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PROJECTIONS OF FUTURE GROWTH OF OUTDOOR RECREATION IN THE UNITED STATES

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Abstract—The Renewable Resources Planning Act of 1974 (RPA) requires assessments of current and future forest and range demand and supply conditions. This paper reports the results of research which led to forecasting future recreation demand in order to meet the RPA mandate. The basic model was grounded in household production theory and the data were primarily from the Public Area Recreation Visitors Study (PARVS). Models for 31 land, water and snow-based activities were estimated and future growth of trip consumption by the American public to the year 2040 was developed. Results were estimates of expected consumption of outdoor recreation if recent past trends of the availability of recreational opportunities were to be continued into the future. By the year 2000, land-based recreation is predicted to increase 15 percent over the 1987 level. Water and snow-based activities will grow between 7 and 59 percent among the nine activities modelled.

INTRODUCTION

One of the most intriguing challenges to researchers and planners is to reliably forecast future demand for outdoor recreation. This challenge is particularly acute when the target is to understand likely futures at the national level. The Renewable Resources Planning Act (RPA) of 1974 requires such forecasting every 10 years in order to better plan programs for the Forest Service and other agencies concerned with forest and range management. The work reported in this paper was developed for the 1989 RPA Assessment of Outdoor Recreation and Wilderness (U.S. Department of Agriculture, Forest Service 1988).

METHODS AND DATA

Conceptualization of the forecasting approach and data collection for the 1989 RPA Assessment were begun in 1982. The anticipated approach was to develop econometric models which would enable estimation and projection of market equilibrium levels of consumption of outdoor recreation. Adoption of this general approach led to initiation of both demand-side and supply-side data collection to support modelling which ultimately would lead to projections of future consumption of outdoor recreation by the American public.

The Model

The basic model structure was based on the aggregate household production model as described by Bockstael and McConnell (1981). In household production theory outdoor recreational trips (the basic consumption unit) are produced in a two-stage process. In the first stage of this production process, resource managers combine land, labor, capital, and technology to provide recreational opportunities. In the second stage, households combine these opportunities with personal equipment, information, skills, travel and other household inputs to produce recreational trips to the sites where the opportunities have been provided. At the point where household costs of producing recreational trips (supply curve) exactly equals (intersects) households' willingness to pay the costs of taking recreational trips (demand curve), an equilibrium is achieved. At this point of equilibrium, the marginal benefits of taking a trip are equal to the marginal costs to households of producing a trip. When resource managers, as providers of opportunity, and households, as both the consumers and producers of recreational trips, are considered

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as actors within the same, larger market, estimates of general equilibrium consumption of outdoor recreational trips can be generated econometrically (Bergstrom and Cordell, in press). The advantage of this general equilibrium approach is that assumptions about both demand and supply determinants can be used to forecast the future. Past forecasting efforts have depended almost solely on demand-side determinants. Such resulting forecasts may not, then, reflect feasible or desired resource management options.

The Data

Supply data were developed from both original and secondary sources. Original supply data sources included the National Private Land Ownership Study and the Municipal and County Parks and Recreation Study (McDonald and Cordell 1988). Secondary sources included agency inventories, census files, directories of opportunities, and other existing hard copy or computer readable files. The result was the National Outdoor Recreation Supply Information System, a county-level file containing over 400 data elements describing recreational sites, facilities, and services in the United States. Many of these data elements were used in our modelling.

Demand data were from the Public Area Recreation Visitor Study (PARVS). PARVS was a cooperative venture (Cordell and others 1987) which generated origin-destination data describing number of trips, average trip costs and purpose of trips across a national sample of over 40,000 recreation site visitors. The dependent variable derived from PARVS was number of trips taken **away from home** by people in representative communities in the United States, to visit a recreation site for the purpose of participating in a chosen activity. A trip away from home is one of more than 15-minutes driving.

Empirical Estimation Procedure

Future community-level consumption of outdoor recreational trips was estimated using a reduced-form, general equilibrium national model of the demand and supply of trips away from home. The model was specified to show the number of trips taken by community residents as a function of community and opportunity attributes. These attributes included:

LTRIPS = Natural log of the total number of trips to consume a recreational activity by people who live in the representative communities.

INCOME = Percentage of people in a representative community who had incomes greater than $30,000 in 1987.

18TOMED = Percentage of people in a community who were between the ages of 18 and the median U.S. population age in 1987 (32).

PCTFARM = Percentage of people in a community who lived on a farm in 1987.

POPULN = Number of persons 12 years and older living in a community in 1987.

SUBS = An index of the spectrum of substitute recreational opportunities within an acceptable driving distance of a community which compete with (substitute for) particular opportunities for an activity as potential uses of people's non-work time and money.

OPPS = Amount of opportunities available for taking recreational trips away from home for a particular activity within the driving range of a community.

The above reduced-form household production model was estimated by regression analysis across a nationwide selection of 243 representative communities (counties). Models were developed for the 31 activities shown in table 1. The functional form selected was a semi-log, dependent variable model, selected because this form provided the most theoretically and statistically consistent fit of the data.

The estimated 31 regression equations had adjusted R^2s ranging between 0.13 and 0.69. Checks for collinearity and consistency of signs on the estimated coefficients were instituted. In all models, theoretically correct signs resulted and in almost all instances the coefficients were highly significant.

The resulting cross-sectional models described equilibrium consumption of recreational trips in the United States for 1987. To obtain projections of future equilibrium levels of trip consumption, assumed future changes of the values of the independent variables for the years 2000, 2010, 2020, 2030 and

Table 1.--Nationwide numbers of recreational trips away from home and indices of future growth to 2040 if recent past trends of recreational opportunities are continued

Opportunity category and activity	Nationwide trips away from home (millions)	Percentage of 1987 trips in future years				
		2000	2010	2020	2030	2040
Land:						
Wildlife observation	70	107	113	120	126	130
Primitive camping	38	108	115	122	130	134
Backpacking	26	124	144	165	185	198
Nature study	71	99	101	103	107	108
Horseback riding	63	114	125	135	144	149
Day hiking	91	123	144	168	198	229
Photography	42	115	128	141	154	163
Visit prehistoric sites	17	127	148	173	203	236
Collecting berries, mushrooms etc.	19	110	120	132	149	169
Cutting firewood	30	109	118	130	144	161
Walking for pleasure	267	116	132	148	168	183
Running or jogging	84	131	160	192	229	260
Bicycle riding	115	124	146	170	197	218
Off-road driving	80	104	108	112	118	121
Visiting museums	10	118	134	152	172	187
Attending special events	74	115	129	144	161	175
Visit hist. sites/ memorials	73	117	133	152	178	204
Pleasure driving	422	110	120	129	139	145
Family gatherings	74	121	139	160	182	202
Sightseeing	293	114	128	144	164	185
Picnicking	262	110	120	131	145	156
Developed camping	61	120	138	158	178	195
Water:						
Canoeing/kayaking	40	113	126	138	153	163
Stream/lake/ocean swimming	239	108	118	128	140	152
Rafting/tubing	10	123	151	182	229	267
Rowing/other boating	35	110	120	130	142	150
Motor boating	220	107	114	122	131	138
Water skiing	108	112	122	132	144	152
Pool swimming	221	135	166	200	237	267
Snow and ice:						
Cross country skiing	9.7	125	136	142	141	126
Downhill skiing	64.3	159	208	261	317	359

2040 were multiplied by their respective regression coefficients, and the products were summed. These sums represent estimates of future levels of recreational trip consumption. Future values of the demand-side factors were obtained from Wharton Econometrics (population and income) and from other credible sources tied to Census of Population data (U.S. Department of Commerce, Bureau of the Census 1986).

The predicted future values of the substitute index (SUBS) and recreation supply or opportunity variable (OPPS) represent special cases. Future values of SUBS were held constant to represent a non-changing situation with respect to per capita availabilities of recreational opportunities which substitute for activity i. OPPS was changed into the future at rates equal to recent past trends—since 1970. Some of these opportunities are increasing, others decreasing (table 2).

RESULTS

The forecasts of future consumption of outdoor recreational trips is shown in table 1. The forecast of number of future trips was converted to an index to represent percentage of 1987 trips. This simplifies comparison of projected growth rates among the 31 activities. The 1987 base number of trips for the U.S. population (in millions) is also shown in table 1. Our assumption is that the projections shown are **the most likely future** for outdoor recreation in the United States—called "expected consumption." This assumption rests on (1) the credibility of sources for the anticipated future changes in the demographic variables in the models and on (2) the strong likelihood that unless planned public sector or market-driven private sector changes in recreational opportunities occur, recreation consumption will continue to follow the course of recent past trends. This assumption has many policy implications and raises questions which must be considered as we move into the 21st century.

Table 2.--Percentage change of land, water and snow recreational opportunities if recent trends (1970-87) are continued into the future

Opportunities	Percentage change since 1987				
	2000	2010	2020	2030	2040
Land:					
Wilderness and other extensive roadless areas	- 9	-15	-21	-26	-31
Undeveloped areas near roads	-12	-20	-28	-35	-41
Partially developed, roaded areas	- 9	-15	-21	-26	-31
Intensively developed sites	8	15	22	29	37
Water:					
Wild and remote lakes and streams	3	6	8	9	10
Lakes and streams near roads	- 3	- 4	- 6	- 8	-10
Lake/stream sites adjoined by roads	8	15	22	29	37
Intensively developed water sites	12	23	34	47	61
Snow and ice:					
Wilderness and other roadless areas	- 9	-15	-21	-26	-31
Undeveloped areas near roads	-12	-20	-28	-35	-41
Partially developed roaded areas	- 9	-15	-21	-26	-31
Intensively developed winter sports sites	17	28	36	43	49

Expected Consumption of Land-Based Trips

In general, across the land activities listed in table 1, continuation of the rates at which opportunities were made more or less available for public recreation over the past years since 1970 will lead to growth of expected recreational consumption. This growth is projected to accumulate across activities to about 15 percent by the year 2000. The expected consumption of land activities which are projected to grow most rapidly includes running/jogging (+31 percent), visiting prehistoric sites (+27 percent), bicycle riding and backpacking (+24 percent each), day hiking (+23 percent), and family gatherings and developed camping (+21 percent and +20 percent, respectively). In total, projected growth among these seven activities is just over 113 million trips per year by the year 2000.

The slowest growing of the land activities are nature study (-1 percent), off-road driving (+4 percent), wildlife observation (+7 percent), primitive camping (+8 percent), cutting firewood (+9 percent), and collecting berries, driving for pleasure, and picnicking (+10 percent each).

For the most part, the relative rankings by projected growth rate among land activities should remain as they currently are to the year 2040. The one dominant theme among the fastest growing activities is their dependence upon trail and developed site resources. Substantial growth of opportunities for these activities should lead to substantial increases in recreational trip consumption in future years.

The slowest growing activities mostly depend upon roaded and partially developed rural lands. Continuation of the recent downward trends of these resources will result in very slow rises in expected trip consumption as households must overcome shrinking space and access using different means and technology to produce their recreational trips and experiences.

Expected Consumption of Water and Snow-Based Trips

For the most part, expected consumption of water recreation trips should grow moderately with continuation of recent past opportunity trends. The exceptions are rafting/tubing (+23 percent by 2000) and pool swimming (+35 percent). Access, technology, and services associated with rafting and tubing types of activities (especially outfitters) have risen rapidly in recent years. So, too, have the number of swimming pools. Continuation of these trends is projected to result in rapid growth of trips to utilize these opportunities. In fact, pool swimming is projected to increase to levels beyond that of stream, lake and ocean swimming by 2020. Motorized water recreation trips should grow slowly if recent trends are continued. Continuation of the moderate expansion of resources suitable for motorized water recreation (at a rate somewhat below population growth) is projected to generate approximately proportionate percentage rises in expected consumption of motorized water trips as reservoirs and lakes continue to be crowded at peak times.

The decrease of undeveloped and roaded rural lands in areas with good winter snowfall is projected to result in slower growth of consumption of cross-country skiing and similar dispersed activities. Actually, the consumption of dispersed winter recreation trips should rise moderately through 2010, and then if the loss of access to private and public lands continues, consumption would level and eventually decrease through 2040. If recent trends are continued, downhill skiing should continue to rise and do so rapidly if both new sites and new capacity are added. Development pressures from downhill skiing may actually contribute to some loss of cross-country opportunity.

OBSERVATIONS

Expected consumption growth of the activities shown in table 1 demonstrates the highly variable rates at which different forms of recreation may grow in the future if recent resource availability trends are continued. Following these trends into the future may, in many cases, match well what the public will likely prefer. But for some activities, recent trends of opportunities may not match public demand for recreation opportunities. Where they do not match, a course into the future that is different than continuation of what has been done in the past may need to be considered.

For wilderness and other extensive roadless areas, recent past trends have resulted in decreases of access and availability (table 2). Although wilderness designations are up, road development has reduced the amount of roadless area which is greater than 3 miles from access and which thus can substitute for protected wilderness opportunity. This same trend has been occurring with lands nearer roads, but which are still unroaded and undeveloped. Recent road and other development has removed area from roadless status, and this has had and will continue to have effect on availability of recreation opportunities. Even more dramatic has been the closure and posting

of private land. Closure of private land has had an especially noticeable effect on recreational opportunity availability of roaded and partially developed lands. This is true even though the amount of Federal, State, and local lands of this type has been increasing due to road construction and other development.

Developed land resources, picnic areas, campgrounds, resorts, nature centers, and golf courses, have been growing in both numbers and capacity. While some Federal sites have been closed or have faced reduced maintenance, local government and private sector resource investment and management has risen more than enough to offset Federal decreases.

Availabilities of remote and wild water resource opportunities have been increasing slightly in recent years (table 2). Designations of Wild and Scenic Rivers and increases in water quality and guide services have all contributed to offset road and other development. The net result has been a small increase of remote water resource availabilities. Some closure of private properties and development of public water areas has resulted in small decreases of availabilities of segments of lakes near to, but not immediately adjacent to roads. This same development, with added boat ramps, reservoirs, road crossings and boat rentals, has increased lake and stream resources adjoining roads. This increase has been at rates closely approximating population growth rates.

Intensively developed water sites have grown rapidly in recent years. Pools, marinas, piers, water amusement parks, and other developments have added to water recreation opportunities. As this development has occurred, resources available for remote or white water activities have decreased. Most of this development for water recreation opportunities has occurred within the private sector.

The implications of continuing recent past trends in the supply of recreational opportunities should be examined further. Among some opportunities the trend is up. Among others, the trend is down. These patterns affect how the American public **can** participate in recreation in the future. There is a need to compare likely future availabilities of recreational opportunities with the quantity of outdoor recreation the American public might prefer. Such a comparison would facilitate more efficient allocation of resources to alternative recreation management programs and strategies. In a forthcoming publication, a methodology for estimating "gaps" between preferred demand and expected supply of recreational trips at the community level is proposed. The methodology for this comparison is described in Bergstrom and Cordell (In press).

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