



A programming model for evaluating changes in resource use in the Bitterroot Valley of Montana  
by Charles Thomas Hash

A thesis submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree of  
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**Abstract:**

The rapid movement of land and water resources from agricultural to recreation-residential use in Montana's mountain valleys presents both opportunities and problems to the residents of those areas—opportunities in the form of increased return to the resources of the area—problems in providing for a growing population without substantial increases in local tax rates and without creating the kinds of urban problems that so many come here to avoid.

A multivariate regression model was used to analyze data on sales of unimproved tracts of land in the Bitterroot Valley area to determine the contribution to value of various amenities and detriments.

A linear programming model of the resource economy of the Bitterroot Valley was used to evaluate the impact on local community well-being of certain policies to internalize some of the external costs of recreation-residential development. It was estimated that an annual benefit of approximately \$63,000 could be realized by forcing developers and recreation-residential occupiers to consider and react to such externalities as the costs of road maintenance, cost of school transportation, and the cost of incompatible uses on adjacent lands.

The present institutions and works for the distribution of irrigation water do not allow the waters available to Bitterroot Valley lands to be fully utilized in agriculture. The same linear programming model was used to estimate the impact of the agricultural economy of improvements in the irrigation water distribution system.

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CHARLES THOMAS HASH

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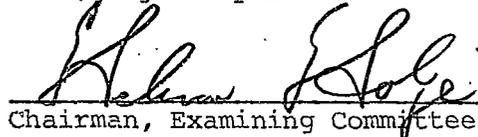
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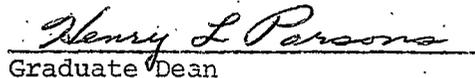
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Approved:

  
Head, Major Department

  
Chairman, Examining Committee

  
Graduate Dean

MONTANA STATE UNIVERSITY  
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## TABLE OF CONTENTS

	<u>Page</u>
VITA. . . . .	i
ACKNOWLEDGMENTS . . . . .	ii
CHAPTER	
I INTRODUCTION . . . . .	1
Some Experiences of Other Areas Undergoing Rapid Real Estate Development . . . . .	4
History of Public Intervention in the Use and Develop- ment of Private Lands. . . . .	9
Scope of Rural Zoning Legislation. . . . .	11
Relation of Zoning to Planning . . . . .	13
Montana's Recent Legislation on Land Use Planning. . .	14
Problems of Rapidly Changing Patterns of Resource Use in the Bitterroot Valley Area . . . . .	17
The Role of the Economist in Planning. . . . .	22
The Problem. . . . .	23
The Problem Defined. . . . .	26
Hypotheses . . . . .	26
The Approach to be Followed. . . . .	27
II A SURVEY OF RESOURCE STUDIES RELEVANT TO CURRENT RESOURCE PROBLEMS OF THE BITTERROOT VALLEY AREA . . . . .	28
Studies Specific to the Area . . . . .	28
Resource Inventories . . . . .	29
Studies of Real and Hypothetical Adjustment in Resource Use. . . . .	36
Water Resource Development Proposals . . . . .	37
III SOME ELEMENTARY THEORETICAL CONCEPTS RELEVANT TO PLANNING FOR RECREATION-RESIDENTIAL DEVELOPMENT . . . . .	41
Some Problems in Actual Markets. . . . .	51
IV ESTIMATING BENEFITS FROM RESOURCE USE. . . . .	60
On the Valuation of Assets . . . . .	60
Estimate of Benefits of Agricultural Uses. . . . .	61
Benefits from Recreation-Residential Use . . . . .	64
Estimating the Benefits of Recreational-Residential Use. . . . .	66
A Note on the Assumptions of the Regression Model. . .	83
Autocorrelation. . . . .	84
Multicollinearity. . . . .	86

## TABLE OF CONTENTS (cont'd)

<u>CHAPTER</u>	<u>Page</u>
V A LINEAR PROGRAMMING MODEL OF BITTERROOT VALLEY AREA . . . .	89
The Basic Model . . . . .	90
Estimation of Technical Coefficients and Restrictions .	92
Estimation of Objective Functions . . . . .	100
Results of the Linear Programming Model and Selected	
Modifications . . . . .	108
Initial Optimal Solution . . . . .	109
Impact of Relaxing the Requirement for Tracts with	
Detriments . . . . .	115
Optimal Solution when Road and Route Costs are	
Considered . . . . .	117
Solutions Under a Random Settlement Pattern . . . . .	120
Estimate of the Planning Benefits . . . . .	122
Water Supplies and Distribution . . . . .	125
VI SUMMARY, CONCLUSIONS AND RECOMMENDATIONS . . . . .	130
Recommendations . . . . .	132
APPENDICES . . . . .	136
Appendix A . . . . .	137
Appendix B . . . . .	141
Appendix C . . . . .	144
LITERATURE CITED . . . . .	147

## LIST OF TABLES

<u>Table</u>	<u>Page</u>
I-1 RURAL SUBDIVISION, SELECTED COUNTIES, WESTERN AND CENTRAL MONTANA, JANUARY 1965 TO MARCH 1970. . . . .	3
I-2 ACREAGE ASSESSED AS SUBURBAN TRACTS, VILLA SITES, ORCHARDS, ETC., SELECTED COUNTIES, 1965 TO 1970. . . . .	5
IV-1 DESCRIPTIVE CHARACTERISTICS OF SAMPLE OF SMALL TRACT LAND SALES. . . . .	69
IV-2 ESTIMATED FEET AND STREAM FRONTAGE MODEL: DESCRIPTION OF VARIABLES, MEANS, PARTIAL CORRELATION, ESTIMATORS AND f VALUES; 134 SMALL, UNIMPROVED TRACTS, BITTERROOT VALLEY AREA, 1960-1970 (All Regression Coefficients Significant at 90% Level). . . . .	73
IV-3 ANALYSIS OF VARIANCE: 134 SMALL, UNIMPROVED TRACTS, BITTERROOT VALLEY AREA, ESTIMATED FEET OF STREAM FRONTAGE. .	75
IV-4 STREAM FRONTAGE DUMMY MODEL: DESCRIPTION OF VARIABLES, MEANS, PARTIAL CORRELATION, ESTIMATORS AND STUDENT "t" 134 SMALL, UNIMPROVED TRACTS, BITTERROOT VALLEY AREA (All Regression Coefficients Significant at 90% Level). . . . .	79
IV-5 ANALYSIS OF VARIANCE STREAM DUMMY MODEL: 134 SMALL UNIMPROVED TRACTS, BITTERROOT VALLEY AREA. . . . .	80
IV-6 CORRELATION MATRIX: ESTIMATED FEET OF STREAM FRONTAGE MODEL; 134 SMALL, UNIMPROVED TRACTS, BITTERROOT VALLEY AREA . . . .	88
V-1 TYPES OF LAND RESOURCES, USES PERMITTED IN THE LINEAR PROGRAMMING FORMULATION AND ACREAGES ASSUMED IN EACH DISTANCE ZONE, TOTAL ACREAGES. . . . .	93
V-2 RESOURCE REQUIREMENTS PER TIME PERIOD; AGRICULTURAL AND RECREATION-RESIDENTIAL ACTIVITIES. . . . .	97
V-3 OBJECTIVE FUNCTION VALUES: AGRICULTURAL AND RECREATION-RESIDENTIAL ACTIVITIES; 1970 BASIS . . . . .	101

## LIST OF TABLES (cont'd)

<u>Table</u>	<u>Page</u>
V-4 TOTAL EXPENDITURES FOR ROADS AND BRIDGES, MILEAGE OF ROADS MAINTAINED AND AVERAGE COST PER MILE, RAVALLI COUNTY, FISCAL YEARS 1962-1970 . . . . .	104
V-5 COSTS OF SCHOOL BUS ROUTES FOR YEAR-JULY 1, 1969 TO JUNE 30, 1970, RAVALLI COUNTY, MONTANA. . . . .	105
V-6 ACTIVITIES IN INITIAL OPTIMAL SOLUTION, LINEAR PROGRAMMING MODEL. . . . .	110
V-7 CONSTRAINING RESOURCES, TOTAL QUANTITY AVAILABLE, AND SHADOW PRICES, INITIAL OPTIMAL SOLUTION. . . . .	112
V-8 VALUE OF ACTIVITIES NOT IN ORIGINAL OPTIMAL SOLUTION AND INCREASES REQUIRED TO PERMIT ENTRY IN OPTIMAL SOLUTION . . .	113
V-9 ACTIVITIES NOT IN OPTIMAL SOLUTION: ROAD AND ROUTE COSTS CONSIDERED, VALUE PER UNIT AND INCREASE IN VALUE REQUIRED. .	119
V-10 VALUE OF SOLUTION AT OPTIMUM: CENTRALIZED VERSUS DECENTRALIZED SELLERS AND DIFFERENCES IN VALUE . . . . .	123
V-11 VALUE OF OPTIMAL SOLUTIONS AND LEVEL OF ACTIVITIES IN OPTIMAL SOLUTION . . . . .	128

## LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
III-1	Normal Indifference Map. . . . .	42
III-2	Normal Production Surface. . . . .	46
III-3	Indifference Map of Influence of Subsidies . . . . .	53
III-4	Hypothetical Damage Function . . . . .	59
IV-1	A Reciprocal Relationship. . . . .	76
IV-2	Relation of Price to Frontage. . . . .	77
IV-3	Nature of Specification Error. . . . .	85

## ABSTRACT

The rapid movement of land and water resources from agricultural to recreation-residential use in Montana's mountain valleys presents both opportunities and problems to the residents of those areas--opportunities in the form of increased return to the resources of the area--problems in providing for a growing population without substantial increases in local tax rates and without creating the kinds of urban problems that so many come here to avoid.

A multivariate regression model was used to analyze data on sales of unimproved tracts of land in the Bitterroot Valley area to determine the contribution to value of various amenities and detriments.

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## CHAPTER I

### INTRODUCTION

Long-time residents of Montana's mountain valleys must feel the same sense of foreboding as their native American predecessors felt a century ago. A mounting wave of migrants into the mountain valleys present the current natives with a perplexing combination of problems and opportunities. In all of this one thing is certain--the face of the landscape will experience dramatic, and likely irreversible, change.

Much of the land on the high terraces of Montana's mountain valleys has been used in the production of forage and timber since the coming of the white man to these areas. In recent years there has been an increasing level of seasonal usage of these lands by recreationists--hunters and fishermen in pursuit of their quarry, picnickers and hikers in search of renewal, and snowmobilers pursuing the thrill of speeding over the snow covered landscape. These recreational uses apparently have not seriously conflicted with the utilization of the land in forage and timber growing. Recent developments in the land use area have led some observers to suspect that coming uses of such areas will not be nearly so compatible with the traditional western activities of forestry and grazing.

The last three decades have witnessed a massive exodus of people from rural to the urban areas of the United States. For a variety of reasons, some perhaps relating to the quality of life in the cities, the

urbanites of the 1970's may attempt to counter this migration in substantial numbers. Many rural communities are ill equipped to handle this influx of people if it should occur. The demand for public services is likely to be immediate while the means of providing and financing these services will respond more slowly. A continuing sense of crisis is likely to well up among those concerned about the provision of services to such a rapidly expanding population. Although the migrant group may be somewhat disaffected with city life, one author has described them as "wishing to enjoy the rural life with all the comforts of the city" [19,p.679].

There are a variety of ways in which one can perceive the magnitude of the problem posed to local communities. One way is to examine the number of rural subdivisions. In the preliminary phases of this investigation, the records of several courthouses were examined to get some feeling for the magnitude of rural subdivision activity in recent years. A tabulation of subdivision filings was made. Some of the information obtained is presented in Table I-1. With the exception of Missoula County, there appears to be a substantial increase in filings of subdivisions in the later years of the period.

Another indicator is the reports of county assessors of the quantity of rural subdivision lands in their counties from year-to-year. The inclusion of orchards in the suburban lands in the report of the State Board of Equalization tends to cloud the data for total acreage

TABLE I-1. RURAL SUBDIVISIONS, SELECTED COUNTIES, WESTERN AND CENTRAL MONTANA, JANUARY 1965 TO MARCH 1970.

County	Estimated Number of Rural Subdivisions					
	1965	1966	1967	1968	1969	1970
Carbon	0	0	2	4	3	0*
Flathead	5	5	8	14	10	0
Lake	3	3	2	2	5	0
Park	0	0	1	1	14	7
Missoula	17	20	14	14	11	0
Ravalli	2	3	5	6	5	0

\*During 1970 some eight subdivisions were filed after March 30 in Carbon County.

in Flathead and Lake Counties at least. The rather consistent increase in acreage reportedly devoted to suburban tracts, villa's and orchards in the other three counties identified in Table I-2 is likely to be principally in the tract and villa lands. The precipitous one-year change in Missoula County for 1968 is likely due to some interruption of normal reporting or is in error. 1/ (It is inconceivable that this large an acreage would have been annexed to the cities and towns during the one-year period from 1968 to 1969. An increase of some 7,850 acres in the period 1967-68 is equally unlikely.)

These indicators of impending problems and opportunities for local communities are also indicative of an increasing level of activity in the real estate business generally and in real estate development in particular. The expression "real estate development" is used here in the conventional sense of the process of acquisition, subdivision and resale of land.

#### Some Experiences of Other Areas Undergoing Rapid Real Estate Development

The pristine mountain valleys of the west are being recognized as an attractive place to live for many reasons. Modern communication and transportation have made possible a life style in the regions

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1/ This phenomena was discussed with the staff of the Missoula County classification office but no further explanation could be advanced.

TABLE I-2. ACREAGE ASSESSED AS SUBURBAN TRACTS, VILLA SITES, ORCHARDS ETC., SELECTED COUNTIES [39,40,41], 1965 TO 1970.

County	Acreage Assessed					
	1965	1966	1967	1968	1969	1970
Carbon	963	1,052	1,142	1,183	1,475	1,758
Flathead	16,265	16,664	17,717	19,130	48,331	58,433
Lake	12,688	13,446	12,649	12,912	13,547	14,694
Missoula	5,324	7,747	10,709	18,556	13,065	14,807
Ravalli	2,675	2,612	3,351	4,454	6,575	7,906

similar to the possibilities in or near our nation's population centers. Meanwhile, these once remote regions offer privacy, varied outdoor recreation opportunities, a relatively clean physical environment, and relative freedom from the problems of congestion, crime, etc., that now characterize some of our nation's cities.

Regardless of the causes, the mountain valley areas appear to be on the verge of, if not already in the midst of, a real estate boom. Tales of the real estate development practices that have been permitted elsewhere under somewhat similar circumstances cause responsible citizens to recoil. A description of these practices appeared in a recent issue of Saturday Review [45]. The author, a newspaper editor and publisher from Troy, Ohio, was preparing a series of articles on out-of-state land companies that were "peddling" land in Ohio. He relates stories of the successful selling of 300,000 acres of Florida land which lies under the waters of the Big Cypress Swamp; of 55,000 acres of Arizona desert sold, "like patent medicine, to buyers who, with a few exceptions, are conspicuously not from Arizona" [45,p.48]; of a proposed development scheme for settling a population approximating that of the city of Tucson in a remote desert area, on land unsuitable to the planned individual sewage disposal systems and with sufficient water for only a fraction of the anticipated population [45,pp.49-50]. A former salesman described the way his old company responded to the land fever in Florida [45,p.51]:

At first we sold Cape Coral in Florida as a legitimate community, and today it is a community. Then we sold Golden Gate with roads, then River Ranch with nothing, and finally Remuda Ranch under water. Everything worked. One of the bosses said one time that 'eventually we'll reach the point where we'll just mail contracts and the people will send them in and we'll tell them where we'll put them.'

He further described a variety of devious selling practices based on misinformation [46,pp.50-51] if not downright deceit.

Descriptions of rapid selling of land in areas closer to home have made many citizens wonder if they can continue to rely on good fortune alone to prevent Montana lands from becoming involved in some predatory promotion scheme. It does appear that so far fortune has been generally kind in the current land rush and few, if any, misleading practices are current here [27,p.2]. One official was quoted (in [27]) as feeling that the purpose of some purchasers was "to gain the exclusive control of trout streams"; a purpose which many Montana sportsmen would find disturbing.

Large scale developers have begun to show an interest in Montana lands. In addition to the so-called Big Sky development, several fairly large ranches have been purchased with the expressed purpose of subdividing them into 5 to 40 acre tracts for sale on a nationwide scale. These developments range up to seven sections in size and are spread from the Bird Tail Hills near Great Falls to the Rosebud Canyon near Red Lodge; from Hamilton in western Montana to Roundup in the central portion of the state.

One development along the Dearborn River west of Great Falls was the subject, recently, of a feature article in the city's daily paper [67]. The article described the process used by the Colorado based firm in platting, developing, and merchandising rugged, mountainous land in the Bird Tail Hills area and along the Dearborn. One technique described (which was observed in several other areas, too) was the mechanism of "communal parks" to guarantee any landowner in the development access to the river even if he himself did not own any frontage outright. The developers set aside an area of some 5 to 15 acres of river frontage land as communal park (sometimes a public park is used also). The developer, characteristically expressed an expectation of being able to sell the land as fast as access roads and survey work could be completed. It was estimated that the entire 5,500 acres in the project could be sold by early 1972.

Concern over the extent and direction of such changing land use patterns are observable over most of the western part of the state and in several central Montana localities. In late 1970 a group of state and federal officials concerned with the rural situation in Montana reported:

A recent review of existing legislation by the State Department of Planning and Economic Development makes it increasingly clear that Montana's planning laws are inadequate for meeting the needs of local communities. Local units of government find it almost impossible to deal with problems brought on by change, whether suburban, industrial, or recreational. Undesirable patterns of land use are developing in the countryside due to lack of controls. [60,p.6]

Many of the concerns expressed reflect fears that the benefits and costs of change will fall rather unevenly upon present and future citizens and outside developers. Measurement of these distributional effects would likely reduce anxiety about the future.

#### History of Public Intervention in the Use and Development of Private Lands

The call for controls (government intervention) is frequently met by challenges of the legitimacy of such actions. A review of the background of public intervention may serve to clarify its respectability.

The term "real estate" <sup>2/</sup> as a synonym for land and improvements reflects the ancient Anglo-Saxon theory that the ultimate ownership of land was vested in the Sovereign. Those who held the land (the lords in medieval Europe) did so as a direct grant and had an obligation to the Sovereign both for personal service and for a share of the product of the land [34,p.187]. The lands could be taken by the Sovereign for public use with compensation (since the signing of the Magna Charta in 1215, anyway). Further, even in ancient times a man's neighbors had legal recourse from the antisocial uses of his lands under the common law of nuisance [34,p.188]. Another historical root is the

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<sup>2/</sup> Literally "royal property".

police power of the Sovereign. 3/ Modern taxes, zoning regulations, building codes, and other government imposed restrictions of the free use of property possess this ancient lineage.

In this country, zoning was practiced even before the nation was formed. The Commonwealth of Massachusetts in 1692 passed laws authorizing the major towns to assign offensive activities (e.g., slaughter houses and distilleries) to certain places in the towns where the activities would be the least offensive [50,p.2]. Mills for the production of gunpowder were forced to locate on the very outskirts of many colonial communities to reduce the risks to the community of fires and explosions that so frequently ravaged these mills and associated storehouses.

Risk of fire was the factor which led early American cities and towns to continue to regulate the type of construction permissible in various districts. This practice (zoning) was recognized in legislation passed in Wisconsin in 1889. Wisconsin led the way again in 1923 in extending zoning to areas outside the limits of cities and towns with general rural zoning authorized there in 1929 [50].

In the lake states, a very slow settlement rate on cutover lands resulted in an extremely scattered population on small farms. Rural zoning was initiated to return many of these areas to forestry and

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3/ Usually defined in terms of the powers of the state to control the individual's enjoyment of his liberty or property in the interest of public welfare.

recreation in an attempt to reduce the costs of providing public service in remote, scattered locations. Much of the privately owned cutover land in that area returned to public ownership through tax delinquency during the depression years [50,pp.33-34]. Most states using rural zoning do not permit further construction of year-round dwellings in the forest or recreation districts. Wisconsin also prohibits farming in such districts due to fire risks and the anticipated detraction from the recreation values of adjacent properties [50,p.35].

#### Scope of Rural Zoning Legislation

Virtually every conceivable land use has come under regulation or outright proscription in some place or other in the United States since the beginnings sketched above. In addition to quite general objectives of protection of public health, safety and morals, and the promotion of the general welfare, the laws of some states have seen fit to include one or more of the following list of objectives which are grouped under several general headings.

##### Orderly Development:

- To encourage the most appropriate use of land and water.
- To guide a coordinated, adjusted, and harmonious development of the county.
- To secure appropriate allotment of land area in new development for all requirements of community life.
- To direct trends of building development.
- To protect and guide development of rural areas.
- To promote coordinated development of unbuilt areas.
- To promote classification of land uses and distribution of land development and utilization.

- To promote desirable living conditions and sustained stability of neighborhoods.
- To protect against blight and depreciation.
- To prevent tax delinquency.

Density of Population:

- To prevent overcrowding of land or water.
- To prevent wasteful scattering of population.
- To reduce waste of physical, financial, or human resources due to congestion.
- To encourage formation of neighborhood or community units.
- To promote a wholesome home environment.
- To promote desirable living conditions.

Health:

- To preserve health and prevent spread of disease.
- To prevent escape of obnoxious fumes or offensive odors.
- To protect residential sections from traffic, noise, smoke, fumes, and other unwholesome conditions and influences.
- To prevent development of unsanitary areas for housing purposes and relate housing density to practically available facilities for waste disposal.

Safety:

- To secure safety from flood or windstorm.
- To secure safety from fire, collapse, or explosion.
- To reduce hazards to life and property.
- To provide adequate police protection.

Highways:

- To facilitate highway development and transportation.
- To increase or preserve traffic-carrying capacity of highways.
- To secure a well-articulated and adequate street system.
- To reduce waste of excessive mileage of roads.
- To prevent a close arrangement or construction of buildings upon streets.
- To eliminate traffic hazards.
- To lessen traffic congestion and accidents.
- To promote convenience of access.
- To provide reasonable access.

Soil and Water Conservation:

- To conserve soil fertility.
- To prevent soil erosion.
- To facilitate soil conservation.
- To facilitate adequate water flow, water supply, and drainage.
- To make and adopt a development pattern for the physical and economic development of the county, including surface mining.

Esthetic Considerations:

- To protect the scenic attractiveness of the landscape.
- To promote conservation of exceptional natural physical features.
- To conserve and restore natural beauty and other natural resources.
- To preserve the natural and scenic beauty and attractiveness of roadsides.
- To promote good civic design and arrangement.
- To restrict unsightly development.
- To increase amenities of the municipality.
- To promote the reservation of common park and playground areas and conservation of natural physical features, trees, waters, stream courses, and other natural resources. [50,pp.10-11]

Although the outright prohibition of certain offensive activities in certain areas is the most obvious and likely the most common way of controlling such activities, it is not the only way. Within the framework of land use regulation, some states have required that minimum site areas be acquired by the potentially offensive or hazardous user to provide a buffer of land between him and his neighbors [50,p.33]. Where secondary uses (say grazing, cropping or recreation) are possible on the lands in the buffer area, this device might lessen somewhat the inequities and inefficiencies which result from outright prohibitions.

Relation of Zoning to Planning:

Most zoning laws require that land use planning precede the actual formulation of the zoning districts in order to achieve the objectives

of the legislation as described above. Perhaps the most obvious output of such a planning effort is a map delineating the uses permitted on the various subareas of the region to be zoned. The plan also establishes a sequence of events to be experienced by the region (and residents thereof) contemplating this sort of action (discussion, adoption, implementation and operation of the zoning district).

#### Montana's Recent Legislation on Land Use Planning

Local citizen concern over the impact of residential, part-time, and recreational use of rural lands probably came to a head with the announcement by Big Sky, Inc., of their planned recreation complex in the Lone Mountain area of Gallatin County. This project is to encompass some 10,000 acres of land and involve a total investment of some \$18,000,000. Such a development is anticipated to have a profound impact on the basically agricultural community of Gallatin County and fear was expressed that considerable commercial activity might be undertaken on the narrow corridor of private lands in the forest area between Bozeman, the county seat, and the Lone Mountain area.

These several forces culminated in the passage of House Bill No. 79 [37] by the 1971 session of the Montana Legislative Assembly. This bill provided for building restrictions and zoning and subdivision regulations by cities, towns and counties; for boards of adjustment; and for city, county, and city-county planning boards. The bill

further provided for a master plan and the establishment of the jurisdictional area of the boards to be formed under the provisions of the bill. Other provisions of the bill deal with definitions, the qualifications of board members, the authority of the boards, and the means of financing.

Montana's earlier laws [36] permitted the formation of city-county planning boards and provided that their jurisdiction might go to a maximum 12 miles beyond the limits of the city or town involved [36, Sec.11-3830]. The 1971 law allows the formation of a county planning board with jurisdiction over such area or areas of the county as the commissioners may see fit, including cities and towns should they wish to be included [36,Sec.11-3830.2].

The city, county, or city-county planning boards created under the provisions of the 1971 law are to have authority only to advise the board of county commissioners and city council (or city commission) [36]. The planning boards are to recommend boundaries and appropriate zoning regulations for each district within the planning district [35,Sec.16-4702]. These regulations are to be made in accordance with a comprehensive development plan [35,Sec.16-4704].

The purposes of the Montana planning and zoning laws are similar to those described for other areas and appear to have both a general and a more specific focus. At the general level, the purpose is stated

[35,Sec.16-4701] as ". . . promoting the health, safety, morals and general welfare of the people in cities and towns and counties. . . ."

Later at a more specific level [35,Sec.16-4704] it is provided that zoning regulations made in accordance with a comprehensive development plan

be designed to lessen congestion in the streets; to secure safety from fire, panic, and other dangers; promote health and general welfare; to provide adequate light and air; to prevent overcrowding of land; to avoid undue concentration of population; to facilitate the adequate provision of transportation, water, sewerage, schools, parks, and other public requirements.

Consideration in drafting regulations is to be given the character of the district and its suitability for various uses; the conservation of the value of existing improvements; the encouraging of the most appropriate use of land within the jurisdiction; and the municipalities within the jurisdiction of the planning district.

It appears that the legislation amply protects the individual citizen from high-handed action by the planning board. The citizen may protest the formation of the planning district, he may attend meetings of the planning board to express his views, he may express his dissatisfaction with a decision of that board when it takes its recommendation to the parent legislative body (Board of County Commissioners or City Council). If the decision of the legislative board is not to his liking, he still has access to the courts to seek redress [35,Sec.11-2707]. It

would appear that the weak authority and protracted appeal features of the enabling laws might render ineffective any planning and zoning boards created under the provisions of the law. Despite these same weaknesses, the city-county planning boards created under the 1947 law appear to have been able to perform their intended functions fairly well. The instances where they have succumbed to industry pressure are probably no more prevalent than for regulatory agencies in general.

Whether local legislative bodies may, within the framework of Montana's land use planning legislation, develop truly unique and creative ordinances designed to meet the specific needs of their own areas will probably have to await the specification of the courts. The general welfare provisions seem quite broad in scope and would seemingly allow creative reaction to local need unless a strict construction of the law is pursued.

#### Problems of Rapidly Changing Patterns of Resource Use in the Bitterroot Valley Area

The resource development problems of Ravalli County were initially discussed with numerous local officials and community leaders. One, State Senator W. A. Groff, described the development situation later in a special report by a Missoula newspaper [16,p.2A]:

'When I was young, a high price for land was from \$80 to \$100 an acre. Now land is selling for around \$400 to \$500 an acre,' he said. 'Land values have been climbing ever since the war (WWII). Off hand, I'd say prices have increased in the neighborhood of 17 per cent from 1960 to 1970.'

The land in the valley formerly was devoted to orchards, sugar beet farming and cattle ranching. As more people discover the mild climate of the Bitterroot, agriculture is giving way to a different form of land use.

'The northern part of the county is becoming a "bedroom" for Missoula. Many people prefer country living, and are able to buy a small acreage and still work in the city,' Groff said.

The mobile home has become particularly important in the subdivision of the land. Young, middle-income families are able to purchase a small tract of land and set up residency in a matter of days.

Agriculture in the Bitterroot is declining for several reasons.

The closing of the sugar beet factory in Missoula, all but eliminated that crop from the valley. People either began growing other crops or sold out.

The permanent migration of youth away from the farm has hurt agriculture nationwide. Young people are finding higher wages and shorter working hours in the cities and urban areas.

Declining profits have caused farmers and ranchers to consider land sales. Most sources agree people in agriculture are making only a one to two per cent profit when the books are totaled up at the end of the year.

'Farmers and ranchers are making such a small return on their investment, land sales look inviting,' said Groff. 'But I wouldn't say there is a mad rush to sell land. Many of the agricultural properties being subdivided belong to older persons who are thinking of retiring.'

Senator Groff and most others expressed a desire to maintain a viable agriculture in the area in the face of growing demand by suburbanites for the resources currently employed in agriculture. Many have heard of the case of the Owens Valley in California, a formerly prosperous ranching area that currently produces water for Los Angeles,

Tule Elk for sportsmen, and little else. The lands of the valley were purchased for their appurtenant water rights to meet some of the water needs of the burgeoning population of southern California. Many of the old "Bitterrooters" both on the land and in the towns recoil at such a prospect for their valley. They view Missoula, the valley's fast growing neighbors to the north, with some suspicion in this regard. Detailed analysis of the water resource potential of the entire Clark Fork-Bitterroot Basin in light of probable water needs should do much to quiet such fears.

The Bitterroot is, of course, in a situation quite dissimilar to the Owens Valley. It is not located in proximity to a rapidly growing municipality in a desert setting with few alternative sources of domestic and industrial water. Missoula is growing rather rapidly and may possess a potential for continuing an accelerated growth in the future but it has a host of alternative sources of water on which to base that growth. Upstream storage to provide timely availability of the 3.8 million acre-feet of average annual discharge of the Clark Fork [47,p.238] and development of the 8 million acre-feet of available ground water of the Missoula basin area [43,p.30] are two alternatives that would appear to be preferable to the expropriation of water being used in agriculture.

The characteristics of the Bitterroot Valley itself are such that means to lessen the impact of immigration on the agricultural base

might be accomplished without great difficulty. The valley runs almost due north-south with a preponderance of the better agricultural land located on the valley floor and low terraces along the east side. The west side is a more picturesque than agriculturally viable area, frequently cut by the valleys of creeks draining the lofty Bitterroot mountains. These creek valleys support scattered stands of mixed coniferous and deciduous trees and the terraces and ridges in between are dotted by open stands of Ponderosa Pine with some dense Lodgepole Pine stands intermingled. The steeper slopes and high terraces at the base of the Bitterroot Range are largely covered with mixed conifers and harvesting of these forests continues to support the local sawmills to a modest extent. The west-side lands are generally characterized by light, shallow soils overlying deep beds of gravelly or cobbled substrata. Small, scattered patches of land along the stream bottoms and fans lend themselves to crops, chiefly hay, while the preponderance of the west-side lands produce only a small quantity of forage for grazing livestock [59,p.6].

It is this agriculturally marginal area that seems to attract most of the immigrants rather than on the better quality land of the east side. This would appear to be a most fortunate circumstance as not only is the sacrifice of agricultural value very small as resources are transferred out but the land seems well suited to the support of roadways and home foundations and the operation of individual sewage

disposal systems. Of course, not all the land on the west side is suitable or even attractive for residences [58,table 3]. Some areas that are attractive are certainly not suitable. The flood plains of the west-side streams in many cases contain several amenities which would make them attractive places to live were they not periodically inundated. Many very picturesque spots are in quite remote locations and/or may be accessible by automobile only in the absence of snow cover and thus are more suitable for seasonal, rather than year-round, residences. Along many of the creek bottoms the water table is so high as to seriously impair the operation of septic tank drain fields during some periods of the year and may pose a definite hazard to those who might use ground water for domestic purposes in those areas.

Residential, commercial, industrial, and certain intensive agricultural activities are carried out on contiguous parcels of land when the best interest of all concerned might be achieved by not mixing such uses. A flood of runoff water runs down the west-side tributaries to the Bitterroot River early each summer but the lands irrigated by these same streams suffer chronic shortages of late season irrigation water.

The Bitterroot thus faces both problems and opportunities. Many have looked to planning at various levels to help solve some of the problems and capitalize on some of the opportunities.

### The Role of the Economist in Planning

The community at large, it seems, tends to view the participation of economists in planning with suspicion in this country. This view perhaps reflects a perception of the rather indifferent success of the planned economies of the world and economists and planning are somehow associated with planned economies. Further, the members of the economics profession demonstrate a lack of unanimity in their prescriptions for treating the economic ills, past and present, of this country. It is not uncommon for the recommendation of the economist to appear, superficially at least, in conflict with some widely held values of society (those values are themselves sometimes conflicting).

The activities of economists in the resource development field have been somewhat overshadowed by their contribution at the national policy making level. Economists have participated in planning activities associated with public investments in the resource development field for some time. Typically, the economist served as a technical specialist assisting public officials and engineers in conducting a more complete and valid analysis of the economic consequences of a particular resource development project. The primary decisions of what shall be produced and for whom were largely left to that best of all planning agencies, the perfect market, which, unfortunately, does not exist.

Recent public awareness of the deteriorating environment has brought a sense of timeliness to a long recognized economic fact.

Economic processes frequently produce "bads" as well as goods and sometimes there is a fairly direct relationship between the quantity of goods produced and the quantity of "bads" generated--factory smoke is a classic example. Economists can help public planning agencies devise institutions to cause the costs of both goods and bads to be properly considered by market participants.

#### The Problem

The private development of mountain valley resources involves a variety of costs. Some of these costs are borne initially by the developer of the land (costs of plotting and surveying, service road construction, etc.). Some costs are borne by the occupier of the land (developing costs, construction and operation of water and sewage disposal facilities). Some costs are borne by the general public. The portion of the costs borne by the public are related to the institutional structure, the density and size of settlement and the distance to places where public services are provided.

The institutional structure will dictate the type of public services to be furnished and the necessary preconditions for such services. It will also largely determine the speed with which the local government can respond to real estate development from the revenue side. If there are few preconditions for service and the local government is relatively slow in increasing its revenue from the developing area, the public cost will be relatively high, other things being equal. The cost of several

public services, e.g., road maintenance, snow removal, school bus transportation, appears to be related to distance.

Density of settlement in the developing areas is related to public costs through the general institutional setting. Services are provided upon request, as a rule, and usually are paid for indirectly through taxes. The excess of costs to local government to provide services to a developing (or distant) area over the tax revenue generated in that area is a direct public cost of the development during the period of development. Generally, the more densely settled an area, the more taxable value and the greater the tax revenue (city slums are an obvious exception). A sparsely settled area may require an extension of school bus routes to serve one family in a new development, for example. Assuming ample bus capacity, the additional cost of serving the second and succeeding families is far less than the addition to cost of serving the first family. Meanwhile as more families settle in the area the tax base expands and the margin between public outlay and revenue is reduced, until the point of break-even on direct public costs and revenues is reached. Excessively small, remote, and/or dispersed developments may never reach the point of providing sufficient revenue to cover the direct costs of service.

Efforts to reduce the external cost of settlement are a legitimate endeavor of public bodies concerned with planning. Efforts to protect and enhance existing values while providing for the needs of a growing population likewise should be of concern to such agencies. An awareness of the cost to be avoided or imposed; and of the values to be protected, created or destroyed, will hopefully improve the quality of decisions by individuals and groups charged with the responsibility for guiding the development of resources to meet expanding community needs.

Montana's mountain valleys, in general, and the Bitterroot Valley, in particular, are experiencing a fairly rapid transformation from resources out of agricultural employments into a kind of dispersed urban use. In many cases, the areas are occupied year-round and involve more acreage than the bare minimum necessary for housing alone. Upon observation that these rather sizeable tracts (1 to 40 acres) are not apparently used in agricultural use but more related to recreation, the term "recreation-residential" use was applied (with the sure knowledge that it is in some cases wholly inaccurate) to this type of resource employment. It was felt that this term was more descriptive than some of the more commonly used alternatives (rural residences, country estates, villas, etc.). While the conversion from agricultural to urban use proceeds there may remain a potential for water resources development in agriculture.

### The Problem Defined

Recreation-residential use of land and associated resources provides a host of benefits and costs to the community in which it takes place. Increasing community concern about this use of resources and its impact on the community has resulted in provision for local government planning of land use. The success of these planning efforts will depend in large measure on the quality of the information on which planning decisions are to be based.

There is currently little information available on the costs and benefits of recreation-residential uses of land and associated resources.

This study will undertake:

- 1) To establish measures of the benefits to be enjoyed when land and associated resources are employed in recreation-residential use.
- 2) To estimate the benefits and costs of certain modifications in the institutional structure in which recreation-residential development may take place.
- 3) To estimate the potential for irrigation development.

### Hypotheses

The major hypothesis of this study is that recreation-residential users of resources either do not consider or need not consider some

significant costs of their activities. If a more complete reflection of the costs imposed were affected, a different resource allocation pattern would occur and the well being of the community in general would improve.

A secondary hypothesis is that total surface water does not impose an effective restraint on growth in the Bitterroot Valley but an inadequate distribution system prevents the realization of the economic potential of the land and water resources of the valley.

#### The Approach to be Followed

A brief review of previous studies related to resource development in the Bitterroot Valley area will be followed by a short discussion of the economic theory supporting the study in Chapter III. Measures of the values of certain agricultural and recreation-residential uses of land will be covered in Chapter IV. Chapter V will be devoted to the development of an aggregative linear programming model of the resource based industries of the valley followed by a discussion of several solutions to the linear programming model and some of the implications of those solutions. A summary of this study and recommendations for action will be found in Chapter VI.

## CHAPTER II

### A SURVEY OF RESOURCE STUDIES RELEVANT TO CURRENT RESOURCE PROBLEMS OF THE BITTERROOT VALLEY AREA

#### Studies Specific to the Area

The Bitterroot Valley area has been the locus of so many studies that someone recently suggested it be studied one more time to attempt to measure the return on public expenditure for research. Such a study will likely have to wait as there remain a plenty of real problems to be solved. A combination of low income, substantial political influence 1/ and fortuitous location combined to generate the plethora of studies.

The Bitterroot Valley of southwestern Montana is bounded on the west by the Bitterroot Mountains and on the east by the Sapphire Mountains. Except for a relatively small area of the northern end of the valley, its drainage corresponds to the boundaries of Ravalli County and thus most studies, including this one, treat the drainage and county as the same unit. The mountain barriers restrict its intercourse with its neighbors to the city and County of Missoula almost to the exclusion of all others. Relative isolation coupled with easy access for study has made the area an attractive one for field research,

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1/ One of Montana's U. S. Senators is from Stevensville, the other Senator and one Representative are residents of Missoula. In the State Legislature, the Chairman of House Appropriations Committee and the Chairman of the Senate Finance and Claims Committee are both from Ravalli County.

while an abundance of problems has led a responsive congressional delegation to press for funding of research.

#### Resource Inventories

One group of studies that has immediate application in any planning or evaluation is a set of studies that might be called resource inventories. These provide basic information on the physical and human resources of the area. A proper place to begin a discussion of this group is the Soil Survey [59]. The Soil Survey was issued in 1959 and contains a wealth of information on the capabilities of the soils, the extent and location of each soil type, etc. This information is presented in considerable detail in maps supported by tables and verbal descriptions and evaluations. Although the information and agricultural potential and farm management did not anticipate the rather widespread adoption of sprinkler irrigation in the valley, it can be of considerable aid to any person or group attempting an "on-the-ground" evaluation of the land resource. Discussion of drainage, flood hazard, and subsoil condition is included for all soils where relevant.

While the soil survey tends, characteristically, to focus on agricultural uses of land, the changing emphasis toward recreation-residential and suburban uses is recognized in a supplemental soil interpretation report [58] designed to complement the original soil

survey. Information, coded to the soil descriptions and maps for the survey, on the suitability and limitations of each soil phase for urban development is presented in the supplement [58,pp.23-56].

Physical and chemical properties of each soil series are listed in considerable detail [58,pp.14-22]. Information on the estimated depth to the water table and depth to gravel or bedrock are also presented for each soil series. An estimate of the flooding hazard is presented for each soil series. Estimates of the limitations and suitability of each soil constitute a substantial portion of the report. Each soil phase, identified with its mapping symbol is rated for its suitability for suburban uses, recreation uses, and public service uses. Suitability for sewage disposal by septic tank and lagoon is also rated for each soil phase. Suburban uses rated are building sites, lawns and landscaping, roads and streets, and parking areas. In addition, several recreational uses are evaluated including playground, camping and picnic area uses.

The Water Resources Survey [45], originally published in 1958 and reprinted in 1965, contains a fairly comprehensive history of land and water use, water rights, decrees, ditch company origins and operation. In addition, it also contains detailed maps of the entire county showing the lands irrigated and identified by source of irrigation water. A foreword containing information about Montana's surface water laws and water right problems provides a useful introduction to





















































































































































































































































