

ORIENTATION OF WATER RESOURCES RESEARCH AND WELCOME ADDRESS

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It is my very pleasant privilege to welcome you to the Third Annual New Mexico Water Conference program. I believe the title which is used this year "New Mexico Water - Present Use and New Sources" is a very appropriate one.

Perhaps it will be of interest to you to know how the Water Conference got started here on our campus. In the spring of 1956 the Agricultural Economics Department, during the course of its graduate and staff Seminar, called in a number of interested people to discuss the water problem. The Seminar was conducted with participating specialists from the State Engineer's Office, Bureau of Reclamation, Geological Survey, Forest Service, Interstate Streams Commission and others. It was so well received that it attracted public attention and others requested permission to attend. As a result of these requests, it was decided to hold the Seminar a second time. This session was called "The New Mexico Water Conference". Subsequently, the Dean of Agriculture and the Dean of Engineering appointed a nine man committee, representing the various departments of the two schools, to organize a regular Water Conference. Dr. H. R. Stucky, of our Agricultural Economics Department, served as Chairman of this Committee and has continued in that position since its organization. Following the first conference, it was the will of those who attended to make it an annual event. A Water Advisory Committee was selected to represent the various areas and interests of the state. The Advisory Committee met with the A & M Water Conference Committee in May to start planning for the meeting which will be held during the two days you are here. In addition, this Advisory Committee will meet again Friday morning, November 7, with the A & M Committee to start planning for the Fourth Annual Conference.

Water is of tremendous importance to the agriculture of New Mexico. Some 860,000 acres of land are irrigated in this state with 66% of it being irrigated by wells. It is estimated that approximately \$55,000,000 is invested in pumping equipment and distribution facilities for the operation of the 7500 wells in New Mexico. Presently 94% of the water used in New Mexico is used by agriculture. Industry uses 1% and municipal and domestic uses total in the neighborhood of 5%. Almost twice as much ground water is used as surface water with 98% of the surface water used in agriculture. Approximately 90% of New Mexico's \$100,000,000 in cash crop receipts come from irrigated farms. These returns except for acreage allotments on some of the primary crops, probably would be

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substantially higher. Irrigated agriculture supplies some supplemental feeds for our \$100,000,000 livestock industry.

A little less than 15% of New Mexico's population lives on farms and ranches, and another 24% is classed as rural non-farm population. Some supplementary income from farming is gained by this non-farm group.

Historically, it has been said that irrigation has been practiced in New Mexico for over 800 years. New Mexico's citizens are water conscious and it speaks well that we who are interested in water are here today to pool our resources of knowledge and ideas to attain more efficiency in the use of this most vital of our gifts.

It has been suggested that I discuss the water research being conducted at New Mexico A & M.

Our Agricultural Economics Department is conducting several studies which are pertinent to New Mexico. Some of these studies are a contributing part of cooperative regional work. One project is "An Analysis of Ground Water Laws and Related Institutions as They Effect the Economy of Lea County, New Mexico". The objectives of this study are: (1.) To inventory the ground water laws and administrative and judicial decisions that apply to Lea County; (2.) To evaluate experiences with ground water laws and decisions as they effect the economy of Lea County and; (3) To estimate and evaluate the probable future effects of present ground water laws and decisions on Lea County. This study is directed toward developing economic criteria which will reinforce or modify our aid in giving direction to existing law and legal decisions affecting the allocation of ground water. This study is scheduled to be completed by 1959. A second project in Ag Economics is entitled "Economics of Pump Irrigation Farming in Lea County". This research has as its objectives: (1.) To determine the cost of pump irrigation water in the Lea County basin; (2.) To determine the production requirements, cultural practices and costs of production for various farm enterprises and; (3) To determine the most profitable combination for crop and livestock enterprise. It will be of interest to note that similar information on the cost of pumping is being prepared for Curry County. A third project is entitled, "Economics of Pump Irrigation Farming in the Estancia Valley". This study is similar to the one being carried on in Lea County and it is believed that we will have a publication in the very near future giving the information from these studies. This study will be expanded to include all pump irrigated areas in 1959. Another project in this department is a cooperative one utilizing "Resources for the Future" funds. This project is financed from a \$50,000 contract between the University of New Mexico and the Resources For The Future. The University of New Mexico enlisted a project committee with membership from associate institutions and other groups in the state. Dr. Stucky, of our Agricultural Economics Department, is

a member of this committee and \$10,000 has been allocated to this institution to study water. Professor Bromilow of our Civil Engineering Department cooperated on the industrial section. The purpose of this joint project is to determine the value of San Juan River water for agriculture and for other uses. Among the important agricultural committees working in the Western states on water research are: The W-33 Committee which is studying the "Economics of Water Application" has just met here at State College on November 3 and 4. There are seven states cooperating in this project; The W-42 Committee studying "Economics of Ground Water Laws" met at the college on November 4 and 5. The New Mexico contributing project deals with the analysis of ground water laws and related institutions as they affect the economy in Lea County. Another committee from the Western Agricultural Economics Research Council has set up a region wide committee to expand and improve the water research in the West. This committee will be meeting in Denver on November 17, 18 and 19 of this year to coordinate findings and make plans for future research. In addition, the Great Plains Council, representing 10 low rainfall states, has a research committee that is vitally interested in water. Associate Director Curry, of the New Mexico Agricultural Experiment Station, is Chairman of a four-man sub-committee of the Great Plains Council charged with the responsibility of developing water and irrigation research projects applicable to the Great Plains Research area. Actually, Mr. Curry and his Committee have developed three such projects and a further hearing by the general Research Committee will determine when and how soon one or more of the projects, dealing particularly with water and irrigation, may be activated.

The Agricultural Research Service of the U. S. Department of Agriculture is doing some research in the upper Colorado area. The New Mexico Agricultural Experiment Station is willing to assist in every way possible with this particular research.

Our Department of Agricultural Engineering is also doing some work with water. One of their projects is, "Water Requirements of Cotton grown on Light Textured to Medium Textured Soils in Mesilla Valley". In addition, they are doing research on the water requirement of alfalfa grown on fine textured soils. The objective of this research is to determine the desirable frequencies of irrigation for cotton and alfalfa production; also, these researchers want to find the desirable range of depths of irrigation water applications, as it is related to optimum production under a limited to adequate water supply. They are investigating the affect of variable depth of irrigation applications and are attempting to determine the utility of electrical resistance blocks as a suitable method for determining the proper time of irrigation. Finally, they want to determine for row crops the relative yield from single beds as compared with double beds when furrow irrigation is used.

In 1950 the Ag Engineering Department, in cooperation with the irrigation division of the Soil Conservation Service, prepared a bulletin which was published, describing the water requirements for crops grown in all irrigated regions of New Mexico. A climatological data method was used to compute the unit consumptive use of all crops. The information in this publication represents average data for each crop. This information has been available as a temporary guide to suffice until more refined data have been determined by research. It is one of the objectives of the afore mentioned projects to determine with greater precision the water requirements considering the influence of site conditions.

It is planned that in the future our Ag Engineering Department will do some cooperative research with the staff in soil physics and soil fertility to study water requirements of crops as influenced by fertility levels and moisture levels.

Our Agronomy Department is studying practices of irrigating pastures and is making observations of various types of irrigation on crops.

In another project, studies are being made of the salt tolerance of cotton and alfalfa under New Mexico conditions and of methods of reclaiming salt-affected soils. Irrigation waters of varying chemical concentration are used to determine how the particular salts in the water affect plant growth. Movement of salt, as affected by shape of the planting bed, is being studied in glass plates that permit observation of the flow patterns of irrigation water carrying soluble salts into the bed.

In an additional project, exchangeable sodium accumulation in soils when irrigation waters of varying sodium calcium ratios are used is being investigated. Both calcareous and non-calcareous soils are included in the experiment in order to determine what factors affect the rate and magnitude of sodium absorption. Along with the soil study, alfalfa is being grown to learn how the sodium/ calcium ratio in irrigation water and in the soil solution affect the yield and chemical composition of plants.

As part of this study, a survey was made of the quality of irrigation well waters in New Mexico and a bulletin summarizing that survey has been published. The data show that there is a wide variation in water quality in the ground water basins of New Mexico but that the chemical characteristics of waters in any one basin are similar.

The Middle Rio Grande Sub-station at Los Lunas is doing some research on the irrigation and nutrition of chile. We are also doing some irrigation research at the Northeastern Sub-station at Tucumcari, where they are studying the fertilization of cotton and its relationship to irrigation.

Dr. James L. Gardner and his U.S.D.A. Associates stationed on this campus are studying, "The Hydrology of Southwestern Grassland Areas as Related to Their Net Yields of Usable Water and Sediment Production".

The main objectives of the work are to determine the interrelated influence of soils, geology, land use, watershed size, and vegetation on water yield; to get accurate field data on areal distribution of rainfall amounts intensities, and times by an adequate network of raingages; and to determine the relation of water yield to range conservation practices.

Two areas--one of 65 square miles on Upper Alamogordo Creek in New Mexico, another the 60 square mile Walnut Gulch watershed in which Tombstone, Arizona, lies--have been covered with recording raingages at approximately 1 mile x 1 mile intervals. Runoff is being measured by means of prerated measuring flumes--one thus far on Alamogordo Creek, five on the Walnut Gulch area. More of these prerated flumes will be established on both areas as time and funds permit. Inventories of the soils and vegetation have been made on the Walnut Gulch area and of the soils at Alamogordo Creek. The vegetation inventory at Alamogordo Creek is still to be made. These vegetation inventories will be repeated at intervals yet to be determined. Besides these two large areas, three small watersheds of less than one square mile each about 40 miles northwest of Albuquerque and four near Safford, Arizona, are being similarly studied.

The Department of Civil Engineering, which is headed by Professor Frank Bromilow, who is also the Associate Director of the Engineering Experiment Station, is conducting some studies of a slightly different nature. First, they are investigating the flows of the Rio Grande and the relationship of the flow to the ground water in the Mesilla Valley. This should supply some very vital information for well users. Along with this, they are making a study of the growth of Algae sewage plant effluent. They have a third study which is designed to measure Aerobic digestion in the liquid state. The research staff in Civil Engineering also is interested in the desalinization of water, but this is planned for future work, since they do not have an active project in it at the present time.

We are all deeply aware of the vital and important position that water occupies in our economy. It is necessary for irrigation, for industry, manufacturing, municipalities, rural homes, livestock, power, recreation, wildlife and many others. It is our sincere wish that this Conference will move us closer to a more complete understanding of the water problems in New Mexico and that it will set forth some guide line as to the most important areas where research is needed. Finally, we should like to repeat again that we are pleased that you have come to your Land-Grant College for this Conference. If any of us can be of any assistance to you while you are here, I am sure that we will be glad for the opportunity to help.