

CHAPTER VI.

THE GREAT VALLEY.

THE Great Valley, or central California, is that part of the State inclosed between the Sierra Nevada mountains on the east and the Coast Range on the west. It is about five hundred miles in length, with an average width of fifty miles, and contains sixteen millions of acres of land, more than half of which is tillable. Although in configuration a unit, the valley is generally considered as divided into two, the Sacramento valley, so called from the river of the same name which flows through it, and the San Joaquin valley, which is also named from the river traversing nearly its entire length. The Tulare valley is a continuation of the San Joaquin, and is named from a large lake within its borders.

The two mountain ranges which bound the entire valley come together on the north at Mount Shasta, and on the south at Fort Tejon. The land thus inclosed is trough-shaped, descending from each side toward the center. The Sacramento river rises at the base of Mount Shasta, and flows nearly due south throughout its whole course. The San Joaquin rises in the south, and coming northward meets the Sacramento, and with it empties into San Pablo bay, which empties its waters through the straits of Carquinez into Suisun bay, and that again through some unnamed straits into the bay of San Francisco. The mingling of the muddy water brought down by these rivers

with the clear water of San Francisco bay sometimes produces very curious effects. When the wind disturbs the surface of the water, as it almost always contrives to do, some of the waves are clear and pure looking, while others are dark and turbid, making the bay look mottled and strangely variegated.

These two rivers, the Sacramento and the San Joaquin, are the only rivers in California that are navigable for any considerable distance. The two valleys are the great wheat-fields of the State. The San Joaquin has the advantage as to quantity and, probably, also as to quality of land. It contains twelve thousand square miles, or seven million six hundred and eighty thousand acres. The Sacramento valley contains eight thousand square miles, or five million one hundred and twenty thousand acres, being less by about one-third than the former.

The northern part of the Sacramento valley, although less fertile, has the advantage over the region further south in a greater rain-fall. As far north in the State as Red Bluff, there has never been an entire failure of crop for want of sufficient moisture, while in the San Joaquin valley it is thought not safe to expect to gather in harvests more than four years out of every seven! Rather fearful odds for a farmer!

The annual rain-fall in the San Joaquin valley averages about twelve inches. Stockton is at the head of the valley, and the entrepôt of its trade. It is one hundred and seventeen miles by the river from San Francisco, with which it is also connected by the western division of the Central Pacific railroad. It is a flourishing place of twelve thousand inhabitants.

These two great valleys suffer from two unfortunate conditions, though in the one valley the misfortune is greater than in the other. They have both too much and too little water. There are about three millions of acres of swamp and overflowed lands to be reclaimed, and the greater part of the remainder needs an artificial system of irrigation before the valleys can be brought up to their highest state of productiveness. It does not require to be demonstrated that farmers will not undertake tillage in a country where the chance is very uncertain that the gathering in of grain will follow the sowing. Sensible, thrifty men will hardly take shares in a lottery where the blanks are about equal to the prizes. For this reason, although the San Joaquin valley has been open for settlement more than twenty years, and is as fine a body of land as can be found in the world for the growth of cereals, it is still very sparsely settled, and much of it entirely unoccupied.

In 1868 there was quite an influx of immigration to this valley. But the three succeeding years were dry; the rain-fall was quite insufficient, and there was an almost, and over much of the valley a complete, failure of crops, inso-much that there was in many cases absolute suffering for want of food. Sheep and cattle were driven off and sold for whatever could be obtained for them, in order to save them from death by starvation. The result was that a large proportion of the immigrants left the valley and sought places where, as they said, "it rained sometimes." Multitudes went to Oregon.

The rain-fall in Stockton averages twenty inches. Further south it is considerably less, and, of course, is not sufficient to secure crops of cereals. In the years just

mentioned it was scarcely the half of the usual amount. Occasionally there is a year when the rain-fall is sufficient to show the wonderful capacity for production which the soil possesses when the conditions are favorable. The year 1872 was such an exception. In that season there were twenty millions of bushels of wheat produced in these two valleys, with less than a fourth part of the land under cultivation, and much of that cultivation of the rudest and most superficial character. Although wheat was the principal crop, there were many other valuable products raised in large quantities.

From the fraction of the San Joaquin valley that was cultivated twelve millions of dollars' worth of wheat was taken, equal in value to more than half the product of all the mines in the State for the twelvemonth, while the number of producers in the case of the wheat was not equal to a tithe of those employed in getting the gold.

A writer says: "Nature or nature's God has done ninety-nine parts toward making these valleys one of the richest agricultural districts in the world; can man supply the small remaining fraction?"

Upon examination, it appears that every facility has been provided for doing what little remains to be done. The valley of the San Joaquin declines toward the center, and on the eastern side there come down from the Sierra Nevada mountains innumerable streams, several of which are large, fine rivers. On the western side there are few rivers, and none of any magnitude. In the extreme southern part of the valley there are three lakes, one of which, the Tulare, is a large body of water, covering an area of seven hundred square miles. Investigation has led to the

discovery that this lake is two hundred feet above the sea-level, and that there is a gradual descent from it all the way through the valley to San Pablo bay.

The question, can these rich lands, for which nature has done so much, be irrigated in such a way and at such an expense as to make crops certain and profitable, becomes, therefore, an easy one to answer.

One of the advantages of living so far down in the ages is, that we have secured to us the chance of learning from the experience of those who have gone before us. Empiricism is not a necessity in all directions. In this matter of artificial irrigation experience has been ample, and the testimony that can be made available is abundant. Systems of irrigation have existed as far back as the authentic history of man extends. There were canals in Egypt for irrigating purposes before the pyramids were built. In China, canals and ditches for this purpose were common long before the time of Confucius. On our own continent, apparatus for irrigation was in use before the incoming of European population. When Cortez conquered Mexico he found arrangements that had been made, at a great expense of labor and money, for supplementing the rain-fall. There is abundant reason to believe that Arizona, dry and barren as it is, and barren because dry, was once a flourishing agricultural region, with hundreds of miles of irrigating canals and ditches, and a population numerous enough to build large cities and towns. Even the Colorado desert, that most arid of all wastes, the worst part of which is comprised by the delta between the Gila and the Colorado rivers, was not always the forlorn and miserable place it is at present, and there is a fair promise that it will remain

as it is no longer when the means for its irrigation are made feasible. These statements are taken from a report made by Mr. J. Ross Browne, who claims that he has personal observation for his authority.

Northern Italy owes its fertility and populousness to artificial irrigation. There are twelve hundred miles of canals in Piedmont, and four thousand five hundred in Lombardy. It is an interesting fact that the increase of population has been fifty per cent. greater in the irrigated district of Piedmont than in the non-irrigated. Districts that were formerly desert wastes are now populous and productive.

But in China, where the density of the population makes it needful to make the most of all possible resources, artificial irrigation has been carried to the greatest extent. The great plain of China, which has an area of two hundred and ten thousand square miles, is a vast network of rivers, canals and ditches.

There is also a vast and complete system of artificial irrigation in India. "The Ganges canal is, perhaps, the largest work of the kind in the world. Its full capacity is six thousand five hundred cubic feet of water a second; the width of the bed is one hundred and sixty-four feet, and the depth ten feet. The main channel is three hundred and forty miles in length, and navigable throughout; the branches are three hundred and sixty miles aggregate length, and the distributaries three thousand seventy-one miles. A carriage road is kept up on all the main and branch canals, and the banks are planted with trees."

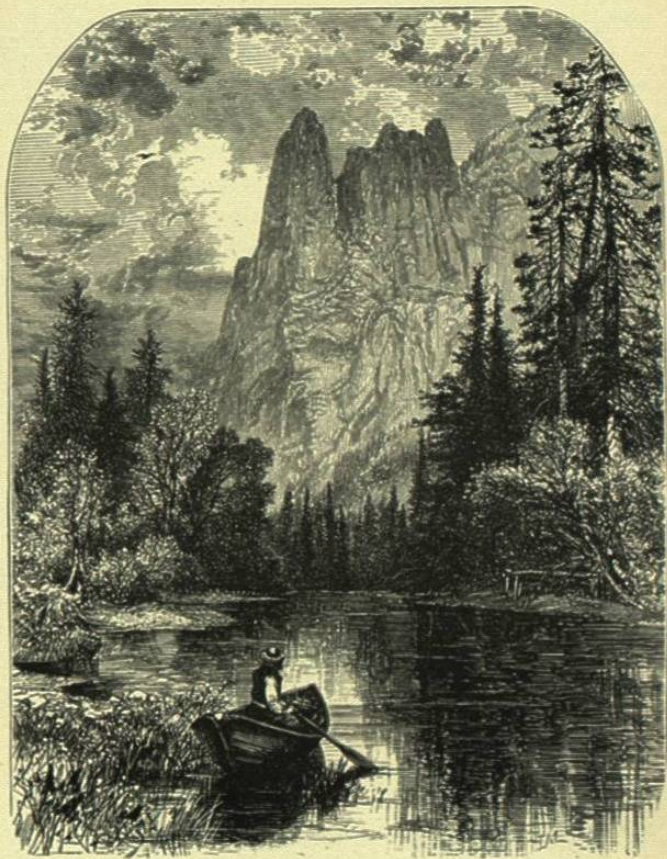
These facts show what has been done in the old world, and the feasibility of meeting the needs of the case in the

new. It remains to be seen what steps have already been taken, and what plans have been projected for doing what is so evidently necessary for the prosperity of the State.

Men of enterprise and capital, most of whom are residents of San Francisco, formed a joint-stock company, which was incorporated by act of legislature in September, 1871, under the name and title of "The San Joaquin King's River Canal and Irrigation Company." The capital amounted to ten million dollars, which was divided into one hundred thousand shares at one hundred dollars each.

"The objects are, the construction of a system of canals in the Great San Joaquin and Sacramento valleys in the State of California, leading from the San Joaquin river, the King's river and their tributaries, also from the Tulare lake, the Kern and Buena Vista lakes, and waters flowing thereinto, for the transportation of passengers and freight, and for the purpose of irrigation and water power, and also the supplying of cities and towns in the State of California with fresh water for domestic purposes; also the buying and selling of lands and real estate. This company's charter is to exist for fifty years. The preliminary objects of the company are the construction of main canals through Kern, Tulare, Fresno, Merced, Stanislaus, San Joaquin, Contra Costa and Alameda counties, leading from the above mentioned lakes and rivers, for irrigating portions of said counties, and for affording navigation the year round from Kern lake to tide-water near Antioch, a distance of three hundred miles."

The sources of supply are from the Sierra Nevada mountains, where the melting of snow during the spring



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and summer months keeps the rivers full at a time when water is most required for the land.

Tulare lake, at its lowest stage of water, is rather over two hundred feet above the sea-level, and covers an area of seven hundred square miles. Six feet of water drawn off its surface would suffice to irrigate five millions of acres of grain and cotton. The average depth of the lake is from twenty-five to thirty-five feet. There are no mountains or hills intervening along the course of the proposed main canal and the bay at Antioch.

The fall of the valley between the lake and tide-water at Antioch is about fourteen inches to the mile; and from the foot-hills of the Monte Diablo range of mountains, which bound its west side, to the San Joaquin river, the transverse fall of the valley is from six to twenty feet to the mile, so that the drainage is naturally perfect, and no swamps and malaria can be created by its proper irrigation.

The soil is of a rich brown loam along the west side of the valley, and a sandy, rich loam on the east side. On the west side wells have been sunk over one hundred feet in depth through pure alluvial soil without any rock or gravel.

The surface of the ground generally along the west side of the valley is remarkably even, and unusually free from rivers and water-courses, so the cost of construction will be comparatively light.

The main canal from the lake to Antioch will have a discharge of fifteen hundred cubic feet per second, and be capable of carrying a depth of ten feet of water, with a width of one hundred feet. The length of this canal will

be one hundred and eighty miles. The company's charge for water to the actual settler on each legal subdivision of the public land is one dollar and fifty cents per acre per crop of grain, cotton or grass.

On the east side of the valley the numerous streams which have their sources in the Sierra Nevada mountains come down well filled, and best filled when most water is needed, for the hot summer sun, which dries the surface in the valley, melts the snow that is stored away in the mountains.

The value of these canals will be much enhanced and their profitableness increased by the fact that they can be used for transportation. The advantage of water over land carriage on the score of cheapness is recognized the world over; and in these days of railroad monopolies and high tariffs, that advantage will have greater appreciation.

It is a somewhat startling fact that in the State of New York, with its multiplicity of railroads and comparatively low charges, in the year 1871-2 nearly one-third of the entire tonnage which passed through the State going from the west to the east passed over the Erie canal, which in the minds of many has become almost a thing of the past, so much more noise is made by the railroads!

A less amount of interest and energy in creating facilities for irrigation than have already been expended in building flumes and constructing ditches for mining purposes in California would convert these great valleys into one of the finest agricultural regions in the world. Crops would then be certain, and when the husbandman sowed he might be sure that in due time he would reap and gather in his harvests.

It will perhaps be a matter of surprise to those who have not looked into the matter, to know that the aggregate extent of mining ditches and canals built in California since 1851 reaches the extraordinary figure of five thousand three hundred and twenty-eight miles! And they have been built at a cost of fifteen million five thousand four hundred dollars! Some of these ditches cost from five hundred to one million dollars.

CHAPTER VII.

RECLAMATION.

NOT only are these vast quantities of land to be irrigated in order to bring them up to their highest producing capacity, but there are also three millions of acres from which the water is to be drained before it can be used for agricultural purposes. This land consists in part of marsh land contiguous to the bay and its estuaries, and in part of tule lands which border the San Joaquin and Sacramento rivers, and extend through a considerable part of both valleys, forming a strip varying in width at a greater or less distance from the river.

During the last three years much has been done toward reclaiming both classes of lands. The success attending these efforts has been very gratifying. The islands in the bays of Suisun and San Pablo, and the delta formed at the junction of the Sacramento and San Joaquin rivers, have been reclaimed or are now in process of reclamation. This process consists simply in raising a levee or dyke high enough to exclude the water, and, when the marsh is salt, in freshening it by letting it lie till the rains have washed out the salt. This operation may be quickened by flooding the land with fresh water from artesian wells, or any other source available. It has been found that the second year after they have been reclaimed these lands will produce alfalfa, and the third year abundant crops of grain.

The yield of these moist lands in alfalfa, timothy and the various grasses is enormous. Five tons to the acre is considered an average crop, while as high as eight tons in a single year is not uncommon. At fifteen dollars per ton a very handsome profit can be made.

On Sherman Island some of the lands cultivated in wheat yielded a profit of not less than thirty dollars to the acre, while the average was twenty-five dollars. According to official reports, eighty bushels of wheat to the acre have been raised on some of these reclaimed lands. Sherman Island, which lies in the bight of the delta formed by the Sacramento and San Joaquin rivers just as they enter Suisun bay, has an area of sixteen thousand acres. It has been reclaimed by building a dyke entirely around it. The investment has been found to be a very profitable one. Two crops even of potatoes can be raised in a season with large results each time. The owner of a farm on the island sent to New York for three barrels of early rose potatoes, which had not then found their way to California. By the time the potatoes reached him they had cost an extravagantly high price. They were planted in January, and in June were ripe and ready for digging. The farmer let them remain out of the ground until August, when he planted the entire yield of the first crop. He had another prolific yield, which he sold at such rates as to give him the largest percentage on the original investment that any capital had ever returned to him.

Besides these swamp lands which Holland and other countries have in common with California, there is another class of lands which is peculiarly a Californian possession. These are the tule lands, so called from the only product of

the soil—the tule (pronounced in two syllables). The tule is a species of bulrush, and judging from the size it must be the great father of all the bulrushes. It grows from six to ten feet high; occasionally one more enterprising than its compeers attaining the altitude of ten feet. The tule is straight as an arrow, and without joints or leaves or any appendage except upon the very summit, which is crowned with a head not unlike that upon the sorghum, only upon a reduced scale. These tules grow so luxuriantly and thickly on the rich, swampy land that neither man nor beast can make a way through them; they must be trodden down and made into a sort of pontoon bridge and walked over. During the fall or early winter they are often burned. The fires made by the burning tules can be seen miles away, looking not unlike the fires on the prairies, except that the volume of smoke is greater and of a more tartarean color. Woe to the laundress whose clothes are on the line out-of-doors when the tules are on fire anywhere within a radius of ten miles! The soot comes down in large flakes, which sometimes so fill the air as to resemble a snow-storm, with the difference that each particular flake seems to have been dyed in an ink-bottle. There is a belt of these tule lands reaching all the way from Kern lake to the Upper Sacramento. These, like the swamp lands, are wonderfully productive when reclaimed. The soil is frequently eighteen or twenty feet deep, and made up of a compound of matted roots and decayed tules. These are so thoroughly decomposed below the surface of the living fiber, that cultivation, even the first year, is not difficult. It is safe to calculate upon at least one-third

more product from these reclaimed tule lands than from the best valley lands.

It will be readily seen that the reclamation of these lands, whether swamp or tule, will be of little avail without a system of irrigation which shall include and cover them. The nature of the soil will make irrigation an absolute necessity.