condition.

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"Invisible River"

AN invisible river, flowing straight uphill, returns to the air a large proportion of all rain and snow that falls. Its name is Evaporation.

At the Hydrology Conference, Dr. C. W. Thornthwaite, of the U. S. Soil Conservation Service, outlined the magnitude of this skyward drainage, and told of progress in its measurement. Of one year's measured precipitation at the U. S. Department of Agriculture experimental farm at Arlington, Va., nearly half was returned to the air by evaporation from the soil surface and transpiration through the leaves of plants.

The practical importance of this way of getting rid of surplus water was suggested by the speaker:

"In central and eastern United States nearly all major flood-producing storms are terminated by invasion of relatively dry air masses of polar continental origin characterized by a thick turbulent layer and low concentrations of water vapor. These air masses provide conditions most favorable to evaporation and are able to absorb enormous quantities of moisture from the rain-drenched land.

"Since floods on large watersheds are most frequently due to general storms which must first restore to the soil reservoir water which had previously been lost by evaporation and transpiration it is evident that land use practices favoring evaporation will accordingly lessen the burden imposed on stream channels by excessive rains, both by retarding immediate run-off and by creating a water-storage capacity in the soil."

Transpiration through plants carries off much more water than direct evaporation from the soil, Dr. Thornthwaite stated. For this reason, it is desirable to encourage maximum coverage with plants of high transpiration rate, in regions subject to floods. On the other hand, in regions where drought is the main danger, it is best to promote vegetation with low transpiration rates, so as to leave as much moisture in the soil as possible.

Until recently, direct measurement of evaporation from land surfaces was so difficult that most scientists considered it impossible. Now, Dr. Thornthwaite said, intricate mathematical formulae have been worked out that can give an expression to this mode of water disappearance.

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PSYCHOLOGY

Girls' Experience Shows Hitch-Hiking Reasonably Safe

Runaways Ranging in Age From 6 Years to 105 Years Tell Their Stories to Travelers Aid Society

WHEN CHILDREN run away from home, they do so chiefly because they feel unwanted or unable to measure up to their own or their parents' standards, Dr. Lawson G. Lowrey, of New York City has found.

The major cause of children's running away from home as found by the psychiatrist differs from causes listed by police department reports and the "most intriguing" stories told by the children to Travelers Aid Society workers.

Girls made up 44% of the group studied. According to their experience, "hitch-hiking seems to be reasonably safe," Dr. Lowrey stated. Favorite story told by the girls when asking the Travelers Aid Society for help in finding an inexpensive room runs as follows:

"Their parents had recently died; they have no family of any sort; they have come to New York to embark on a glamorous career in the theatre, movies, or dancing."

"The boys are clumsier with their stories but usually more convincing," Dr. Lowrey said.

The runaways studied ranged in age from 6 years to 105 years. For the most part they were running away from something unpleasant, to a situation "which they hope will be a better one in a variety of ways." Most of the runaways did not have psychiatric abnormalities.

"Nomads present a somewhat different picture," he said. "Many of these are competent workers, who have little difficulty in securing a job, but do have difficulty in holding one. Many of them present paranoid types of personality, such that they are under some compulsion to reorganize any job they have. They commonly give histories of having been on the road for a number of years, unable to remain long in one place because of their paranoid tendencies.

"One man, 105 years of age, had come on to New York from California to get financial backing for a mine. He had been a prospector for many years, he claimed, but was also interested in promoting a cancer cure and a tuberculosis cure. His small pension was enough for him to live on, but he had wandered away some four or five times during the past six years, always in pursuit of some type of business adventure. There was no evidence of senile deterioration."

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MEDICINE

Hayfever Cause Extracted From Ragweed Pollen

EXTRACTION from ragweed pollen of a colorless, nitrogen-containing chemical believed to be one of the major causes of hayfever was announced by Prof. Harold A. Abramson and Dr. D. H. Moore of the Columbia University School of Medicine and Dr. H. H. Gettner of Mount Sinai Hospital, New York City, at the Wilder D. Bancroft Colloid Symposium held at Cornell University under the auspices of the National Research Council and the American Chemical Society.

The molecular weight of the chemical was found to be "surprisingly low—only 5,000," Prof. Abramson reported.

This small size is significant, it appears, from his explanation that in order to produce hayfever, pollen must not only be blown into the nose and eyes but the molecules causing the symptoms must pass through the mucous membranes into the deeper tissues beneath.

"Our study indicates that the ease