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Irrigation of Twelve Million Acres in the Valley of California

BY R. T. SAWYER, E. E.-'23

From notes and an interview given by Col. Robert Bradford Marshall

The California State Irrigation Association is the promoter of this immense project and has an active membership to date of 4,000 members. Due to the aid of these members and the interest of the California people, assembly bill No. 910 was approved June 3, 1921, which is an act to provide for the investigation by the state of California of the possibilities of the storage, control, and diversion of water for public use, and public protection in the state of California, and making an appropriation for said purpose. \$200,000 have been appropriated to investigate the water resources of California.

Pursuant to this assembly bill Governor Stephens appointed nine men on the consulting board. They are, H. D. McGlashan, district engineer of the water resources branch of the United States Geological Survey; B. A. Etch-very, Berkeley, Professor of Irrigation at the University of California; Col. Robt. B. Marshall, originator of the Marshall Project; H. Hawgood of Los Angeles, a consulting engineer; Peter Cook, of Rio Vista; O. B. Tout, of El Centre; U. S. Webb, attorney general of the state; Jonathan Dodge, state superintendent of banks; and J. C. Forkner, of Fresno. Mr. Forkner was made chairman.

The above shows you the type of men who are backing this project, representing the people of California. Now I wish to have Col. Marshall's own explanation of his project—"The Marshall Plan."

INTRODUCTION

"I desire to set before you some facts regarding the development of the resources of California that to me seem to need immediate attention. The power and the wealth of California lie in its agricultural lands. These lands are the foundation on which everything else must stand, and California possesses a richer stock of this fundamental resource than any other state or similar area in the United States, if not in the world, and yet a large part of the resource lies dormant. We know it lies there unused, yet we calmly look on and do nothing to bring it into use. California's potential wealth in land reaches into billions of dollars; 12,000,000 acres lie all around us bristling with invitations to help ourselves, yet there they remain practically untouched.

"I propose to show that the possibility of reclaiming this Valley of California by engineering is its greatest asset. It is a large undertaking, but this is a day of large undertakings, and although it is a comprehensive, state-wide job its immediate practicability and success depend only upon the successive building of its various parts to form a consistent whole, each part so arranged as to yield instant returns on a propor-

tionate fair first cost — each practically self-supporting. The project has been thought impossible of execution because of legal difficulties, but the present laws pave the way for the removal of all obstacles.

"For some twenty-five years I have surveyed and topographically mapped areas in California. During most of that time I have had administrative charge of the State Co-operative Survey and in this connection have traveled all over the state, with the ever-present thought of the wonderful possibilities involved in the reclamation of its millions of unused acres. The unusual opportunities thus afforded me for observing the field conditions throughout the entire state, together with my familiarity with existing maps and their interpretation, now enables me to assemble in graphic and concrete form the results of twenty-five years of study; without the detailed map of the Valley of California made by the U. S. Geological Survey in co-operation with the state the study could not be made. I have traveled on the Sacramento River with some of the commissions that made reports; I have read the interesting statements of able engineers that it is not feasible to take the waters from the Sacramento Valley into the San Joaquin Valley, but notwithstanding all the authorities I say it is entirely feasible. It is not only feasible, but necessary. It must be done and it will be done. I desire therefore to give you the benefit of my thirty years' training and experience in the U. S. Geological Survey, during which I have seen most of the United States and have noted its development, to tell you briefly of my observations, and to suggest a general outline for a plan that will help make the Valley of California the world's greatest garden. The plan is a large one, larger by many times than the entire program of the U. S. Reclamation Service for the 16 public-land states, but it is in keeping with the state, for small ideas have no place in California.

GENERAL STATEMENT

"The U. S. Geological Survey, in co-operation with the State of California, has now topographically surveyed and mapped (primarily for study and use in reclaiming the Valley of California) the entire Sacramento Valley and the San Joaquin Valley as far south as Merced; it has also, co-operatively, gaged streams, made profiles and surveyed the larger reservoir sites along the principal streams in the state. Prior to this co-operative survey the U. S. Geological Survey had mapped practically all the area draining into the Valley of California and the San Francisco and Bay Cities section, as well as southern California. Thus we have all the field data necessary to begin this work and could start construction to-

morrow. A study of these complete maps now available will convince the layman, the farmer, the land owner, and, I hope, any progressive engineer that the proposed plan of reclamation presents no serious obstacle, for it is only a Big Job.

"There are approximately 12,000,000 acres of level land in the Sacramento, San Joaquin, Santa Clara, Livermore and Concord Valleys, and more than enough water annually passes through the Sacramento and San Joaquin rivers into the sea unused, lost forever, to put water three feet deep on each of these 12,000,000 acres. Who will dispute that, taken as a whole, each of the 12,000,000 acres is not worth an expenditure of at least \$50, yes, even \$100, to place it under permanent water control? Who will dispute that the value of each acre thus put under permanent water control will not be increased over its present value at least \$500 per acre? This would mean an increased state valuation of \$6,000,000,000. Therefore, why haggle at an expense of even \$1,000,000,000 when we know that the reclaimed land will within 20 years produce, with the use of the water provided, many times more than the cost.

"This scheme of reclaiming the Valley of California does not call for the expenditure of one penny from the State or National treasury. All the general public will be called on to do is to give their endorsement to the bonds, which will be secured by the land, thus placing on the market bonds as good and as safe as Government bonds. The water users, whether land-owners or municipalities, will pay the entire cost of the construction. Everything done under the plan would be an affair of community interest; all rates for water, electric railroad rates, navigation routes, and rates would be controlled by a board of directors to be elected by the water users' association. Under this plan the bonds would be much sought after by the land-owning water users, and this would inspire them to expedite the creation of the district and the completion of the work.

"Los Angeles, San Francisco and the Bay Cities need water and no doubt would be glad to spend their proportionate share of the cost of state-wide development when shown that they will participate in the benefits.

"The engineering plans for such a project must be comprehensive, for their execution must not only assure the complete reclamation of 12,000,000 acres of valley lands but must also effectively and forever control the river floods and insure safe and continuous river navigation throughout the year. The hydro-electric current generated along most of the streams would furnish all the power necessary for construction as well as supply more power than would be needed for use on electric railroads, in municipal lighting, for manufacturing, and for domestic use in the new homes as they were established and the sale of this power at fair rates would be a big revenue producer.

"Consider also that our west coast, particularly that of California, needs protection, and that there can be no better propaganda for patriotism than to place owned homes in the hands of present and prospective citizens, for it is well known and recognized the world over (as has been lately

and so truly exemplified in France and elsewhere) that every man will defend to the death his tract of land, his home, his castle. Place 3,000,000 more in happy country homes in the Valley of California, and she will forever defend herself from invasion.

"My solution of the whole problem is to turn the Sacramento River into the San Joaquin Valley, a feat which is now shown to be practicable as an engineering enterprise, that is possible of execution within ten years and that would justify a cost, if necessary, of \$750,000,000, be safe for the investor, present no legal obstructions, and provide for the present as well as the prospective land owner, the most attractive proposition ever offered in the state. Remember, however, that the plan is a big, state-wide plan and also remember that success, as California measures success, is assured only when the enterprise is planned and carried out in its entirety.

RIVER CONTROL AND NAVIGATION

"Although the control of the Sacramento River for navigation is vested in the War Department, and Congress has appropriated money for its improvement, the state has already expended nearly an equal amount for the single purpose of maintaining it as a navigable stream. But the withdrawal of water for irrigation already almost preempts the supply necessary for summer navigation, and the further the land development proceeds the greater the need will become for more water upon which to transport the rapidly growing commerce of the valley.

"I do not know how many millions of dollars have been spent in trying to control the flood waters of the Sacramento and San Joaquin rivers, and I doubt if anyone knows how much damage to property these river floods have caused. I do know, however, that as long as the present piecemeal attempts to control the river floods by the foolish levee policy continue, the damage to property, the waste of millions of dollars' worth of water, and the failure to profit by the vast quantity of products that could be obtained from the lands now unused will also continue.

THE MAIN PROPOSITION

"We would start the general plan by constructing in the Sierra Nevada Mountains reservoirs and building a diversion dam across the upper Sacramento River above and near Redding, the top of the dam reaching an elevation above sea level of at least 440 feet, and from this initial point the main development would begin by way of two grand canals, one down each side of the Sacramento Valley.

"All along and below these grand canals, in places where there are ample reservoir sites, flood water would be stored in foothill reservoirs, to be released for irrigation early in spring and in low water periods in August, September and October. All reservoir sites on any of the streams before they reach the grand canals encircling the Valley of California would also be utilized for additional flow in exchange for the Kern River, which is to be diverted to southern California; we would divert the Klamath River at an elevation of 4,000 feet after it leaves the lower marsh lands in the vicinity of Klamath Falls and

approximately 16 miles above its narrow canyon (below which it goes into the ocean unused), take it through tunnels and by canal 40 miles over Shasta Pass near Upton at an elevation of 3792 feet and drop it 1250 feet into the Sacramento River near Shasta Springs, developing 375,000 horse power and adding over 2,000,000 acre-feet to the water supply of the Valley of California.

"East Side: Leaving Redding at about 440 feet above sea the East Side Grand Canal would flow southeastward along the grade (approximately six inches to the mile) necessary to handle the large volume of water needed, picking up the waters from each tributary river or stream as it was reached and continuing along the edge of the foothills far east of Marysville, Sacramento and Stockton, to a point near the crossing of the San Joaquin River, where the first section of the canal would end. In order to obtain a higher gradient for the irrigation of the rest of the San Joaquin Valley a second section of the East Side Grand Canal would start from a diversion dam on the Stanislaus River at an elevation of about 400 feet and be carried high above and east of Fresno to a point in the valley above Tulare Lake and there dropped. A third section would start from an elevation of about 1,000 feet on the San Joaquin River and flow southward past Bakersfield, around the south end of the San Joaquin Valley, and down the west side past Coolings to a point near Dos Palos.

"West Side: Leaving Redding at an elevation of at least 440 feet above the sea the West Side Grand Canal would flow southward along the west side foothills through Creston Pass and deliver water at Benicia at an elevation of about 300 feet where an inverted siphon would carry it across Benicia harbor, to a point from which the West Side Grand Canal would be carried through Martinez tunnel, into and around the Concord Valley, and into and up the west side of the San Joaquin Valley to its end near Dos Palos. If any further ample water supply is to be had for San Francisco and the Bay Cities it must be taken from the Sacramento River, and it is therefore planned to tap the West Side Grand Canal at two points — first, at the south end of the Martinez tunnel, to supply cities on east side of bay; second, near Walnut Creek, to supply San Jose and San Francisco.

LOS ANGELES UNIT

"South End: At a cost of \$25,000,000 Los Angeles has recently constructed a splendid 225-mile aqueduct from the Owens River Valley, but this supply will not meet the phenomenal growth of Los Angeles for more than 50 years, even for the city and county alone, whereas there are now elsewhere in southern California fast-growing towns that need relief and much acreage that needs water to put it under fullest development. The only ample supply of water is the Kern River, which at a cost of \$50,000,000 would provide all the water southern California can reasonably get and perhaps would need for 150 years. Does southern California want approximately four times more water than is now carried in the present Los Angeles aqueduct? If south-

ern California does not join the large scheme at the beginning and Kern River water is once used in the Grand Canal system — a use which will affect the entire plan of construction — then southern California can not get the Kern River water in the future.

"The electric power now taken from the Kern River near Kernville to southern California would be continued until additional power could be furnished from plants on the South Fork and other rivers farther north. Thus the supply of both water and power to southern California can be increased to an ample amount without harming the San Joaquin Valley in the least, and the San Joaquin valley users of the Kern River water near Bakersfield cannot object if they are given an ample permanent supply of water from the Grand Canal.

"Finally: This Valley of California scheme differs somewhat from other plans for caring for the unemployed, especially from other ideas to make homes for the soldiers. This work will be so extensive that it will furnish employment to more of our soldiers of the world war than will ever apply for or need work, and after they have worked as long as they care to, they will, no doubt, in large numbers, acquire some of the reclaimed lands and remain to enjoy the large returns that surely await the fortunate owners of farms in the Valley of California. The plan herewith presented is based upon common sense as well as science. Further, this plan does not call for a single dollar from the State or National treasury. There is no question about its being successful from every possible point of view, for in the Valley of California we have the best lands and climate, the most fertile and lasting soils, the largest returns from the soils, the best water of ample quantity — in fact, every possible condition to make country life ideal. We have no stumps to remove, no swamps to drain, no mosquitoes to exterminate, no frost to destroy the crops, no industrial conditions to adjust — simply one large ideal opportunity to enthuse the most skeptical — and the entire scheme can be finished and in full operation with assured success in ten years."

"I LIKE IT"

Tobacco it a dirty weed,
I like it.
It satisfies no normal need,
I like it.
It makes you thin, it makes you lean,
It takes the hair right off your bean.
It's the darnest stuff I've ever seen.
I like it.
—Chicago (Ill.) Herald.

A soft shirt is a social break,
I like it.
It satisfies no parlor snake.
I like it.
It's soft within, it's soft outside,
It doesn't scratch or tear your hide,
It lets your Adam's Apple slide,
I like it.
—New York Tribune.

GOT THE JOB

Police Commissioner—If you were ordered to disperse a mob, what would you do?
Applicant—Pass around the hat, sir.
Police Commissioner—That'll do; you're engaged, sir.
—Pathfinder.