Water Development as a Prelude to Range Management in Greece

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The shepherds of Greece and, I believe, of the entire Eastern Mediterranean World, are a pretty skeptical lot. They have customarily believed almost nothing of what they heard and only part of what they have seen. Therefore, in order to win their confidence it has been necessary to do something for them that they could understand. An outsider could come into one of these mountain, or shepherd, communities and talk until he was blue in the face about the need for "deferred grazing" and "rotation grazing" and a reduction in the number of "animal unit months" but such talk would get him just nowhere. The people just simply do not respond to such advice or suggestions.

There is one thing, though, above all else, that they can understand and that is the development of water for their animals. If you help them develop water for their livestock you have won their confidence and are then in a position to initiate some of the less-appealing aspects of range management. They can understand a water development program simply because water is so scarce. Due largely to the nature of the geological formations throughout much of the higher mountainous areas of this part of the world there are comparatively few dependable watering places for livestock. The formations are principally jumbled-up masses of limestone that were pushed up ages ago by igneous intrusions.

The soil, rock and gravel are so porous that water is absorbed like a sponge. Even during torrential rains or the rapid melting of snow, the water will usually run only a few hundred feet before it sinks into the ground. Much of it reappears again far down in the valleys below, sometimes in the form of small streams coming right out of the sides of a limestone mountain.

Because of this formation natural water in the form of springs is seldom found at the higher elevations. On the lower slopes of the mountains, and particularly where the formation is of mixed igneous and sedimentary composition, there are occasionally springs. While a few of these produce a good dependable supply of water the year round, many of them dry up, or become only "seeps" or marshy places during the dry season of the year. Although the shepherds have been grazing these lands for centuries it is a surprising fact that almost nothing had been done towards the development and improvement of these potential watering places up until the arrival of American technicians. The few local developments that had been made were of the most primitive kind.

The Greeks milk both their sheep and their goats and, for convenience of handling, customarily run the animals in small bands of from 125 to 150 animals each. Coming to one of these public watering places along during the later part of the season, one could often see a dozen or more such bands waiting in the vicinity for their turn to get in and water. The result of this practice was not only detrimental to the physical well-being of the animals but it also resulted in serious overgrazing around the watering places. In fact, overgrazing is prevalent around practically all such watering places and in many cases serious erosion has set in.

In most cases the animals are required to trail long distances back and forth between water and pasture, often doing without water for several days at a time. This practice always results in scrubby lambs, or where ewes are being used for dairy purposes, in low productivity. Both sheep and goats can do without water for considerable periods without apparent harm to the adult animals. But, during such periods, they will produce very little milk and the constant trailing is particularly hard on the small lambs and kids.

Nature of Water Development Program

Early in 1951 a preliminary survey of the country's livestock and pasture problems indicated that a water development program was a necessary prelude to more advanced range management practices. That was something that the shepherds could definitely understand as well as something that would add wealth to the Greek nation. When one explained that a certain wet-weather spring could be developed to the point where it would supply several times the usual amount of water, they began to show an interest in "range management." A good many of them were still just a little bit skeptical, but they were quite willing to be shown.

Development of Springs

About twenty of these spring, or "seep," developments were constructed the first year, mostly in the Mt. Olympus area. The operation involved the digging of a good-sized "catch basin" at the site of the spring and then walling it up with "rubble masonry" (Fig. 1). It is estimated that a spring which furnishes a stream of water no larger than a lead pencil will supply water for about five bands of dairy-type sheep of 125 head each. Incidentally, the dairy-type Greek sheep are less than half the size of
From these catch basins the water is then piped to stone-and-concrete troughs, at a distance of a few feet to as much as a mile or more. It frequently happens that a spring is located in a badly overgrazed or eroded area, or at some other location which is not a suitable watering place for livestock. In such cases it is desirable to pipe the water to a suitable location.

The troughs are constructed of stone and concrete, with some structural steel reinforcements, and are usually about 60 feet long (Fig. 2). A stone pavement or platform, about 20 feet wide, the length of the troughs, is constructed for the animals to stand on while drinking. Where both cattle and sheep are grazed on the same area, two separate troughs are sometimes constructed, since these small Greek sheep require a low shallow trough.

Rock has proved to be a more suitable construction material than lumber. The Greeks are excellent stone masons and handle limestone well. Limestone is considered ideal for this type of work and is usually available in almost unlimited quantities. There was some concern at first that the masonry might tend to crack during severely cold weather, but three winters have now passed and no serious damage has been observed.

Reservoir Construction

Reservoirs are also being constructed, particularly at the higher elevations. They generally range in size from 200 to 1,000 cubic meters capacity. Reservoir construction, however, is confined to those areas where there is no possibility of getting water in any other way. Most of the high-altitude areas, or those in excess of 6,500 feet elevation, are devoid of all forest cover. Much of this area, however, supports a good cover of various species of grasses, the most prominent of which are the fescues and bromes.

Since these high-altitude areas generally have very little water they were largely ungrazed. One large block of around 50,000 acres on the higher slopes and plateau of Mt. Olympus was completely without water. Other areas almost as large in the high Grammes and Pindos mountain ranges were likewise without water. It was evident that several thousand sheep, along with a considerable number of cattle, could be safely and profitably grazed on these lands during the summer months if water could be made available.

In the construction of these reservoirs it has been found desirable to select a site in a gorge or depression near the head of a canyon. All loose material is first removed and the desired excavation is then made. The dam, as well as the walls and basement of the reservoir, is constructed of stone and concrete masonry, together with some structural steel reinforcements. An area above the reservoir, sufficient in size to fill it from rainfall and melting snow, is then paved. In some countries, such as Hawaii, galvanized iron roofing is used to serve this purpose but here in Greece where paving material is plentiful paving is regarded as being preferable.

It is highly desirable to concentrate as much water as possible in a cavity with the minimum area exposed to the surface in order to decrease evaporation. The rate of evaporation from a body of water is in direct proportion to the surface area exposed. Therefore, an effort should be made to keep the surface area as small as possible. Ordinarily the nearer the summit of the mountain the smaller the reservoir, because the grazing season is shorter. Also it is cooler with less evaporation. In some instances, where the water is to be piped to distant locations, it may be desirable to construct rather large reservoirs at the higher elevations.

These reservoirs were constructed with great effort. The sand and cement and even the water for mixing the mortar, had to be transported up the mountain over very poor trails on the backs of mules and donkeys.

Benefits of Program

The water development program
has proved to be very popular with the entire livestock industry including the Agricultural Bank and other finance agencies. Shepherds usually slaughter most of their male lambs around Easter and then milk the ewes during the following five or six months. Shepherds report that, since the construction of some of these water developments, the weight of their lambs that were held over has been increased by from 25 percent to 40 percent. And the increase in dairy products is even greater. Experience has proved that ewes, when required to do without water or required to walk long distances, give very little milk.

The range management program in Greece has cost the American taxpayer almost nothing except the salary of the American technician. Some “Counterpart Funds” were used the first year to get the program under way but since then the Greeks have financed it in one way or another by themselves. However, instead of waiting for the Government to finance the program, as during the first two years, the communities and some of the shepherds with large flocks are now volunteering to stand much of the cost. This usually consists of supplying the labor and arranging for transportation of the material. The Government furnishes the technical supervision and the material that must be purchased, such as cement and pipe. This is regarded as a fair division of the costs, where the grazing lands are owned by the National Government. Some of the larger private land owners are now putting up the entire cost, except for Government technical supervision which they request. In some areas the Agricultural Bank is now sponsoring a program of water development and is offering to put up 50 percent of the costs of each individual project.

**Figure 2.** Watering trough, about 60 ft. in length, of stone and concrete with a masonry platform 60 x 20 ft. for the animals to stand on while drinking. Water is piped from a distance of one mile to this development on the lower foothills of Mt. Olympus.

**Water Development Leads to Range Management**

With the success of the water development program the shepherds are beginning to take an active interest in other phases of range and pasture management. One of the most hopeful signs is the changed attitude on the part of the shepherds towards the forestry officials. Where relations between the shepherds and the forestry officials formerly were of almost open hostility, they are now cordial. They have come to see that the foresters are interested in helping them instead of continuously hailing them into court.

Many of the communities have recently agreed that the number of livestock grazing their lands is excessive and are voluntarily making the necessary reductions. They are realizing more and more that the quality of their livestock should be improved and that it should be better cared for. Experiments in fertilizing, and in the reseeding of worn out pastures and abandoned farm lands, are being watched with great interest by the entire shepherd industry. They are still pretty skeptical in regard to some of our experiments and suggestions but their eyes have now been open to the extent that they seldom say that it can’t be done.