

Factors Contributing to Land-Use Change in the Hardwood Rangelands of Two Central Sierra Nevadan Counties¹

Sharon G. Johnson²

Abstract: *In many parts of California, the rate and progression of land use change in the hardwood rangeland depend upon the decisions of ranchers. As major landowners in these regions, a rancher's decision to subdivide or sell for development are significant moves toward land use change. In many instances, a single landowner decision may effect the disposition of thousands of acres of hardwood rangeland. This study seeks to identify factors that contribute to the sales or subdivisions of ranches in two rapidly developing counties in the Central Sierra Nevada: El Dorado and Amador. Area ranchers were surveyed through personal interviews and questionnaires in an effort to identify and examine factors creating difficulties for ranch operations. Instability factors identified by other land use change researchers were also explored.*

Research to date has established that the direct loss of woodlands to subdivision remains the greatest, most immediate threat to the viability of California's oak woodlands and the wildlife nurtured there (Doak and others 1991), (Allen-Diaz and Holzman 1993). Bolsinger (1988), for example, shows that since the 1970's suburban development has been the primary reason for woodland loss. He also estimates that current pressures for development threaten to claim another quarter million acres by the year 2010.

In much of California, the vanguard for new growth and development is largely focused on rangelands. Once characterized by low use and low value, the past 20 years have brought intense pressure for development and rising land values to much of California's hardwood rangelands. The foothill counties of the Central Sierra Nevada, for example, are among the fastest growing regions of the state. Between 1970 and 1990, the Sierra Nevadan population expanded more than 130 percent—that is over two and a half times as fast as the rest of the state. Most of this growth occurred in the central Sierra Nevadan foothill counties, with El Dorado County alone accounting for more than 28 percent—by far the highest in the region (Griffiths 1992). There is no question that growth must and will continue to occur in many of these areas, but questions as to how and whether traditional land uses, such as agriculture and livestock ranching, can persist in these evolving landscapes are concerns of many resource managers.

This study focuses on a fundamental aspect of land use change: the rancher. In many rural parts of California, the rate and progression of land use change in the hardwood rangeland depend upon the decisions of landowning ranchers. As major land holders in these regions, a rancher's decision to subdivide or sell for development may be a significant move toward regional change. In many instances, a single landowner decision may effect the disposition of thousands of acres of hardwood rangeland. Factors that contribute to rancher decisions to sell, whether they be difficulties in the modern business of livestock ranching or difficulties with increasing suburban neighbors—become the building blocks of change. This research seeks to identify and examine these keystones of change—those factors that contribute to ranchers' decisions to sell.

¹ An abbreviated version of this paper was presented at the Symposium on Oak Woodlands: Ecology, Management, and Urban Interface Issues, March 19-22, 1996, San Luis Obispo, Calif.

² Ph.D. student, Department of Geography, University of California, Berkeley, CA 94720.

Methods

The data reported in this paper were gathered in a series of in-depth, personal interviews with ranchers in El Dorado and Amador Counties during 1994 through 1996. The findings reported here are preliminary and reflect the first phase in a series of planned interviews. For each county, a list of active ranchers was obtained from the farm advisor. These lists were compared to Assessor's property records to determine if the ranchers or their families were also landowners in the county. The resulting list of landowning, ranching families became the source list for the interviews.

Interview techniques evolved somewhat during the first stages of this research. The first interviews were predominantly open-ended, guided by a list of questions derived from the literature on land use change and from issues identified during previous interviews with county staff. As themes emerged in these early interviews, they were included as questions for later interviews. The question list soon evolved into a draft questionnaire, intended to be used as a future mail survey.

The draft questionnaire guided the majority of interviews including all those taking place after June 1995. In fact, these interviews were also designed to "test" the draft questionnaire, as it was assumed that the interviewees at this stage were typical of the target group intended to be sampled in the mail survey to follow. Although the questionnaire guided much of the interview, time was always taken for more open-ended conversation both before and after the questionnaire was completed.

It is the results of these interviews, from the earlier, less directed contacts through those directed by the testing of the draft questionnaire, that are reported here. Not all questions were answered by all ranchers. Some declined answers on personal questions in such face-to-face settings, and some issues did not emerge until later interviews. For these reasons a descriptive approach has been taken in this paper. Where available and appropriate, numbers of respondents and answers are included.

Interview Participants

A total of 17 ranchers were interviewed, including 14 El Dorado and Amador County ranchers and three Sacramento County ranchers whose ranches were located near the Amador/Sacramento county line. Spouses participated in the conversations in three instances. All ranchers were from multigenerational ranching families. Six were third generation and five were fourth generation. In 11 cases, the ranch lands, or portions of them, had been in the family more than 60 years; six of these had been in the family for more than 100 years.

All participants were over 30 years of age. Six were 30 to 49 years old, three were 50 to 64, five were over 65, and ages of three were unknown. All had spent most of their lives within their county. School and military accounted for most time away. Of the eight participants who volunteered educational background, all had some college, several had Baccalaureate degrees, and two had graduate degrees.

Eight called themselves "full-time" ranchers whereas five had full-time jobs off the ranch. Three were retired from full-time jobs. Eight claimed that most of their family income came from the ranch, two said it contributed less than half their family's income, and two others said all profits from cattle were reinvested in building their herds.

Issues Identified in the Literature of Land-Use Change

Land-use-change researchers have documented and described the process of change from rural/agricultural uses towards suburban uses in many parts of the country. The term “the urban-rural interface” is often used to describe regions surrounding growing urban areas where the propensity for land use change is high. In this zone, land value, land use, and rural economy are all affected by the dynamics of growth. It is as if the urban center casts an economic shadow across the nearby landscape.

The zones of the urban-rural interface have been described by a number of scholars. John Fraser Hart (Hart 1991) likened this vanguard of expansion around urban areas to a bow wave spreading before a moving boat. Land planners speak of an “urban shadow” in which the intensity of agricultural practices diminishes and scatterings of urban-type buildings or businesses appear. Economists describe an “impermanence syndrome” that discourages investment in agriculture in the urban fringe (Heimlich and Anderson 1987). Characteristics of land use change within these zones have also been detailed by researchers such as Bradley (1984), Huntsinger and Hopkinson (1996), and Healy and Short (1981).

A number of investigators, including Healy and Short (1981), Bradley (1984), Clawson (1971), Hart (1991), and others have examined various elements of land use change on agricultural and forest lands. Causal mechanisms such as demographic change, land market conditions, and speculation have been examined. But land use change on these lands may not be directly analogous to change in California’s oak woodlands. Furthermore, other than work by Huntsinger and Hopkinson (1996), Forero and others (1992), and McClaran and others (1985), little work has been done on the progression of land use change on rangeland, especially in California.

The research reported in this paper takes factors and processes identified by other land-use-change researchers and investigates their relevance to the hardwood rangelands of the Central Sierra Nevada. Specific factors explored in interviews and questionnaires include:

- The parcelization of large rural properties
- Land speculation
- Increased land values (reflecting urban values rather than agricultural values)
- Disintegration of the farm economy (leading to increased farming costs for remaining farmers)
- Breakdown of farm infrastructure (increasing costs and business complexities for remaining farmers)
- Conflicts with urban neighbors

Parcelization and Speculation

Many of the above processes are already evident in the rangelands of the Central Sierra Nevada. Subdivision of large properties exists in a somewhat helter-skelter pattern across existing rangeland. All ranchers interviewed, for example, identified their home ranch as less than 5 miles from a subdivision or development. As one drives through the remaining undeveloped areas of these two counties, enclaves of subdivision are commonly encountered.

Land values in this area have also been affected by development potential. Values ranging from \$1,000-\$2,300 per acre, as cited by the ranchers themselves, are now beyond the price of land that can be purchased for livestock grazing alone. These high values create specific problems for ranchers wishing to

continue their traditional livelihoods and will be addressed in detail later in this paper. Analysis of assessor's property records suggest that much land ownership is speculative in nature. Development companies are major landowners in both counties, especially in El Dorado County where the top three private land owners are development companies. Ranchers also feel the advance of speculation as all ranchers queried say they have been contacted by developers or real estate agents interested in their property. Several ranchers commented that such contact occurs "all the time."

Disintegration of the Farm Economy and Infrastructure

A number of questions were asked in an effort to gauge changes in the farm—ranch, in this case—economy. Ranchers were asked about changes in their herd size: whether their numbers were generally stable or had they increased or decreased. Four ranchers say they are actively increasing herd size now. Three ranchers reported the number of animals in their herds as remaining fairly stable during the past decade, with some fluctuation due to drought or market conditions. The situations of two of the three ranchers claiming a decrease in herd size will be discussed in some detail in the Public Land Policy and Private Land Management section. The other ranch reduced its stock numbers when the family member primarily responsible for ranch operations died.

Ranchers were also asked about the nature of their operations, specifically whether they were primarily cow/calf or stocker operations. "Stocker," also called feeder cattle, refers to weaned calves usually bought in the fall and sold in the spring (actual timing varies by operation.) Stockers require only a single season of investment and can be a more speculative investment. A cow/calf operation, on the other hand, implies a longer period of investment. A cow is held for 8 to 12 years depending on her health and fertility, and her calves are the product that is sold. A herd of cows is an important part of ranchers' investments in their future operations. A trend change away from cow/calf toward stocker operations might indicate a reduction in long-term ranch investment in an area and a turn toward operations that are more speculative.

No clear trend was evident from answers to these questions. Except for the one instance to be described, in which a rancher sold his cow herd and invested in stockers as he planned for change, the nature of most operations remained fairly steady under each rancher's management. Cow/calf operations dominated, with some ranchers making additional purchases of stockers. Because of the generally steady nature of operations, these stocker purchases suggest a diversified business strategy of the rancher/businessman rather than a change.

As an indicator of change in the farming infrastructure, questions were asked regarding how ranchers sold their crop of calves. Most ranchers remember a time during which there were numerous packing houses in the area, and representatives would come out to the ranch to buy or inquire about buying animals—often well before the calves were ready to be sold. Today, a few ranchers still maintain the contacts to have buyers come to the ranch, and video sales are becoming more common. But the primary outlet for sales today is the auction. Although several auction yards are within a few hours' drive of most ranches, the number of auctions is less than it was just a few years ago.

None of the ranchers reports the diminishing opportunity of sales as a critical problem. Most felt that animals could be sold when needed. One mentioned, however, that being restricted to auction sales, having a bad day at the auction, and low prices hurt the rancher more than situations with more competition.

The breakdown of farm infrastructure and possible increased costs and difficulties for ranchers were also explored through questions regarding the availability of veterinarians and suppliers. Aside from one rancher who noted

that veterinarians who treat large animals are harder to find, medical treatment and supplies are generally adequately available to all operators.

Questions were also asked about the ability to hire help on the ranch. All ranchers asked said that the financial and administrative burden of hiring help—because of withholding, social security taxes, and disability and compensation insurance—is a definite disincentive for ranchers. Most work today is performed by family members and friends. One rancher said that if it were not for the help of a son, he would sell his cow herd. Another commented that his children can earn more driving trucks than by working the family cow herd.

Although the literature on land use change suggests that a breakdown of the social fabric in agricultural communities can contribute to change in fringe areas (Smith and Martin 1972), the ranchers interviewed do not consider this a problem. Nearby family and ranch friends may be fewer these days, but those that are left “stick together more.” There is a general awareness, however, that the neighbors moving in now have different lifestyles and values, and livestock operators often do not feel understood by their more suburban neighbors.

Conflicts with Urban Neighbors

The literature on land use change suggests that conflict between agricultural operators and suburban residents increases as a region develops. These conflicts typically take the form of traffic problems, trespass, vandalism, complaints from urban neighbors, and problems with dogs.

Some conflicts are indirect. For example, in past decades ranchers would drive their stock to pasture on public roadways. Even the long drive from the home ranch in the foothills to the summer range in the mountains involved driving the herd up public highways, such as Highway 50. But as population has increased and traffic and congestion with it, the cattle drive has essentially disappeared. Transport by trucks, involving higher operating costs, have taken their place.

Other conflicts with urban residents are more direct. Vandalism, damage to fences, trespass, poaching, and problems with dogs are common occurrences. Fences are commonly damaged inadvertently by vehicle accidents, but they are also purposefully cut, broken, or driven over by trespassers wanting to get motorcycles or other vehicles onto the rangeland. Such problems are not just an inconvenience requiring the expense of repair, they are also a liability concern. Regardless of the reason cattle get out, ranchers bear full responsibility for accidents caused by cattle that stray onto roadways.

Marauding dogs are another persistent problem for all ranchers. It is not just the loss of stock or the inconvenience of “dealing” with the problem (ranchers in both counties are entitled to kill dogs that are found chasing stock); the disbelief of suburban residents regarding what their dogs do when they are not home does not help relations between ranchers and their newer neighbors. Dead dogs do not help these relationships either.

Aside from the killing of stock by dogs, poaching on the home ranch within these two counties has not been a major problem to date. Several ranchers are concerned, however, about unexplained losses of calves on their summer ranges in the mountains, leased from the USDA Forest Service.

Many ranchers have had some personal experience or know of someone who has had to deal with complaints from urban neighbors. Complaints typically focus on animal noise or stock bells, especially during early morning hours. But ranchers in both of these counties are protected by “Right to Farm” ordinances which allow all agriculturists to continue normal operations in spite of complaints. Ranchers uniformly feel these ordinances are critical to the future of agriculture in the area. Unfortunately, issues that cause complaints, although

carrying no force of law, do not lead to better understanding or improved relationships between ranchers and their increasingly suburban neighbors.

Although the literature suggests that conflicts with urban neighbors do contribute to further change in use, such conflicts did not appear to be significant in these two counties. The ranchers themselves refer to them as “irritations” or “hassles” but consider them surmountable. Instead, ranchers identified a number of other factors they consider more threatening to their continued operations. These are what one rancher described as the “insurmountable” problems.

Critical Problems Identified by the Ranchers

From the first interview, ranchers themselves identified problems they believe are the most difficult to overcome. These include the economics of cattle raising, estate taxes, what will be referred to as the “pyramid of heirs,” and the inflexibility of assets. Each is discussed in some detail below.

The Economics of Livestock Ranching

Livestock ranching is a land-intensive activity with a low dollar yield per acre. It is best suited for locations where land costs are low and competition for competing higher-income land uses is nonexistent. This was the case for most of the Central Sierra Nevada rangelands until recent decades.

Certain economic parameters shape the profitability of livestock operations. As a rough figure, a cow can produce a calf that brings in \$100 to \$200 profit a year. This figure takes into account that not all cows calf each year, half of those born are females that cannot be considered income-producing in the same way, and that all costs of operations come out of the income calves produce. The market price of beef, which is currently very low, also dramatically affects profitability.

A herd must be supported by land—how much land depends upon the land’s productivity. In the foothill hardwood rangeland of El Dorado and Amador Counties, year-round carrying capacity varies from about 10 acres per cow in the better areas to 20 acres in other areas. Land values typically range from \$1,000 to \$2,300 per acre depending on area. A simple example here can help illustrate the difficult economics ranchers face: Assuming a 15-acres-per-cow carrying capacity and a low land value of \$1,000 an acre, a \$15,000 land investment is required to support a cow that produces \$100-200 profit a year. This is a return of around one percent per year. On the basis of these figures, land worth \$1.5 million is needed to support a 100-cow herd.

Another way to look at the problem is the rent value of land. One acre of land worth \$1,000 at current prices, if rented out as pasture, would earn only about \$10—again a return of only one percent. It is not surprising that ranchers now say they cannot afford to buy land for cattle production. With the agricultural earning power of land such a small percentage of its value—its value for development—it no longer makes sense to buy land for livestock. All ranchers interviewed already owned land. Given current economics the most likely future buyers of rangeland will be speculators.

The Need for Summer Range

The above figures also do not consider the need for summer range. *All* ranchers interviewed seek additional pasture during the drier times of the year, from about May to November, depending upon the elevation and climate of the home ranch. This additional pasture may be at higher mountain elevations either owned by the rancher, leased from other land owners, or leased from Federal land management agencies. Some ranchers lease pasture—sometimes improved with irrigation—from other land owners near the home ranch. The need for summer range adds expense and complexity to the livestock operation.

Estate Taxes

For those families who have been able to pass the ranch on to subsequent generations, the very ownership of land—the fact that land that does not need to be purchased at today's prices—allows for the continuation of the family livestock business. But high land values return to haunt the family when a ranch passes from one generation to the next. The Williamson Act may provide some tax relief in the form of lower annual property tax rates for enrolled agricultural lands, but federal estate taxes, which must be paid at the death of a landowner before assets are distributed to heirs, are based on the full market value of the land. Although California does not currently have estate taxes, the federal bite is fierce enough. Estate taxes allow only \$600,000 of value to be passed on to heirs tax free. For estates worth more than this amount, the tax rate ranges from 37 to 55 percent, depending on the value of the estate. We have already seen that a herd of 100 cows requires the support of land worth an estimated \$1.5 million. As one rancher said, "The profit from our herd is not enough to pay the interest on the loan we took out to pay federal estate taxes."

Incorporating the family livestock business offers some mechanisms to pass on the family ranch, but incorporation is complicated and requires planning decisions that are difficult for many families to make. Legal assistance is also required which adds a burden of cost and complexity to the process. About this situation another rancher commented, "No one wants to talk about death and lawyers." Even with estate planning, there is no guarantee that heirs can or will continue the family business.

The Pyramid of Heirs

Even if a family is able to manage the financial planning to enable a ranch to pass on to the next generation, another problem often awaits: the expanding pyramid of heirs. If a family has a single heir, the ranch can more simply pass on in one piece. If a family has multiple heirs, the assets must somehow be divided. Even in the case of an incorporated family ranch that can stay intact, problems emerge if some heirs do not want to participate in the family business or if heirs do not get along. Property settlements brought on by divorce can especially ravage the family ranch. Splitting assets or buying out heirs presents a multitude of problems to estate planning for ranching families. Even if a ranch can be passed on intact for one generation, circumstances for the next generation may be much more complicated. The expanding pyramid of heirs in these counties has already caused the splitting, sale, and later development of a number of foothill county ranches.

Inflexibility of Assets

For most urban residents, dipping into savings accounts is a major way to finance education, retirement, or unexpected medical expenses. For these ranchers their ranch lands or their cow herd itself are their major assets. The non-liquidity of these assets presents major problems to ranch families for any of the above-mentioned needs and are especially restrictive when it comes time to handle estate taxes or distribute assets among heirs. Selling some land or stock to meet financial obligations directly lowers the ranch's earning ability, thus compounding financial problems. Selling off a portion of land is further complicated by the costs of surveys required for any subdivision. The survey costs of splitting off a 40-acre piece, for example, range from \$10,000 to \$12,000.

Most ranches are composed of a number of individual assessor's parcels, each of which is a legal entity and capable of being sold. But the selling of any such piece could threaten the economic viability of the remaining ranch. Similarly, if land is divided among heirs, the individual pieces may not be large enough to run a cattle operation. Williamson Act status—which most ranchers

feel is critical to their operations—may also be threatened if the ranch becomes smaller. County review is required for any piece with Williamson Act designation. A piece cannot qualify if it is no longer economically viable for its designated agricultural activity. Ranches are not viable if they become too small. Thus, the inflexibility of a rancher's major assets—the ranch lands or the herd itself—adds to the instability of ranching in the region. If financial needs become too great, either to meet family needs or the settlement of an estate, the likely result is the sale of the entire ranch. Since land prices are now too high for the purchase of land for ranching or agriculture, development is most probable.

Federal Land Policy and Private Land Management

Much is said and written today about the potential impacts of changes in federal grazing policies. This issue is much larger than can be considered here, but experiences related in these interviews suggest an important connection between public land policy and private land management decisions.

All ranchers interviewed seek additional pasture for the summer. Of 16 ranchers queried, 13 have relied on USDA Forest Service grazing leases on mountain land at one time or another. Eight still rely on these leases, two take their cattle to Oregon, and the rest graze on rented pasture closer to the home ranch. Many mountain leases have been in the same family for generations. Of the ranchers who have used federal grazing leases, a number interviewed related incidents of losing or giving up these leases. These losses have important consequences best illustrated with examples.

Two ranchers interviewed lost their grazing leases when a dam was built on the land they leased. These ranchers began trucking stock to Oregon for summer range. One of these ranchers has recently sold his cow herd, invested in stockers for the time being, and intends to phase out ranching. He claims that current costs of trucking on top of other ranching economics now makes his operations unfeasible. Much of his land is now in Williamson Act nonrenewal—a process requiring 9 years. Development, at least on a portion of his property, is the most probable future disposition of these lands. As a major landowner in his area, any change in use will be widely felt. This is one case in which the loss of a lease appears to have contributed to the eventual phasing out of the family ranch.

Another rancher who lost a grazing lease is now renting improved pasture near his home ranch in the foothills. Since rented pasture is hard to find, he has reduced the size of his herd. Several other ranchers in the same area just abandoned their mountain leases because of difficulties in dealing with staff in their Forest Service District. They will also be looking for private pasture in the same area for the first time this summer.

One of the ranchers interviewed cited a shortage of rentable pasture as the major problem facing the livestock industry in these two counties today. Considering that much of the pasture currently available for rent is in unstable ownership dispositions (leased by retired ranching families who no longer run their own cows, leased by land-holding development companies with development plans, or leased by absentee landowners), the future availability of rentable pasture is highly questionable.

Every rancher who loses a lease on high-country pasture and seeks rentable pasture near the home ranch is heightening competition for a commodity already in short supply. These problems could well encourage ranchers to cut back herd size or just go out of business. Because livestock returns are such a small percentage of land value, it is unlikely land will be purchased for new ranches or

purchased to be rented out for pasture; thus, development is the most likely future of land that is abandoned for ranching. In this way federal land policies regarding grazing leases in high-country locations can easily influence landowner management decisions on the home ranch miles away.

Conclusion

This research suggests that the “urban shadow” has already affected ranches in El Dorado and Amador Counties in many ways. Processes observed by other land-use-change researchers, such as land speculation, parcelization of large properties, the breakdown of farm infrastructure, and conflicts with urban neighbors, are all present to some degree. But interviews with 17 ranchers suggest that in the Central Sierra Nevada the most important effect of the urban shadow—an effect that may well encourage further change—is increased land value.

Hargrave (1993) found that El Dorado County ranchers had a higher return from land appreciation than from livestock production during the past decade. But returns in the form of higher land values exacerbate all the problems ranchers identified: it increases the discrepancy between land value and agricultural earnings, making the purchase of land for ranching a poor investment and thus weakening the stability of livestock grazing as a major land use. High land values also generate high estate taxes, and the inflexibility of land assets makes it difficult for ranch families to meet financial contingencies, settle estate taxes, or settle claims of heirs.

Perhaps the most critical juncture for the future of any ranch is when a ranch passes from one generation to the next. At this time, all problems that ranchers identified—the economics of ranching, inflexibility of assets, estate taxes, and the pyramid of heirs—are particularly exacerbated by high land values. For these reasons, much actual land use change in the suburbanizing counties of the Central Sierra Nevada may be initiated by the very mortality of the land owner. Summarized in another way, the loss of family ranches in this region may ultimately be traced to two facts of life familiar to us all: death and taxes.

References

- Allen Diaz, Barbara; Holzman, Barbara. 1993. **Resampling VTM plots in Blue Oak cover type series.** Forest and Rangeland Resources Assessment Program, California Department of Forestry and Fire Protection; 73 p.
- Bolsinger, Charles. 1988. **The hardwoods of California's timberlands, woodlands, and savannas.** Paper PNW-RB-148. Portland, OR: Pacific Northwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture; 148 p.
- Bradley, Gordon A. 1984. **The urban/forest interface.** In: Bradley, Gordon A., ed. Land use and forest resources in a changing environment. Seattle and London: University of Washington Press; 3-16.
- Clawson, Marion. 1971. **Suburban land conversion in the United States: an economic and governmental process.** Baltimore: The Johns Hopkins Press. Published for Resources for the Future, Inc.
- Doak, Sam; Green, Kass; Fairfax, Sally K.; Johnson, Sharon G. 1991. **The legal environment for hardwood lands in California.** In: Proceedings of the symposium on oak woodlands and hardwood rangeland management. Gen. Tech. Rep. PSW-126. Berkeley, CA: Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture; 242-245.
- Forero, Larry; Huntsinger, Lynn; Clawson, W. James. 1992. **Land use change in three San Francisco Bay area counties: inventing the urban ranch.** Journal of Soil and Water Conservation 47(6): 475-480.
- Griffiths, Phil. 1992. **The Sierra now: a compendium of social and economic statistics on the Sierra Nevada Region.** Berkeley: University of California, Department of City and Regional Planning, professional report submitted for the M.C.P. degree.

- Hargrave, T. 1993. **The impact of a Federal grazing fee increase on land use in El Dorado County, California.** Berkeley: University of California, Energy and Resources Group; 68 p. Master's thesis.
- Hart, John Fraser. 1991. **The perimetropolitan bow wave.** *The Geographical Review* 81(1): 35-51.
- Healy, Robert G.; Short, James L. 1981. **The market for rural land trends, issues, policies.** Washington, DC: The Conservation Foundation.
- Heimlich, R.E.; Anderson, W.D. 1987. **Dynamics of land use change in urbanizing areas: experience in the Economic Research Service.** In: Lockeretz, W., ed. *Proceedings of the symposium on sustaining agriculture near cities*; Nov. 20-21, 1986; Boston, MA. Ankeny, IA: Soil and Water Conservation Society; 135-154.
- Huntsinger, L.; Hopkinson, P. 1996. **Sustaining rangeland landscapes: a social and ecological process.** *Journal of Range Management* 49: 167-173.
- McClaran, M.P.; Romm, J.; Bartolome, J.W. 1985. **Differential farmland assessment and land use planning relationships in Tulare County, California.** *Journal of Soil and Water Conservation* 40: 252-255.
- Smith, A.H.; Martin, W.E. 1972. **Socioeconomic behavior of cattle ranchers, with implications for rural community development in the West.** *American Journal of Agricultural Economics* 54: 217-225.