

The Development of Agriculture in Butte and Glenn Counties

There are a number of environmental influences that helped shape the development of agriculture in Butte and Glenn counties of Northern California. Soils and climate are the most obvious, but coupled with this is the influence of mans technology and the settlement of the area. Irrigation technology allowed for the full use of these natural resources and over time changed a grassland to one of the most productive agricultural areas to be found.

Of the history and anthropogenic influences, “rural regions cannot be understood without examining the values and economic conditions of the larger society.” (Napton 1989, 333) Classification of the stimuli on the development of agriculture cannot be made on environmental influences alone, “such a subjective classification could not hope to help unravel the complexities of agriculture and farm systems.” (Ilbery 1985, 15) The environment does put in place certain precedents that technology and settlement must address in its use of the rural landscape. It is apparent that in addition to environmental factors, technology and settlement practices have also played an important role in the development of the rural landscape. "It has proved surprisingly difficult to establish an environmental theory of agricultural location..." based on the environment alone. (Grigg 1982, 49)

Economic forces and technology have a major influence on agriculture and rural development. Understanding this development requires appreciation for the society, the benefits of biotechnology and the forces that drive it, the role of irrigation, the “internationalization of the food system”, and the pressures of urbanization. (Napton 1989, 334) Economic forces though, have their anomalies, “not all farmers are profit maximizers.” [sic] (Grigg 1982, 53) The “emotional attachment” of the farmer’s tie to the land also influences their decisions. (Clope 1989, 3)

Government policy is another contributor to the factors that influence development. In the 1920's the Federal Aid Secondary (FAS) system roads and Block grants for 160 acre parcels was a pull factor to rural and agricultural development. (Cloke 1989, 161)

The environmental influences that have affected development in Butte and Glenn counties are geology and climate, specifically, "three environmental factors are needed for the development of agriculture -soil quality, growing season, and moisture supply" Butte and Glenn counties have all three. (Carlson 1981, 234) In considering these factors it has been found that crop location has a strong correlation with soil distributions. The Central Valley has a favorable growing season of about 262 days a year, a benefit of the Mediterranean climate of mild wet winters and dry summers. The Central Valley is relatively dry, Willows has an average rain fall of only 17 inches per year. The significance in the moisture supply for agriculture is the development of irrigation systems.

Butte and Glenn counties traverse across the Sacramento Valley from the California Coast Ranges to the southern reaches of the Cascade Range. As a part of the California Central Valley, Butte and Glenn Counties contribute to the extraordinary agriculture and the rural development of California. The erosion and the subsequent alluvial deposits from the Coastal Mountain Range and the southern Cascades have created the forty-mile wide valley. The depth of this deposition is up to 6000 feet deep at the center of the valley. (Williams 1992) The result of this deposition and its variability can be seen in the distribution of crops being grown in the valley; the changes in crops are indicative of the soils beneath them. The purpose of this project is to identify the correlation between soils, their characteristics, and the crops being grown on them, it is an examination of the environmental factors that have influenced agriculture and rural development on this rural landscape.

To survey the environmental influences on the development of agriculture in Butte and Glenn counties a transect was chosen that extends from the Coast Range to the Cascades. This transect begins in the Coast Range on the ridge above Willows and follows Alder Springs Road descending eastward until merging with State Highway 162 and continues to the valley's western edge approximately 5 miles west of Willows. This section of the transect provides a view of the mountains and foothills to the west of the valley and the influences on development. This area supports one of Glenn County's chief crops, livestock. The transect continues across the valley to the road now called Midway and is in fact "Historic Route 99." This region contains the diverse crops that contribute to California's agriculture. From the intersection of Highway 162 and Midway the transect travels north to Chico offering an interesting observation of differing soil types that exist between southern and northern Butte County. From Chico the transect follows State Highway 32 northeast up into the Cascades.

In addition to observations in the field, Butte and Glenn county agricultural reports, soil surveys, geographic information system layers from the California Department of Water Resources and California Department of Conservation, and interviews were used to identify changes in the patterns of agricultural development and the rationale behind their distribution.

The eastern end of the transect in the Coast Range reaches heights above 6000 feet, here timber is the only crop and contributes little to Glenn County's agriculture. Mendocino National Forest Lands in Glenn County occupy 221,568 acres, half of which are considered commercial timber land. Merchantable trees are Sugar Pine, Ponderosa Pine, Douglas Fir, White Fir, Red Fir, and Incense Cedar. The Coastal mountain region is 360 square miles of Glenn County's 1322. The most consistent contribution of this region to Glenn and Butte agriculture is water.



Fig. 1 One of the numerous creeks flowing down from the Coastal Range, just before flowing into Stony Creek, part of the Orland Project.

At the foot of the mountains the Stony Creek Fault provides a natural catch basin for the 345 square miles of watershed that lie above it. Precipitation in the foothills and mountains above Stony Creek ranges from 25 to 65 inches. On this east facing slope rain fall is considerably less than the far side of the valley in Butte County because of the rain shadow effect. This precipitation continues to work on these “poor” mountain soils that contribute to the continued enrichment of the soils down stream. “Poor” is a relative term from the agricultural point of view that does not convey the riches derived from the mountains: recreation, wildlife, water, and the creation of soil. The contributing parent material here is schistose, sedimentary rock and is called the Sheetiron-Josephine Association.

The Stony Gorge Reservoir provides storage for 50,000 acre feet of water and is part of the Orland Project that provides irrigation to 20,000 acres. In 1991 the crops irrigated from this

water project valued \$9.7 million. The entire Orland Project system delivers 410,000 acre feet of water a year.



Fig. 2 Stony Gorge Dam, completed in 1928 and operated by the Orland Unit Water Users Association.



Fig. 3 Stony Gorge Reservoir, 50,000 acre feet capacity.

In the foothills the soil transitions from the Maymen-Los Gatos Association to the Millsholm-Sehorn Association. These soils provide for forbes and grasses that offer forage for wildlife and livestock. These soils range in elevation from 300 to 5000 feet. Within these foothills cattle are raised. Bernie Millsaps is a fourth generation rancher who lives near Chrome, a few miles north of Stony Creek Reservoir. He says his family came here after a brief stop at Sutter's Fort. The hilly terrain reminded his family of home, Kentucky and Tennessee. Before talking to Bernie I had a different vision of the development of the cattle industry of the area.



Fig. 3 Oak and grassland of the foothills above Stony Creek

In 1844 while California was still under Mexican rule large land grants of 17,000 to 26,000 acres were awarded to ranchers. The vast grasslands that covered the Central Valley and its adjacent foothills provided the feed and space to raise cattle. During this time almost all agriculture was based on cattle, only enough corn, wheat, and barley for feed and local needs were grown. The first products derived from cattle were hides and tallow, no markets yet existed for beef cattle or dairies. The reciprocal trade was for manufactured goods not yet produced in California.

A common theme of phased growth in the development of California, and repeated in Butte and Glenn Counties, was that first cattle ranching was established followed by “wheat farming, which gave ground to row crops and orchards which in turn retreated in the face of urbanization pressures.” (Howard 1989, 63) The cattle business held its position within the von Thunen model which would place it removed from the urban center near the wilderness. This trend gradually pushed the cattle ranchers from the valley into the peripheral foothills.



Fig. 4 Cattle in the foothills just outside the valley.

While the von Thunen model is supported by the current location of cattle production Bernie Millsaps attributes it to other factors as well. Quite simply stated by Mr. Millsaps, “Cattle didn’t like it in the valley.” Winter winds were cruel and the foothills provided protection. “The Central Valley,” he said “was not prime grazing land; it became too dried out during the summer and too wet in the winter.” This seems credible because one particularly wet

winter over 100,000 cattle died in the valley. Mr. Millsaps also keeps his cattle in the foothills “because they do better. Cattle that graze on stubble in the valley have fuller stomachs but they are not as healthy as range fed cattle.” (Milsaps 2003)

Sheep and goats were at first the greatest component of the livestock raised here and preceded cattle as the primary livestock in Glenn County. Goats did well browsing on the Chamise brush that dominates the upper foothills. Grasses and forbes were enhanced by periodic burning by the ranchers. This was halted and the ranchers were forced to leave the land they had used for years by the newly created National Forest Service in 1905. This area is now burned by the Forest Service in the management of fuel loads. On January 1, 1961 there were over 200,000 sheep in Glenn County. The economic competition in the sheep business led to the greater emphasis on the higher valued beef cattle.



Fig. 5 Sheep were once the primary livestock of Glenn County, today there are fewer than two thousand.

I was referred to Bernie Millsaps by Craig Owens whom I met while traveling the transect. Mr. Owens has been ranching in the Elk Creek area for 30 years, having moved here from Red Bluff. When I asked where dairying took place in Glenn County he said it was in

valley. It was there he said “because it cost too much to bring in feed from the valley.” When I told him I was a geography student with aspirations in working with geographic information systems (GIS) he told me that Glenn County had provided some GIS materials to ranchers in the area and said “neat stuff, but we pretty much do what we want.” No doubt based on common sense developed over years of experience. He also added concerning the cattle business in the area that “there’s no money in it. Only ten percent of the of the original land holdings of ranchers are still held, most of it now belongs to ‘big money,’ car dealers from the Bay Area.” Bernie Millsaps leases property from Cal Worthington a notable car dealer in California.



Fig. 6 Abandoned barn illustrates the decline and consolidation of livestock agriculture.

Craig Owens also cited the Tehama-Colusa Canal as one of the influences that restricted cattle ranching to the foothills, increased irrigation capabilities raised the economic value of the land and its ability to provide greater profits through greater valued crops.



Fig. 7 The Tehama-Colusa Canal along the western edge of the valley.

Along the transect, upon approaching the valley floor to the west of Willows the first cultural feature since Stony Creek is the Tehama-Colusa Canal. From this point onward the valley soils determine many of the crops grown, as revealed by their location. On the western edge of the valley the Meyers soil is predominant. The Meyers soil is in the Tehama Hillgate Arbuckle association and is characterized as a well drained soil. The crops present are grain and hay, field, truck crops, and pasture. This soil type extends from the canal to the west side of the town of Willows five miles to the east.



Fig. 8 Grain crops line the valley's edge in soils transitioning to greater clay content.

On the eastern side of Willows the Glenn Colusa Canal marks the beginning of an area whose dominant soil types are Willows and Capay in the Willows Zamora Marvin association. A higher clay content and greater impermeability, especially in the Willows soil, encourages the growing of rice. This crop continues across the valley for about 8.5 miles to the next change in soil type near the Sacramento River. Glenn County devotes 91,000 acres to rice and claims to be “The Rice capital of the United States.”



Fig. 9 Flooded rice fields in Glenn County, in the background you can see where the soil transitions to Columbia loam where tree crops are grown.

Just before the Sacramento River the soil changes to Columbia, sand and silt loam. The crop here turns abruptly to the deciduous fruits and nut category and is mostly Walnuts. This soil stretches eastward a little farther distance on the other side of the river where row, truck, and field crops are predominate with some Walnut orchards along the river. The Columbia soil here is limited to a narrow strip of land along both sides of the river at a width that is about 2.5 miles

wide. On the east side of the river newly planted walnut orchards are expanding this crop toward the east. Mixed within the field crops are wheat and the pasture crop alfalfa.



Fig. 10 Walnuts expanding away from the Columbia soil. Walnut crop values are increasing the distribution of this crop.



Fig. 10 Walnut orchard on the Columbia loam soil, in the background are Almonds.

Walnuts in California account for 99 percent of the U.S. commercial walnut industry. The economic incentive of walnut production is increasing its distribution through out the state and is encouraging new technologies to this end. One new method of increasing the areas walnuts can be grown is slip plowing. Slip plowing is device attached to rippers on large tractors for deep plowing, the break up of hard pan in stratified soils. (Agristruction 2003) Most walnut production in Butte and Glenn counties is near the Sacramento River, “there is only about a mile on each side of the river that has good soil” for the growing of walnuts. (Lindavers 2003)



Fig. 11 This mix of walnuts and row crops are just east of the river, looking toward Butte County.

A change in crops again occurs at the Sacramento River Overflow three miles to the east of the edge of the Columbia soil, with the transition to soils with less permeability rice again becomes the only crop grown. At Butte Creek the State of California operates the Howard Slough Unit of the Upper Butte Basin Wildlife Area a wetlands area managed for water fowl; this is the only break in the rice fields until the Midway road crosses Butte Creek. This area is of

the soil types Landlow Clay Adobe and Stockton Clay Adobe both of which have an impermeable compact substratum that prevents water from percolating downward and the flat topography impedes drainage. The land area devoted to rice crops in Butte County is 121,000 acres.



Fig. 12 Irrigation system in Butte County within the expansive rice fields,

Rice began to be grown in Butte County in 1918 and had steady growth to its current levels. Of all the crops affected by weather rice has been the most resilient in Butte and Glenn agriculture. Numerous weather events have proven very harmful to crops. In Glenn County the 1995 crop values were decreased by 18.5 million dollars due to severe weather. Again in 1999 the value of Glenn County fruit and nut, and field crops were down by 52 million dollars because of heavy rainfall, 41.62 inches. Losses from heavy rains, valley winds, intense heat and other abnormal weather conditions demonstrate the dependence of the areas agriculture on the Mediterranean climate.

Another marked change occurs in crops when crossing traveling north on Midway. Upon crossing Butte Creek, it is here that the soil type changes to Vina Loam and deciduous fruit and

nuts agricultural category dominates. Vina Loams are extremely productive soils and considered among the best in Butte County.



Fig. 13 Almond orchards just above Durham looking north toward Chico.

The town of Durham is located on Midway and was one of the first settlements in the area and sponsored by the State Land Settlement Board. Durham's history provides a unique view to the development of the agriculture of the area. The design of the settlement and the location of the different types of farms were based on soils. The soils here are considered "some of the most productive in the world." (Williams 1992, 9)

Closer to Chico, demonstrating the change in the landscape due to population growth there are mini ranches, this conversion is called "rurbanization." (Sanders 1998, 6)

In the Cascade Range timber made a considerably greater contribution to Butte County agriculture than did the Coastal Range to Glenn's. In 1949, the first year timber was included in the Butte County Agricultural Report it accounted for 14.2 percent of the total agricultural output, not an insignificant number. Reporting of timber's contribution to Butte and Glenn counties agricultural reports is sporadic, and so was the cut. An average of 135 billion board feet of timber was harvested in Butte County from 1948 to 1955 and went unreported again until 1980. This amount seems excessive by today's standards however, it is plausible. Scaling systems for measuring the number of board feet in logs has not changed but the technology in making of lumber has. Compared to today's lumber yield from logs there was an enormous

amount of waste in lumber production in the 1940's. There for the number of board feet harvested does not reflect the actual yield. Another reason for the phenomenal numbers is that it was the practice to only harvest large trees and to recover only the largest part of the bole of the tree which lowered handling, increasing productivity and lowering costs. This was the era in which our forests provided the homes needed to house a new population of baby boomers.

In 1983 timber harvests were included in the Glenn County report after a long absence because of no logging activity. Butte County harvests reached a peak in 1988, during President Reagan's 2nd term in office, chainsaws obliged his goal "to restore the great, confident roar of American progress and growth and optimism." (White House)

In searching for environmental influences it should not be forgotten "the significance of man as an agent in changing the environment." (Glacken 1956, 74) This has been done through the irrigation projects. The distribution water in Butte and Glenn counties is not a natural endowment; it is the result of numerous water projects. The agricultural development "has been directly reliant upon water development. (Williams 1992, 70) California State water projects are among the largest in the world. (Napton 1989) There are over 1,637 miles of major irrigation channels in Butte and Glenn counties. Irrigation of agriculture uses 80 percent of California surface water. In the early 1920's alfalfa was an important crop and at that time supported a sizable local dairy industry. One of the reasons for its decline and eventual disappearance was water logging of the soil in the late 1920's this resulted in the loss of the dairies. (Williams 1992) Perhaps this water logging was the result of irrigation in the Durham settlement.

The rural landscape of Butte and Glenn counties has indeed been influenced by the environment. The most obvious influence is seen in the edges that exist in the distribution of crops, as they follow lines of changing soil types. Agricultural development has a clear

connection with the soils beneath them. The Sacramento Valley in Butte and Glenn counties has some of the finest and most productive soils in the world. The agriculture here has contributed immensely to the development of the rural landscape.

The California climate is favorable to a wide range of crops. The 262 day growing season provides the time and conditions needed to grow the diverse crops that thrive here. The climate is also endowed with sufficient unique conditions that must be met to trigger growth mechanisms.

The moisture supply element though is the result of the influence of man; most of the land under cultivation in the Sacramento Valley would dry up during the long summer months were it not for the irrigation systems. The amount of rain fall that occurs in the mountains of the Coastal Range in Glenn County is as high as 65 inches, and in Butte County the Cascades receive as much as 85 inches.

The influence of soils on agricultural development has received less attention than other factors within the discipline of geography, but is now recognized as equally import as the other aspects examined. (Gregor 1970) This treatment of the information touches only the surface. The influence of soils on the patterns seen in the crops is plainly visible. The individual requirements of the different crops and the environmental factors that satisfy them are only alluded to in this work.



Fig. 14 Butte City was once the shipping point for grain during its heyday during the late 1860's during which time wheat was the prime California crop. (Hellman 1936)



Fig. 15 Almond orchard north of Stony Gorge reservoir in the foothills consisting of trees stunted by soil and climate conditions demonstrate the influence of environment.



Fig. 16 Almonds growing in the fertile Vina loam soils north of Butte Creek.



Fig. 17 Almonds expanding in to the foothills evidence of the economic influences that affect development.



Fig. 18 A still undeveloped location near Chico preserving the original landscape of the valley.



Fig. 19 text on next page

These dairy cows being raised in the foothills near Stony Creek will be moved to dairy farms in the valley, closer to feed and for the most part on gravely soils that permit drainage for waste.



Fig. 20 Chamise covered slopes used to be managed by ranchers raising goats until the Forest Service took over.



Fig. 21 Before drying up for the summer, the foothills offer pleasant scenery.



Fig. 22 Coastal Range watershed.



Fig. 23 Sacramento River with adjacent Columbia loam soils growing walnuts, and harnessed as a part of the extensive California water projects.



Fig. 24 Urban sprawl, you might think Chico was going to the dogs.