Attitudes about the West, both by the residents and by outsiders, have changed considerably in the last 100 years. When this land was first being settled, the story was told of a newcomer who said:

"This would be a fine country if we just had water."

"Yes," answered the man whose wagon tongue pointed east, "so would hell."

Probably most of us would agree that the West as it looked to the pioneers must have appeared like the infernal regions. Except for the mountain areas and the banks of perennial streams, green vegetation was noticeably absent. Sagebrush covered the low hills and valley floors. As a matter of fact, I understand Brigham Young settled the Mormon pioneers in the Salt Lake Valley because it was so desolate he believed no one would bother them there. And it was Brigham Young and his followers who set the pattern for irrigation which has made the desert blossom and flourish.

In many cases the land was fertile and needed only water to become rich cropland. In 65 years Reclamation has completed or rehabilitated 196 reservoirs and has 14 under construction with a total storage capacity of over 134 million acre-feet of water to serve people of the West and the Nation. Total storage and conveyance features, including those constructed by others, in operation on Federal Reclamation projects, include 276 storage reservoirs, 302 diversion dams, 13,180 miles of canals, 420 miles
of pipeline, 160 miles of tunnels, 30,840 miles of laterals, 103 major
pumping plants, and 13,230 miles of project drains. In 1966, our latest
year of compiled records, the average gross crop value on over 8 million
acres of lands irrigated by Reclamation facilities passed $200 per acre
for the first time in history. The aggregate value of all crops produced
on Reclamation projects since 1906 now totals $24.9 billion, over 5 times
the total Federal investment in completed plant-in-service for all
functions of the Reclamation program.

In addition to irrigation water we also supply substantial quantities
of municipal and industrial water to various cities. Over 14.6 million
people, or nearly 30 percent of the Reclamation West, benefit directly
from these water deliveries.

Over 40 million visitor days of outdoor recreation are provided
annually by public use areas associated with Federal Reclamation projects.
Flood damages prevented by project structures total about $660 million
over a 17-year period, 1950-1966, well in excess of the $556 million total
allocated flood control costs on all authorized projects. Annual income
from hydroelectric power sales is now over $115 million. The cumulative
total power income from Federal Reclamation projects now stands at $1.4
billion.

This is the record of the lands and the rivers, reacting favorably to
planners, designers, and engineers. But there has been another reaction--
the reaction of the people to the water projects. As the water changed
the land so did it change the way people lived and thought. They worried
about different things, argued about different subjects, and advocated
different courses of action. Today I will try to point out the peculiar nature of social man living in the desert, who either already has, or wants, a Reclamation project.

Public Force for Water Development

Just what is a water resource development project? In its narrowest sense, it could be a ditch dug by a farmer to bring a trickle of water to his field. Somewhat broader, it could be reforestation of a mountain slope or a general program of watershed management. Among the newest types of water resource development projects now on the horizon are those to desalt the sea and modify the weather. Most commonly thought of, however, Reclamation is a multifeatured project to store, regulate, and redirect surface waters. Although we have been in business for over 65 years, Federal Reclamation is a relative late comer in water development. The first settlers naturally claimed land along the streambanks and soon built small, private irrigation works of their own. Such water diversions caused no trouble so long as the supply held out, but within a few years, downstream users began to experience drouths when their streams were depleted by upstream users. This resulted in harsh words, litigation, and even a few gunfights. Thoughtful men realized that residents would have to organize and pool their irrigation efforts if they were to finance mounting costs and avoid conflict.

To a layman, the conception, planning, and authorization of a project might seem rather simple. Someone gets the idea, engineers investigate the physical problems involved, economists integrate financial data to determine whether the benefits outweigh the costs, and whether water users can repay in full the reimbursable cost. Congress debates the merit of the project,
a law is passed, the Bureau of Reclamation builds the project, and, in most cases, the water users, after construction, assume responsibility for operation and maintenance of facilities. This is a gross oversimplification and overlooks the fact that a water project has far-reaching effects on many people, and if justified must clearly be for the benefit of people. There is no justification for the Reclamation program unless it benefits people—today and in the future. With the growing competition for the use of water and the multipurpose project concept which has developed to meet the many needs, everyone has an interest. I think you would be amazed by the great number of steps plus the large number of groups, committees, and agencies that participate in the planning and development process.

Although many of the agencies that review our project plans are parts of either State or Federal Government, they are not artificial bodies. They are people and they represent people. Each of them represents a particular public interest which it is obligated to protect. Thus, the end product is not simply something dreamed up by the Bureau of Reclamation. It is something put together by people and represents the thinking of people who will be most affected by the proposed project.

The multiple uses of water are not always compatible, in fact they frequently are competitive and conflicting. Farmers will naturally want the maximum amount of water for irrigation, which could mean reservoir operation on a simple fill-and-spill basis. Growing cities, that are almost invariably seeking more water, will try to obtain or reserve as much water as possible for municipal and industrial use. A specialist in flood control only wants to get rid of all the water he can as quickly as possible.
possible. This requires retention of vacant space in reservoirs to
catch flood flows. Where navigation is important, it is necessary to
keep the rivers reasonably full and with minimum fluctuations. Those
engaged in electrical power production would seek to have the hydropower
plants of the project generate as much high-income power as possible,
regardless of the fluctuation in rivers or lakes. Pure recreationists
prefer stable reservoir levels to avoid shoreline mud flats. Lake
fishermen would fluctuate the reservoirs on a planned basis to allow
shoreline vegetation alternately to grow and then serve as fish food and
shelter. Stream fishermen would maintain relatively constant streamflows
at adequate levels for fish life. Those concerned with pollution control
would use stored water to maximize river dilution.

These would appear to be "water problems." Actually they are "people
problems," problems brought about by a diversity of interest and by the
scarcity of water, or occasionally by a surplus of water.

The competition between river basins adds complication whenever an
interbasin diversion of water is contemplated. The basin with apparent
surplus contends that its own future growth will eventually require all the
available water. Where these basins are in different states, the inherent
powers of State government are involved.

The wonder of it is that so many of these conflicts have been solved.
Fortunately, most people will present their views vigorously but, in the
final analysis, are willing to accept a justifiable compromise. Our job
in Reclamation is to listen to the people (Federal, State, private, and local),
to advise with them, and to provide them and the Congress with sound facts,
analyses, and projections. It is the Congress that makes the final
decision as to whether a project will be authorized.

Now let us go on to the next step. If a potential project somehow
runs the authorization gauntlet successfully and reaches the construction
stage, what then are the social forces that are put into motion?

Heavy construction required for dams necessarily brings in work
forces in varying numbers. In these days of mobile-home trailers, workers
usually bring their families with them, expecting to send their children
to local schools, and to receive the usual community services, including
fire and police protection and water and sewer service. Arrival of these
forces affects the local people in inverse proportion to the
size of the town. While a large city can absorb them with no inconvenience,
a small town may be hard pressed to accommodate them. Most of our dams
are built in more remote areas where all the nearby towns are small and
thus the problems accentuated.

The effect on Duchesne, Utah, 3 miles from the Starvation Dam site, is
a good example. When the dam builders moved in about a year ago, the influx
of children overtaxed the local school facilities and extensions were
necessary both in the elementary and high schools. The citizens of Duchesne
passed a bond issue to enlarge their water distribution system and are in
the same process to provide a new sewer system. The Federal Government is
helping through special grants in accordance with present laws dealing with
impacted communities. In Duchesne, as elsewhere, there are fairly good sized
groups of Reclamation employees among the influx, and we urge our people to
become an active element in the community and to work with the community in
solving problems resulting from sudden expansion.

C.B.P. Third Floor House 2400 WHER 1600 pupils
A different case is Page, Arizona. This is an entirely new town built to service the needs of those building and then operating Glen Canyon Dam. Here there were no residents of a going community, but there were Navajo Indians living throughout the area. The effect of this new town, with all manner of services available, set down in what was the most remote part of the Navajo Reservation, has had profound impact on these Indians. Now there are modern schools, doctors, a hospital, a theater, and supermarkets within easy driving distance. The sight of many Navajo women, their black hair carefully tied in the back, wearing long skirts of velveteen, doing their weekly washing at the Page laundromat, is unforgettable.

Since construction was completed a new industry has been established in Page, an electronics packaging firm which hires only Navajos. The Bureau of Indian Affairs pays for their on-the-job training. Within the past few months these Navajos have opened many savings accounts at the local bank and are living better than they ever did before.

Our experience at Page is a unique example of the immediate social consequences of Reclamation construction.

When a dam is finished and the lake begins to fill, and the project commences operation, other social forces are put in motion. One conspicuous example is recreation development to meet the demands of a very mobile American public. Before Flaming Gorge Dam was finished, the National Park Service estimated that about 300,000 people would visit the lake each year. Actually, last year, 1967, over a million visits were recorded. Over half of the visitors were people from the Wasatch front communities of Utah. The heavy use of the lake reflects the added leisure time of our affluent society which is placing heavy pressure on
recreational facilities everywhere. Ten most popular Reclamation reservoirs receive more visitors annually than do the 10 most popular western National Parks.

Recreation activity stimulates the economy, benefiting the motels, cafes, filling stations, and resorts near the new reservoir, as well as retail business generally. One community which has had its economy drastically changed is Manila, Utah, near the west shore of Flaming Gorge Lake. Manila was formerly one of the most isolated mountain towns in the United States. Many decades ago it and the valleys nearby were considered almost impregnable outlaw hideouts. Now the tourist business has come to stay. The old residents discover that the sleepy town of their childhood is no more. In summer the town swarms with tourists, with camper trucks and boats. This has been disrupting in that it has forced oldtimers to alter their thinking and their social life, but the added social and economic benefits to the community income sugar-coat the pill even to those who preferred no change.

But of more importance than the recreation impact is the effect of increased water and electrical power on the areas served. Whether the cities and farms prosper and grow economically depends largely on other factors, such as climate, mineral resources, and nearness to good transportation, but water is a most essential item and, indeed, acts as a powerful catalyst when other circumstances are favorable. Many if not most modern Reclamation projects supply supplemental irrigation water to help stabilize and lift the economic ceiling of already established communities and rural areas. As such, the social effects of such activity are almost
inconceivable. Let it suffice to say that in most irrigated areas there are few of the dwindling or, in some instances, totally deserted towns which reflect the growing movement from farm to cities. Irrigated areas, by the very nature of their operation, generate service and processing industries which add to the economy and social stability of the urban and rural communities.

Looking to the future, water shortages in many areas unquestionably will become more acutely felt than ever before.

We will use every means possible to increase the usable water supply. More efficient use of presently developed supplies should be an immediate objective. Currently there is a 30 percent seepage loss in water supply between river diversion and the farmer's headgate. Furthermore, farm irrigation efficiencies are generally below 50 percent. These losses can be reduced using modern systems and materials.

Weather modification or cloud seeding to increase precipitation, now 47 billion acre-feet of water pass over the nation in the atmosphere annually, looms very favorably on the horizon. For the past 7 years we have had an increasing program of practical research into the techniques and effects of cloud seeding to determine whether an operational program could be justified. Atmospheric conditions appear most suitable in the high mountains in the wintertime, and one of our research contracts is with Utah State University which is looking into the seeding of broad frontal storms that strike the Wasatch Range in winter. Inducing added snowfall is peculiarly fitted to Reclamation operations because it will help fill our reservoirs and utilize existing and proposed systems.

Another major possibility for the future is desalination of sea water.

Although the cost of desalted water is still relatively high, the price
continues to go down. While it is not yet in a range where it can be used for irrigation purposes, costs today are well within the ballpark for municipal and industrial uses in coastal areas and may soon become so for irrigation in selected areas. In future decades, much of the water used in coastal cities is expected to come from the ocean.

Other programs that will help increase usable water supplies are (1) control of phreatophytes, the water-loving plants that rob our rivers, reservoirs, and canals of water, (2) the application of evaporation retardant on the surface of reservoirs, and (3) the salvage and reuse of regulated water again and again. Importation may be expanded in the future.

In the long-range future we may embark on water diversion projects that would dwarf many existing projects. The most ambitious scheme proposes transportation of water from Canada and Alaska, from the Mackenzie and Yukon Rivers, through the United States and into Mexico. As the demand for water grows, the need for larger and more far-reaching projects becomes more and more apparent. But there first must be a determination of the total foreseeable needs within any river basin before large-scale transbasin and transstate and international movement of water is considered. Also the most economical means of meeting water demands must be accomplished first. Currently it appears that sea water conversion and weather modification will be exploited before major transbasin importation schemes are seriously considered.

To summarize, water development projects, such as those built by the Bureau of Reclamation, set in motion a wide range of social forces. In the planning phase, these forces seek to resolve conflicts and usually
take the form of long and drawn-out negotiations and compromises. The construction phase is characterized by sudden economic buildup in remote areas, which sometimes changes existing social patterns. When the project is finished the social changes include adaptation to an enlarged and stabilized economy resulting from the additional water and power made available to the service areas of the project.

One subject I have not discussed and one which I think has strong social implications is the reimbursability of the Reclamation program. In this era of free government handouts and "I can get it for you wholesale" thinking, the Bureau of Reclamation has a record of 90 percent reimbursability of the Federal investment. I like to think that this gives us and the many, many people with whom we deal in the planning of a project an added sense of fiscal responsibility.

I believe this also rebuts those thoughtless persons who accuse the Bureau of Reclamation of being an organization of hardheaded, single-minded engineers who are interested only in construction without thought to the social implications of their work. Certainly, if we were so inclined, the participation of individuals and organizations who are faced with the necessity of committing themselves to repay the reimbursable costs would bring us up short. But I believe the success we have enjoyed in dealing with people and achieving a better way of life all over the West bespeaks our concern with the human and social factors of Reclamation development. Construction of glamorous, gigantic dams, reservoirs, and power plants is not the end objective of the Reclamation program, but merely a means to the end. The end objective must be measured in terms of benefits to people which also means benefits and strength to the Nation.
There is a familiar analogy that characterizes our relationship with the people with whom we work. First there is the courtship, when a plan is being developed and authorization sought jointly between the Bureau and the people in the area. Next the marriage, when the contractual relationships are entered into. After that there is the honeymoon, when the project is being built and readied for operation. Finally the marriage is tested by future circumstances and with the realities of living together in the modern world.

The test, of course, is the endurance of such relationships. We point with pride to practically no divorces, few family squabbles, and a long history of productive and friendly mutual accomplishment.
Reclamation project formulation and justification includes a calculated benefit-cost ratio. Benefits are in two categories—direct and indirect. Direct benefits are to measure the estimated increase in net income to the water users. All other benefits are indirect and are intended to measure the net increase to nonfarmers who share in the processing of agricultural commodities from the farm to the consumer. Direct benefits must at least equal costs in order for a project to get favorable consideration of the Administrator.

While there are significant social impacts of water resource development, they are not currently being measured nor portrayed to any significant degree in project evaluation or justification.

I believe this deficiency ought to be corrected; but first we need to know what sociological factors to identify, what indicators are important, and how should they be brought into the evaluation process.

The Bureau of Reclamation would be happy to see the social scientists become interested in this field and would be happy to cooperate in establishing the objectives and ground rules for such a research project.

We are convinced that the need to recognize, evaluate, and forecast sociological impacts and benefits of water resource development is more prevalent today than we have been inclined to admit; and the need will become greater as time passes.

Thus I believe this offers a fertile field for imaginative research.

Like Egyptian Mummies
Puzzled for time

We have been asked many things this year that have been asked today—we have tried to answer them.