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Some Climatic Influences in the Regional Economy of the Rogue River Valley[1]

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The Rogue River Valley consists of an area of about 300 square miles carved out of the Klamath Mountains of southwestern Oregon by the Rogue River and its major tributaries. Its elevation ranges between 1000 and 2000 feet and the entire region is surrounded by mountains. The economic bases of the valley consist of general farming of a rather intensive nature, subsistence mining, and an increasing health resort and tourist business. Its agricultural specialization lies in pears, it being one of the three largest commercial pear producing regions in the United States.

From a general description there appears to be nothing unique about the valley that might even be the subject of a scientific study. Training, however, the technique of modern geographic analysis on this valley some interesting and distinctive environmental relationships appear.

In modern geographic analytical philosophy no natural nor cultural landscape merely occurs, either because of the whims of nature or of man. Natural or cultural landscapes are, rather, viewed as the adjustmental resultants of a long and subtle interplay of the elements of the natural environment which include climate, relief, soil, water resources, natural flora and fauna, size, shape, and location or access. The development of landscape and the economic or cultural pattern of a region tend to be an outgrowth of these elements of the natural environment as they exist in varying combinations. Climate usually sets broad bounds, but frequently peculiarities of climate have a far reaching direct influence in shaping the regional economy of an area. This situation is particularly true in the Rogue River Valley.

Climatically the valley represents the more arid phase of the Marine Temperate or West Coast Cyclonic type. Situated some 60 to 100 miles inland, with a mountain interval between the valley and the coast, certain characteristics of both a subtropical and continental nature are also in evidence. Many of the older homes in Medford and Ashland possess palm trees, and at least two pomegranates have weathered some 30 or 40 years in the town of Jacksonville.

The maximum rainfall occurs in winter. Precipitation may be as heavy as 40 to 80 inches in the surrounding mountains, but the fact that the agricultural sections in the valleys lie far below the surrounding territory, places the entire region within the rain-shadow of the ranges, resulting in a dry valley island within the plateau. In the valley proper the average annual rainfall runs from 25 to 30 inches near Grants Pass on the west to around 15 at Medford. The minimum rainfall occurs in summer. Except for occasional light conventional showers July and August are practically rainless.

A month is cooler than is ideal if the average temperature of that month falls below 32 degrees F., and warmer than is ideal if the temperature averages above 70. The Rogue River Valley fits well into this optimum climatic range. Zero temperatures are rare, and the mean for January is between 37 and 39 degrees. Summers are hot. The means for July and August range between 69 and 71. The hottest spells, however, usually last but a week or so, and although the general temperature prevails high, the humidity is low and the sensible temperature is not excessive. Because of the cloudless skies, facilitating rapid radiation, and the nocturnal drainage of cooler mountain air into the valley basins, nights in summer are always cool. The combination of mild winters, frequent changes, warm to hot days in summer, but delightfully cool evenings and nights, is undoubtedly conducive to a maximum of human energy, and the Rogue River Valley may be safely referred to as one of the most energizing geographic regions in North America. Its climate, with the geologic attractions of lithia and sulphur-springs, Oregon caves, and Crater Lake, is thus responsible in part for the development of an important health resort and tourist industry.

There are no really destructive storms throughout the valley. During the summer steady, prevailing westerly winds blow along the strike of the valley and sometimes present minor problems. These winds appear to be drawn southward by the summer low of the arid southwest and the Sacramento Valley convection. This is evidenced by the fact that the hotter the day the more steady and firm are the winds. On a hot afternoon the winds develop such force that they tax the capacity of a powerful car pulling up the Siskiyou Mountains northbound, and truckers and drivers who are familiar with local conditions schedule their trips so that they will be southbound over the Siskiyous in the afternoons and northbound either in the evening or morning, to escape these strong head winds.

Grants Pass, lying in the wind shadow of the coastal mountains, has the second lowest average wind velocity of any station in the United States. As one progresses eastward through the valley, however, the winds increase in velocity. This increase and a prevailingly northwesterly direction means that young orchards need to be especially pruned or propped to prevent leeward leaning and excessive leeward development of the trees.

In the spring of the year there is considerable of a frost hazard in many parts of the basin. During still nights the colder air from the highlands drains into the valley bottoms. As a rule it is only on the valley floor that serious injury may result from minimum temperatures during the blooming period. Even in the valley on slight elevations no frosts may occur, while serious injury may result only a few feet below. The hillsides surrounding the valley usually escape frosts altogether once the normal spring season has arrived. The average variation in temperature in favor of the lands lying above the valley floor is from 5 to 6 degrees, due to a marked inversion of the temperature gradient when cold dense air creeps in and lies in stagnant pools underneath the warmer air. Temperatures as low as 23 to 25 degrees on the ground and 32 to 35 degrees fifty feet above have been recorded by special frost investigators.

Because of this frost danger on the valley floor, most of the more recent fruit orchards have tended to migrate up along the detrital slopes where air drainage is

better. Here is located the greatest orchard acreage at the present, although several fine old orchards are still to be found in the low lands. Eternal vigilance against spring frost is the price paid for these orchards, however.

An additional characteristic of the precipitation of this complex climatic region, and one which has played an important part in shaping its economic history, is its variability in amount, monthly and annually. There is a noticeable difference in total precipitation from year to year. In 1907 the heaviest rainfall in the history of the Ashland station occurred, with a total of 28.87 inches. Two years previously the lowest amount was recorded, when but 11.99 inches fell for the entire year. Months likewise show this variability. In January of 1881 a total of 12.29 inches fell, more in one month than in the entire dry year previously mentioned. August, ordinarily a rainless month, may suddenly find itself with 2.71 inches. November may have a trace or it may have 8.10 inches. Such fluctuations mean that the rainfall is not dependable for ordinary types of agriculture. Under natural conditions the Rogue River Valley would be an area of agricultural risk. With this variability of rainfall, together with a low average total and bad seasonal distribution, it is easy to see why the agricultural specialization of the valley has awaited the development of irrigation.

Thus far little has been said about the landscape and the part climate has played in its appearance. Broadly speaking there are three types of native vegetation associations within the area. The Coast Range section is composed of the typical vegetation and forest types of the humid Pacific mountains, including spruce, cedar, and Douglas fir. The Cascade section includes yellow pine, and hemlock in response to the lesser rainfall to the east. The valley proper supports a typically sclerophyllous vegetation in response to the light winter rains and hot dry summers. On northerly slopes where the winter snows remain longer into the summer, and where the rate of evaporation is not so great, coniferous stands mixed with a number of broadleaved species such as oak, ash, maple, aspen, and cottonwood, give rise to definite forest slopes. Southerly exposures may be nearly bare, except for needle grass and fox tail, which mature early and then are yellow and parched the balance of the summer, together with open stands of oak, mistletoe laden, and occasional thickets of madrona, manzanita, or buck brush. These open hardwood patches give rise to a park landscape whose grasses provide excellent forage most of the year under a setting of evergreen oaks and madrona that can scarcely be excelled for landscape charm, strikingly reminiscent of the Mediterranean.

Another feature of the valley which has shaped the landscape and to a large extent the economic adjustments, and which is traceable quite directly to climatic influences, is the soil.

Generally speaking the soils of the Rogue River Valley are prevailingly low in nitrogen content, due to a deficiency of organic matter brought about as a natural floral response to the semi-arid conditions of most parts of the valley. Likewise there is a slight tendency toward alkalinity in some sections, and everywhere there is high percentage of natural lime, more for example, than one finds in the original parent rock. This characteristic is to be expected as the lowland soils of the valley belong to that great subdivision of lime-accumulating soils typical of the arid and semi-arid regions of the west. This means that the soils have not been leached of soluble plant minerals, in fact minerals from the subsoil have been brought to the surface to some extent through capillary action. Such soils are likely to be excessively productive if the natural water deficiency can be overcome, as has been amply accomplished here by irrigation.

Climatic influences over a long period of time have also made possible a reclassification of soils here for purposes of regional anaylsis. The Soil Survey map for Jackson County shows 45 different kinds. Reclassification on a maturital basis, in which climatic influences supercede geologic, reduces the number of generalized soil types to four, with a high degree of correlation in crop distribution. (1) The undifferentiated mountain soils are mostly wasteland, timberlands, or forage lands. (2) The residual-colluvial foothill soils are youthful and still bear a resemblance to the parent rock. These are the dominant orchard lands, with rich soils, good air drainage, and a maximum of sunny slope, ideal conditions for forcing an extensive pear crop. (3) The arid and semi-arid desert soils of the valley floor are post mature in age, representing an older floor of the valley. These soils, known generally as the Agate Desert, represent waste land, abandoned orchard plots, and even abandoned grazing lands in the heart of a valley pressed for agricultural soils and with irrigation canals crossing at intervals. The adverse feature is a lime-bound "B" horizon that forms a hard-pan inimical to drainage, a feature quite directly due to the interplay of an arid climate on a flat soil type, covering a long period of time. (4) The recent flood-plain alluvial soils are found along the rivers and streams. They represent both an overflow hazard and a frost hazard, with the result that they have recently been given over largely to truck crops, forage crops, small fruits and berries.

These observations are somewhat sketchy, but they do indicate some of the features of the natural landscape and the regional economic development pattern of this particular valley, that are largely traceable to the influence of the elements of weather and climate.

The Bearing of the Post-Paleozoic Sedimentary Record on the Occurrence of Gas in the Rattlesnake Field, Washington[1]

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In an attempt to locate a large supply of water under artesian pressure for irrigation purposes in the Cold Spring area in 1912 a well was put down into the Columbia basalt series and began to produce natural gas. Since then the flow of gas has been continuous and for the past few years a commercial operation has been serving several towns in the Yakima Valley from gas delivered by some fifteen wells. So long continued a flow of even the modest proportions obtaining here has naturally awakened considerable interest in the source of the gas and the present paper is an attempt to evaluate some of the data which bear on the question.

Gas is taken at approximately the same stratigraphic zone in all wells that have been drilled, although a secondary source has been found in a few wells and gas taken from both. The main zone lies about 700 feet below the surface, the second some four or five hundred feet lower. Both are in porous basalt unassociated with sediments.

Since the gas could not conceivably have originated in the basalt, but must have migrated there from its source, and since further, it seems unlikely that it has migrated downward from the thin sedimentary zone some two hundred feet above the gas producing basalt, the question of what kinds of rock lie concealed beneath the extensive Columbia River

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