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ECONOMIC EFFECTS OF RIVER RECREATION ON LOCAL ECONOMIES[1]

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ABSTRACT: Outdoor recreation is a major, growing use of water resources in the United States. The economic effects of expenditures by visitors to three recreational river sites on local economies surrounding the sites were estimated using an input-output model (IMPLAN). Expenditure data were from the Public Area Recreation Visitors Study (PARVS). Results indicate that visitor spending stimulates a considerable amount of economic activity and growth in local economies. Economic effects include increases in total gross output ranging from $2.6 million to $13.4 million, increases in total income ranging from $1.2 million to $5.6 million, and increases in employment ranging from 60 to 292 jobs.
(KEY TERMS: river resources; outdoor recreation; expenditures; local economic effects; input-output.)

INTRODUCTION

A considerable amount of research has been conducted on the value of river recreation measured in terms of consumer's surplus or net willingness-to-pay (Sorg and Loomis, 1984; Walsh, Johnson, and McKean, 1988). However, it appears that no previous studies have been conducted on the contribution of river recreation to regional economic growth. Information on the regional growth effects of river recreation may be very important for resource planning and policy, especially at the regional, state, and local levels.

The purpose of this paper is to present the approach and results of a major study of the effects of three National Park Service river recreation sites on local economic growth. The methodology of the study is discussed in the next section. Results and implications are then presented, followed by a summary and conclusions.

DEFINITIONS AND METHODOLOGY

When visiting a river, recreationists often spend a considerable amount of money in the surrounding local area. The influx of these outside dollars stimulates economic growth in the local area. Economic growth results from the direct, indirect, and induced effects of recreational spending.

The direct effects of recreational spending refer to the first-round purchases of inputs needed to meet increased demand by recreationists for goods and services. For example, a river recreationist may eat several meals at local restaurants. In order to provide more meals, these restaurants would have to increase purchases of food and other inputs. Such purchases are the direct effects of spending by recreationists at eating establishments.

In order to meet increased demand for inputs from restaurants, restaurant suppliers would have to make additional purchases of inputs. For example, local farmers who may provide fresh vegetables to the restaurants would have to increase purchases of farm inputs. Farm suppliers, in turn, would have to increase purchases of inputs in order to meet increased demand for inputs from farmers and so forth. These secondary purchases of inputs are the indirect effects of spending by recreationists at eating establishments.

Increased sales and purchases of inputs stimulated by recreational spending causes the incomes of local residents to increase. For example, increased business from recreationists may result in an increase in restaurant employees' incomes. Given this increased income, restaurant employees may increase their purchases of goods and services. These additional consumer expenditures are the induced effects of spending by recreationists at eating establishments.

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Thus, the total economic effects of river recreation on a local economy are measured by the sum of the direct, indirect, and induced effects of visitor spending. Estimation of the direct, indirect, and induced effects of visitor spending requires several steps. First, the mean expenditures per person per trip to a river site must be estimated. Second, these expenditures must be allocated to economic sectors (e.g., eating establishments) in the local area. Third, the direct, indirect, and induced effects of these expenditures must be estimated using an appropriate estimation technique such as an input-output model.

Estimation of Trip Expenditures

Expenditures per recreational river trip were estimated from data collected as part of the Public Area Recreation Visitors Study (PARVS). PARVS is a multiagency, multi-state cooperative effort to collect data on the economic value and importance of outdoor recreation (Table 1). The PARVS data collection effort consists of two major stages. The first stage involves on-site interviews of recreationists. In these interviews, recreationists are asked to provide general information on recreational trip and activity patterns. In the second stage, recreationists are asked to fill out a mail questionnaire on detailed trip expenditures. Since 1985, over 55,000 interviews have been conducted at over 325 sites nationwide. In addition, over 15,000 trip expenditure mail questionnaires have been returned and processed nationally. A detailed discussion of PARVS is provided by Cordell *et al.*(1987).

TABLE 1. PARVS Cooperators.

Organizations	Cooperators	
States	Georgia	Virginia
	Kansas	North Carolina
	Minnesota	South Carolina
	Missouri	New Mexico
	Tennessee	New Jersey
	Indiana	Florida
Federal Agencies	President's Commission on Americans Outdoors	
	Forest Service	
	National Park Service	
	Tennessee Valley Authority Corps of Engineers	
	National Oceanic & Atmospheric Administration	
National Associations	National Council of State Planning Agencies	
	National Association of State Recreation Planners	
	National Association of State Park Directors	

In cooperation with the National Park Service, three recreational river sites were selected to be included in the PARVS data collection effort. These three sites were selected to represent three types of recreation river sites managed by the National Park Service: National Wild and Scenic Rivers, National Recreation Areas, and National River Parks. The Upper Delaware Scenic and Recreational River was selected to represent National Wild and Scenic Rivers. The Delaware Water Gap National Recreation Area was selected to represent National Recreation Areas. The Upper Delaware site is located in Pennsylvania and New York. The Delaware Water Gap site is located in Pennsylvania and New Jersey. The New River Gorge National River in West Virginia was selected to represent National River Parks.

Interviews were conducted at the three recreational river sites during the summer of 1986. A total of 1,196 complete interviews were accepted and conducted. During these interviews, recreationists were asked to provide information on trip patterns (e.g., distance traveled), activity patterns (e.g., activities participated in while visiting the river site), and socioeconomic characteristics (e.g., income). At the end of the interview, interviewees were given a trip expenditure questionnaire and asked to fill it out at home and return it in the mail. Mail follow-ups were sent to non-responding persons.

The mail questionnaire asked recreationists to provide information on their equipment usage and trip expenditures in four categories. The first category was trip-related expenditures made at home before or after a trip to a recreational river site. The second category was expenditures made while traveling to and from the river site. The third category was expenditures made while in the immediate vicinity of the site. The fourth category was annual expenditures made for services and durable recreational equipment not explicit to any particular trip. Reported expenditures in these categories were used to estimate mean expenditures per person per trip.

Allocation of Trip Expenditures to Local Area Economic Sectors

Recreational trip expenditures impact many economic sectors in local economies. That portion of recreational trip expenditures impacting a particular sector in a local economy around a river site was determined using an allocation algorithm (or bridge table) developed by several researchers cooperating in the PARVS (Alward and Lofting, 1985; Propst, 1985; Watson and Bratcher, 1987). This allocation algorithm, based on U.S. Department of Commerce producer prices and

margin data, allocated recreationists' expenditures on gasoline to the following economic sectors: petroleum refining; lubricating oils and greases; other wholesale trade; other retail trade; and motor freight, water, air, and pipe transportation. More detailed information on the allocation algorithm is provided by Watson and Bratcher (1987).

Once trip expenditures were allocated among economic sectors, it was then necessary to determine what portion of these expenditures likely were spent in the local impact region. This allocation was based on a scheme developed by cooperating PARVS researchers (Alward and Lofting, 1985; Propst, 1985; Watson and Bratcher, 1987). Local impact regions were defined as the group of counties immediately surrounding a river site that were thought, a priori, to be most impacted by recreational spending associated with visits to the site. The local impact regions for the Upper Delaware, Delaware Water Gap, and New River Gorge sites were composed of six, five, and seven counties, respectively (Appendix A). The impacts of recreational spending on local economic growth were estimated considering only expenditures made within these local impact region by visitors living outside of the local impact regions.

Expenditures by residents living within the local impact regions were excluded from the economic impact analysis since they do not represent an infusion of outside dollars. Some expenditures by nonresidents of the impact regions may occur outside the impact regions and should also be excluded since they do not stimulate within-impact region economic activity. For example, expenditures by nonresidents made at their homes before or after a trip were completely excluded from the economic impact analysis because it is almost certain that all of these expenditures occurred outside of the local impact region.

A further step was to allocate a portion of en route expenditures to a local impact region based on the simple equation:

$$Y = (R/D)*E \quad (1)$$

where, Y = en route sector expenditures allocated to a local impact region, R = distance from the recreation site to the border of the impact region in miles, D = total one-way distance traveled in miles, and E = total sector en route expenditures. Finally, all expenditures made during the stay at the recreational river site were assumed to occur in the local impact region.

Allocation of Annual Expenditures

The annual expenditures on durable recreational equipment will also stimulate economic growth in a local area if these expenditures are made within the local area. A portion of the annual sector expenditures were allocated to the local impact region by the equation:

$$X = (A/T)*(R/D) \quad (2)$$

where X = portion of annual sector expenditures allocated to a local impact region, A = annual expenditures on equipment which is attributable to a site, T = total trips to a site, and R and D are as defined for Equation (1). Annual expenditures on equipment that is attributable to a site was estimated by the equation:

$$A = (K/H)*M \quad (3)$$

where K = total trips to the site, H = total trips to all other sites, and M = total annual expenditures on recreational equipment that a respondent had with him or her when interviewed.

Estimation of Economic Effects of Recreational Spending

The economic effects of recreational spending on the local impact regions shown were estimated using the U.S. Forest Service IMPLAN model. IMPLAN is an input-output modeling system developed by the U.S. Forest Service for conducting regional economic impact analysis. The system consists of a nationwide, county level data set that describes economic characteristics of a county (e.g., total gross output, employment, population), software modules for constructing nonsurvey based input-output models for user defined regions, and software models for estimating direct, indirect, and induced effects of changes in final demand for commodities. The IMPLAN model uses technical coefficients (e.g., production functions) from the national input-output model developed by the U.S. Department of Commerce (Alward and Lofting, 1985; Alward *et al.*, 1985; Palmer and Siverts, 1985).

In this study, changes in final demand are represented by recreational expenditures. Spending in a local impact region by recreational river site visitors who live outside of the region results in an exogenous increase in the final demand for goods and services in the local impact region. The total increase in expenditures is estimated by first multiplying the mean expenditures per person per trip by the annual visits to a site. Annual visits to each recreational river site, which were provided by the National Park Service, are shown in Table 2.

After estimating total trip expenditures associated with a site, these expenditures were allocated to

economic sectors in a local impact region using the procedures discussed previously. The total effects (sum of direct, indirect, and induced effects) of recreational spending on local economic growth were then estimated using IMPLAN. The economic indicators analyzed included total gross output, employment, employee compensation, property income, value added, and indirect business taxes.

TABLE 2. Visitation Estimates for Recreational River Sites, 1986.

Recreational River Site	Annual Use Level (thousands)	Nonresident Annual Use (percent)
Upper Delaware Scenic and Recreational River	232.6	83
Delaware Water Gap National Recreation Area	135.4	67
New River Gorge National River	100.0	66

RESULTS AND IMPLICATIONS

A total of 383 usable trip expenditure mail questionnaires were returned for an effective response rate of 32 percent. From these expenditure data, mean expenditures per person per trip to the Upper Delaware Scenic and Recreational River were estimated at $19.42. Mean expenditures per person per trip to the Delaware Water Gap National Recreation Area were estimated at $40.89. Mean expenditures per person per trip to New River Gorge National River were estimated at $19.94. The major categories of trip expenditures across all three sites included lodging, transportation, food and beverages, and miscellaneous.

The direct, indirect, induced, and total effects of recreational expenditures on local economic growth are presented in Table 3. The economic effects are highest for the Upper Delaware Scenic and Recreational River. Visits by nonresidents to this site generate a considerable amount of economic growth, including $13.35 million in total gross output, $5.58 million in total income, $6.22 million in value added, and 292 jobs.

The total gross output is a measure of overall economic activity analogous to the gross national product (GNP) for the nation. The total income is the sum of employee compensation and property income. The value added is the sum of employee compensation, indirect business taxes, and property income. Value added basically accounts for all new income accruing to a local impact region when a product is produced and sold. Employee compensation and property income are paid to local residents directly. Indirect business taxes indirectly benefit local residents through the government (Palmer and Siverts, 1985).

TABLE 3. Economic Impacts of Recreational Spending by Trips to Recreational Rivers by Visitors Living Outside of the Local Impact Region, 1986.

	Economic Impacts					
Local Impact Regions	Total Gross Output (Millions $)	Employee Compensation (Millions $)	Property Income (Millions $)	Total Income (Millions $)	Value Added (Millions $)	Employment (Jobs)
Upper Delaware						
Direct Effects	6.5861	1.8180	.7709	2.5889	2.8795	185.43
Indirect Effects	2.3014	.5014	.3439	.8452	.9185	28.44
Induced Effects	4.4639	1.1485	1.0003	2.1487	2.4242	78.06
Total Effects	13.3514	3.4679	2.1151	5.5828	6.2222	291.93
Delaware Water Gap						
Direct Effects	3.4646	1.0298	.4158	1.4456	1.6362	104.24
Indirect Effects	.6634	.1672	.1411	.3082	.3328	1.57
Induced Effects	2.8000	.7323	.7601	1.4925	1.7262	50.56
Total Effects	6.9280	1.9293	1.3170	3.2463	3.6952	156.37
New River Gorge						
Direct Effects	1.2205	.3831	.1338	.5169	.5926	32.55
Indirect Effects	.3338	.0923	.0659	.1582	.1740	5.61
Induced Effects	1.0133	.3017	.2355	.5426	.6246	21.77
Total Effects	2.5676	.7771	.4352	1.2177	1.3912	59.93

The New River Gorge National River has the lowest economic growth effects in the local impact region. Visits to New River Gorge generated $2.57 million in total gross output, $1.22 million in total income, $1.39 million in value added, and 60 jobs. The magnitude of the economic impacts of Delaware Water Gap National Recreation Area falls in between the impacts of the other two sites. The economic growth in the local impact region generated by visits to this site include $6.93 million in total gross output, $3.25 million in total income, $3.70 million in value added, and 156 jobs.

The values in Table 3 provide measures of the additional economic activity (e.g., jobs) in a local impact region that can be directly attributed to a recreational river site. If the site were closed to public access, this economic activity may be completely lost since nonresidents would most likely reallocate expenditures to other recreational sites outside of the local impact region. Similarly, if site management or changes in visitation patterns result in a reallocation of trips by nonresidents away from a site, the resulting decrease in economic activity would represent a net economic loss to the local impact region. Alternatively, if site management or changes in visitation patterns (caused, perhaps, by advertising or improved transportation facilities) result in increased trips by nonresidents to a site, the subsequent increase in economic activity would represent a net economic gain to the local impact region.

The economic sectors most impacted by recreational expenditures in the local impact regions associated with each recreational river site are shown in Tables 4-6. Three economic indicators are presented in each table: total gross output, total income, and employment. The economic sectors most impacted by recreational expenditures include hotels and lodging places, eating and drinking establishments, retail trade, amusement and recreation services, real estate, owner-occupied dwellings, air transportation, and equipment repair and leasing.

The potential economic effects of visits to recreational river sites are indicated by the regional economic multipliers given in Table 7. These multipliers define the total effects of recreational expenditures per unit of direct effect. For example, suppose that the direct effects of additional visits to Delaware Water Gap National Recreation Area include the addition of 10 new jobs to the local impact region. The employment multiplier for Delaware Water Gap indicates that the indirect and induced effects of recreational spending will add an additional 5.8 jobs to the local impact region. Thus, the total effects of recreational spending on employment is equal to 15.8 new jobs, calculated by multiplying the ten jobs created by the direct effects by the multiplier of 1.58.

Regional economic multipliers are relatively consistent across the three recreational river sites. This implies that the economic structures of the local impact

TABLE 4. Annual Economic Impact of Nonresident Visitation to New River Gorge by Most Affected Sectors in the New River Gorge Local Impact Area.

Sectors	Total Gross Output	Total Income	Employment
	(Million $)	(Million $)	(Jobs)
1. Retail Trade*	0.3583	0.2063	14.46
2. Eating and Drinking Establishments	0.2756	0.1008	9.08
3. Hotels and Lodging Places	0.2070	0.0816	6.86
4. Wholesale Trade**	0.1900	0.1030	NA
5. Owner Occupied Dwellings	0.1570	0.0997	0.00
6. Air Transportation	0.1228	0.0344	1.75
7. Real Estate	0.0758	0.0503	0.53
8. Recreation Related Retail	0.0748	0.0431	2.85
9. Hospitals	0.0585	0.0297	1.80
10. Fluid Milk	0.0539	0.0127	0.22
11. Electronic Services	0.0538	0.0243	0.29
12. Amusement and Recreation Services	0.0536	0.0297	1.00
13. Meat Packing Plants	0.0485	0.0048	0.24
14. Gas Production and Distribution	0.0478	0.0092	0.13
15. Motor Freight Transport	0.0439	0.0250	0.97

*Other retail trade inclusive not elsewhere reported.
**Other wholesale trade inclusive not elsewhere reported.

TABLE 5. Annual Economic Impact of Nonresident Visitation to Delaware Water Gap by Most Affected Sectors in the Delaware Water Gap Local Impact Area.

Sectors	Total Gross Output	Total Income	Employment
	(Million $)	(Million $)	(Jobs)
1. Air Transportation	0.8423	0.2359	8.00
2. Owner-Occupied Dwellings	0.6021	0.3823	0.00
3. Retail Trade*	0.5647	0.3252	21.10
4. Recreation Related Retail	0.4023	0.2317	17.69
5. Hotels and Lodging	0.3953	0.1558	11.65
6. Eating and Drinking Establishments	0.3896	0.1425	14.55
7. Real Estate	0.3275	0.2173	2.27
8. Amusement and Recreation	0.3069	0.1699	7.66
9. Equipment Repair/Leasing	0.2420	0.1745	1.63
10. Insurance Carriers	0.1513	0.0366	2.49
11. Hospitals	0.1481	0.0751	4.70
12. Sporting and Athletic Goods	0.1337	0.0592	1.92
13. Doctors and Dentists	0.1240	0.0749	1.61
14. Automobile Repair	0.1044	0.0441	1.19
15. Water Transportation	0.1005	0.0214	0.84

*Other retail trade not included elsewhere .

TABLE 6. Annual Economic Impact of Nonresident Visitation to Upper Delaware by Most Affected Sectors in the Upper Delaware Local Impact Area.

Sectors	Total Gross Output	Total Income	Employment
	(Million $)	(Million $)	(Jobs)
1. Air Transportation	1.6645	0.4461	13.58
2. Hotels and Lodging Places	1.0611	0.4181	33.11
3. Eating and Drinking Establishments	1.9516	0.3481	35.46
4. Recreation Related Retail	1.9417	0.0598	1.25
5. Owner-Occupied Dwellings	1.7477	0.4748	0.00
6. Amusement and Recreation Services	1.6379	0.3531	21.97
7. Equipment and Repair Lease	1.5749	0.4146	3.76
8. Retail Trade*	1.5055	0.2911	20.94
9. Real Estate	1.5010	0.3323	3.23
10. Insurance Carriers	1.3692	0.0893	5.35
11. Hospitals	1.2713	0.1376	8.11
12. Doctors and Dentists	1.2197	0.1326	2.48
13. Recreational Related Retail	1.2073	0.1194	10.12
14. Wholesale Trade**	1.1716	0.0931	NA
15. Water Transportation	1.1713	0.0365	0.83

*Other retail trade inclusive not elsewhere reported.
**Other wholesale trade inclusive not elsewhere reported.

regions surrounding the sites are likely similar, as are the spending patterns of recreationists. Consequently, the economic effects of a given increase or decrease in trips are likely to be similar in each local impact region. Another implication is that the differences in total economic impacts across sites observed in Table 3 are probably attributable mostly to the differences in total visitation to sites shown in Table 2. In general, the

TABLE 7. Regional Economic Multipliers for Recreational Spending Generated by Trips to Recreational Rivers by Visitors Living Outside of the Local Impact Region, 1986.

Economic Indicator	Regional Economic Multipliers		
	Upper Delaware	Delaware Water Gap	New River Gorge
Total Gross Output	2.03	2.00	2.10
Total Income	2.16	2.25	2.36
Employment	1.57	1.58	1.84

relatively high multipliers reported in Table 7 suggest that increased trips to recreation river sites may have substantially stimulated local economic growth. Conversely, decreased trips to recreational river sites may substantially reduce local economic growth. The multipliers reported in Table 7 are similar in magnitude to recreation and tourism multipliers from previous studies summarized by Walsh (1986).

SUMMARY AND CONCLUSIONS

The management and use of water resources may have various economic effects on local regions. In this paper, the economic effects on local regions of managing rivers for outdoor recreation were analyzed. A region with a recreational river can be viewed as "exporting" river-based recreational opportunities. Recreational expenditures made by people living outside of the local region (e.g., nonresidents) results in an influx of dollars into the local region economy. These outside dollars stimulate new economic growth in the local region.

The economic impacts of three recreational river sites on the local area surrounding each site were estimated. The sites were selected to represent three general types of recreational river sites managed by the National Park Service: National Wild and Scenic Rivers, National Recreation Areas, and National River Parks. The expenditures per person per trip to a recreational river site were estimated from data collected as part of the Public Area Recreation Visitors Study (PARVS). The total effects of these expenditures (i.e., the sum of direct, indirect, and induced effects) on local region economies were estimated using IMPLAN. IMPLAN is an input-output modeling system developed by the U.S. Forest Service.

Results suggest that visits to recreational rivers may stimulate a considerable amount of economic activity in local regions. The total gross output stimulated by recreational spending ranged from $2.57 million to $13.35 million. The total income generated by recreational spending ranged from $1.22 million to $5.58 million, and the total employment generated ranged from 60 to 292 jobs. Economic effects were largest for the National Wild and Scenic River site and smallest for the National River Park site.

When rivers are protected and managed for outdoor recreation, local residents may be concerned that local economic growth and opportunities will be adversely affected. However, the results of this study suggest that recreational rivers have positive economic effects on local regions. Moreover, the estimated regional economic multipliers suggest that there is great potential for stimulating additional economic growth in local regions by taking action to increase visits from nonresidents to recreational rivers. Thus, protecting and managing rivers for outdoor recreation may provide a clean, economically viable means for enhancing local economic development, as well as for providing needed recreational opportunities to the nation. Moreover, recent experiences with declining farm and forest incomes in rural economies points toward recreational uses of natural resources as an added means for diversifying local economies. It may be that diversification, more than growth, is a needed target for benefiting rural economies.

APPENDIX A—LOCAL IMPACT REGIONS

A. Upper Delaware Scenic and Recreational River

1. Wayne County, PA
2. Susquehanna County, PA
3. Lackawanna County, PA
4. Pike County, PA
5. Delaware County, NY
6. Sullivan County, NY

B. Delaware Water Gap National Recreation Area

1. Monroe County, PA
2. Wayne County, PA
3. Pike County, PA
4. Warren County, NJ
5. Sussex County, NJ

C. New River Gorge National River

1. Summers County, WVA
2. Monroe County, WVA
3. Greenbrier County, WVA
4. Fayette County, WVA
5. Raleigh County, WVA
6. Mercer County, WVA
7. Giles County, VA

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