

Table of Contents

Keynote Address

Discipline and Chaos <i>Tom Goodale</i>	3
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Management and Planning

Recreational Leasing of Industrial Forestlands in New York State <i>Sergio Capozzi and Chad P. Dawson</i>	11
Environmental Attitude-Behavior Correspondence Between Different Types of Forest Recreationists <i>Brijesh Thapa and Alan Graefe</i>	20
Support for Recreational Trail Development and Community Attachment: A Case of the Soucook River Watershed <i>Jodi L. Michaud and Robert A. Robertson</i>	28
Human Territoriality: An Examination of a Construct <i>Thomas D. Wickham and Harry C. Zinn</i>	35
What's Happening in Our Parks? <i>G. Scott Place</i>	40
Open Space and Imagination <i>G. Scott Place and Bruce Hronek</i>	43

Economics of Outdoor Recreation and Tourism

Opinions of Elk Viewers on a Proposed Pennsylvania Elk Hunt <i>Bruce E. Lord, Charles H. Strauss, and Walter M. Tzilkowski</i>	49
The Role of Non Timber Forest Products: A Case Study of Gatherers in the Eastern United States <i>Siri Doble and Marla Emery</i>	53
Degraded Visibility and Visitor Behavior: The Case of New Hampshire's White Mountain National Forest <i>John M. Halstead, Wendy Harper, and L. Bruce Hill</i>	58
Estimating Relative Values for Multiple Objectives on Private Forests <i>Donald F. Dennis, Thomas H. Stevens, David B. Kittredge, and Mark G. Rickenbach</i>	64
Cost Consideration as a Factor Affecting Recreation Site Decisions <i>Allan Marsinko, John Dwyer, and Herb Schroeder</i>	68
Attendance Structure and Economic Impact of the National Road Festival <i>Charles H. Strauss and Bruce E. Lord</i>	74

Tourism

A Comparison of Tourists and Local Visitors to National Estuarine Research Reserve Sites <i>Allan Marsinko, William C. Norman, and Tiffany J. McClinton</i>	83
Individuals' Interpretation of Constraints: A New Perspective on Existing Theory <i>Po-Ju Chen, Deborah Kerstetter, and Linda Caldwell</i>	89
Culture, Heritage and Tourism Destination Choices <i>Achana Francis, Joseph T. O'Leary, and Alastair Morrison</i>	94

A Measurement of the Experience Preferences of Central Appalachian Mountain Bicyclists <i>Roy Ramthun and Jefferson D. Armistead</i>	104
Effect of Balanced Information on Attitudes Towards Open Ocean Aquaculture Development in New England <i>Robert A. Robertson and Erika L. Carlsen</i>	107
Characteristics of Outdoor Recreationists	
Use and Users of the Appalachian Trail: A Geographic Study <i>Robert E. Manning, William Valliere, Jim Bacon, Alan Graefe, Gerard Kyle, and Rita Hennessy</i>	115
A Comparison of Recreation Conflict Factors For Different Water-Based Recreational Activities <i>Cheng-Ping Wang and Chad P. Dawson</i>	121
SCUBA Diving & Underwater Cultural Resources: Differences in Environmental Beliefs, Ascriptions of Responsibility, and Management Preferences Based on Level of Development <i>Sharon L. Todd, Tiffany Cooper, and Alan R. Graefe</i>	131
Ethnicity and Culture	
Recreation Safety in Municipal Parks - Bloomington, Indiana and Tsukuba, Japan: A Comparison Study of Risk Management <i>Bruce Hronek</i>	143
The Meaning of Leisure: Conceptual Differences Between Americans and Koreans <i>Joo Hyun Lee, Sae-Sook Oh, and Jae-Myung Shim</i>	145
Universal Campsite Design: An Opportunity for Adaptive Management <i>Jason R. Biscombe, Jeri E. Hall, and James F. Palmer</i>	150
A Life to Risk: Cultural Differences in Motivations to Climb Among Elite Male Mountaineers <i>Patrick T. Maher and Tom G. Potter</i>	155
Outdoor Recreation Behaviors and Preferences of Urban Racial/Ethnic Groups: An Example from the Chicago Area <i>John F. Dwyer and Susan C. Barro</i>	159
Methodological Issues	
Evaluating Multiple Dimensions of Visitors' Tradeoffs Between Access and Crowding at Arches National Park Using Indifference Curve Analysis <i>Steven R. Lawson and Robert E. Manning</i>	167
Effective Survey Automation <i>John Weisberg and Jay Beaman</i>	176
Weighting Issues in Recreation Research and in Identifying Support for Resource Conservation Management Alternatives <i>Amy L. Sheaffer, Jay Beaman, Joseph T. O'Leary, Rebecca L. Williams, and Doran M. Mason</i>	183
Intervention for the Collaborative Use of Geographic Information Systems by Private Forest Landowners: A Meaning-Centered Perspective <i>Kirk Sinclair and Barbara A Knuth</i>	187
Estimating Social Carrying Capacity Through Computer Simulation Modeling: An Application to Arches National Park, Utah <i>Benjamin Wang, Robert E. Manning, Steven R. Lawson, and William A. Valliere</i>	193
Does the Suggestion That Respondents Recall Events Chronologically Significantly Influence the Data Collected? <i>Andrew Hill, Jay Beaman, and Joseph O'Leary</i>	201

Marketing and Management in Outdoor Recreation and Tourism

Importance-Performance Analysis: An Application to Michigan's Natural Resources <i>Gloria Sanders, Erin White, and Lori Pennington-Gray</i>	207
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Poster Session

The Eastern States Exposition: An Exploration of Big E Tourist Expenditures <i>Robert S. Bristow and Heather Cantillon</i>	213
Sustainable Tourism Development: The Case Study of Antalya, Turkey <i>Latif Gurkan Kaya and Richard Smardon</i>	222
The Role of Avocational Archaeology and History in Managing Underwater Cultural Resources: A Michigan Case Study <i>Gail A. Vander Stoep</i>	228
Tornado Chasing: An Introduction to Risk Tourism Opportunities <i>Heather Cantillon and Robert Bristow</i>	234
Community Based Open Space Planning: Applications of a GIS <i>Christian Mettey, Brian Demers, Nicole Halper, Robert Bristow, and Stephanie Kelly</i>	240
A Spatial Analysis of Wilderness Campsites in Lyell Canyon, Yosemite National Park <i>Steven R. Lawson and Peter Newman</i>	245

Management Presentation

Interpretation Programming in the NYS Forest Preserve Campgrounds: Successful Consensus Building, Partnership, and Regional Management <i>W. Douglas Fitzgerald</i>	251
Don't Be Thru-Hiking; Start Uhiking <i>Kirk D. Sinclair</i>	256
Using Technology to Develop Connections Between Individuals, Natural Resources, and Recreation <i>Wen-Huei Chang, Carolyn H. Fisher, and Mark P. Gleason</i>	260
Monitoring Visitor Satisfaction: A Comparison of Comment Cards and More In-Depth Surveys <i>Alan R. Graefe, James D. Absher, and Robert C. Burns</i>	265

Roundtables

The Forest Service's Recreation Agenda: Comments on the Roles of Research and State and Private Forestry in the Northeast <i>Thomas A. More and Mark J. Twery</i>	273
Development of a Use Estimation Process at a Metropolitan Park District <i>Andrew J. Mowen</i>	276
Nature Speaks - An Exploratory Study of Nature as Inspiration <i>Will LaPage</i>	278
Great Gulf Wilderness Use Estimation: Comparisons from 1976, 1989, and 1999 <i>Chad P. Dawson, Mark Simon, Rebecca Oreskes, and Gary Davis</i>	283
New England's Travel & Tourism Markets: Trends in the Geographic Target Markets in the 90's <i>Rodeny B. Warnick</i>	289

Founder's Forum

Notes on My Trip Through Nebraska, or Some Alternative marketing Principles for Parks and Recreation
Alan R. Graefe301

Index of Authors307

Poster Session

THE EASTERN STATES EXPOSITION: AN EXPLORATION OF BIG E TOURIST EXPENDITURES

Robert S. Bristow

Associate Professor and Chair of Geography and Regional Planning, Westfield State College, Westfield, MA 01086

Heather Cantillon

Regional Planning Student, Geography and Regional Planning, Westfield State College, Westfield, MA 01086

Abstract: The purpose of this paper is to prepare a visitor economic expenditure study for the 1999 Eastern States Exposition, better known as the Big E. The study was executed as part of a class project in Recreation Geography offered the Fall 1999 semester at Westfield State College. The students undertook an economic expenditure study at the Big E by studying tourism economics, executing the visitor exit surveys, and evaluating the responses.

Introduction

The Big E is one of the largest tourism events hosted in the New England region. In 1999, over 1.15 million visitors attended the fair, a slight decline from the past two years. Previous research by Market Street Research, Inc. (1998) found an average per person expenditure of approximately \$113 at the fair, excluding admission and parking. Yet, while totals of visitor expenditures are known, any disaggregated, i.e., lodging, transportation, food, drink, vendors, amusement, etc. expenses are unknown.

Recreation and tourism economic impacts have been widely debated over the past 75 years. In fact, Recreation Geography evolved from the field of Economic Geography. The early research of Freeman (1929), McMurtry (1930) and Brown (1935) first postulated the relative importance of leisure and attempted to quantify the importance in economic terms.

Yet today, there remains considerable debate on the economic analysis of tourism events, especially in the use of economic multipliers, cost-benefit analysis, and regional impact of tourism (Hall and Page 1999). The economic impacts of tourism can be defined in terms of primary and secondary impacts. Primary impacts are the direct expenditures of tourists for food, travel and lodging. Secondary economic impacts may be indirect or induced. Indirect impacts include expenditures incurred by businesses supporting tourist visits, e.g., a hotel buys cleaning supplies. Induced tourist impacts occur when the employee of the hotel can buy a new stereo from the salary.

Given the estimated 1998 tourist expenditures of \$113 per person (excluding outliers) and the attendance of 1.25 million in 1998, one could expect as much as \$141.25 million in expenditures! This paper seeks to further define per capita expenditures from an expenditure survey administered at fair exits. A limitation in this study must be stated at this point; that is, for the true economic impact to

occur, only new money entering the economy from visitors outside the community can count. It is quite difficult to define the community, especially near political boundaries. Therefore, tourist expenditures from visitors residing sixty miles or more from West Springfield will be summarized as well.

Implementation Plan

Stage One, or the survey creation stage, occurred during the summer months by consulting with the Eastern States Exposition staff. The marketing staff had some tourism expenditure data at the aggregate (or total) level, and yet lacked any knowledge of precisely what type of expenditures occur during the event. Therefore, the lead author designed a survey instrument to collect the socio-economic and demographic data needed. The instrument was pretested on 18 September 1999 and was found to be appropriate for the study. Minor adjustments in the instructions for the survey teams were made at this time. A copy of the survey instrument is found in Appendix A.

Stage Two took place during the first two weeks of the 1999-2000 academic year. In this stage, students enrolled in GARP0218 Recreation Geography were introduced to the economics of tourism and were organized to execute the survey. Thirteen of the twenty-five students were Business Management majors, seven were Regional Planning majors, and the remaining were studying a variety of disciplines. The students were trained in basic surveying techniques with readings from a world recognized tourism planning and management manual (TRRU, 1983). The students practiced administering the survey until they attended the fair.

During the event, students were posted at several exits of The Big E to solicit responses to a tourism economic impact survey. The survey teams were provided with a Big E cap, a nametag, and a letter of authorization. At all times a site supervisor was present to deal with questions and problems. A total of 406 visitors were surveyed during the fair with an overall response rate of 39%. Details of times and survey numbers were summarized and checked by the site supervisor.

Stage Three involved the tabulation and interpretation of the data. The survey teams assisted in the data entry, additional research in tourism economics, and prepared maps and graphics for subsequent presentation. Specifically, the data were entered in a Microsoft Access™ Database and later exported to an Excel™ Spreadsheet that served as the data file for statistical analysis in SPSS for Windows™. This process of multiple software insures very accurate data encoding and analyses.

Results

In this section of the paper, details describing the data collection process and a summary of key findings are discussed. In addition, some interpretation and explanation will be provided. While the data were checked in the field, during encoding, and in the analysis stage, some "missing"

values, or otherwise incomplete responses remained in the sample. The interpretation is the responsibility of the lead author and not the other members of the survey team.

Sampling

Seven survey dates were assigned during the Big E event. The first date, Saturday 18 September 1999, permitted the pretesting of the survey instrument and as a result, additional instructions were provided to the survey teams. The six remaining survey dates were Friday the 24th, Saturday the 25th, Sunday the 26th, Tuesday the 28th, Saturday the 2nd of October and the last day on Sunday the 3rd. The survey team had one rain date (Tuesday 21 September) which forced a move to the following Tuesday the 28th. This schedule was not randomly selected, since obviously only two weekdays were sampled. At best, the sampling schedule would be called a convenience sample, since the dates and times were selected to accommodate the survey teams and to maximize success in data collection during times when the greatest number of visitors were

expected to be leaving the grounds. However, the over-sampling on the weekends, when the attendance at the fair is the greatest, allowed the survey teams to get a very high response rate.

Survey teams of three to five students were positioned at various exit gates in the late afternoon and early evening to collect the data. The late afternoon was appropriate to insure a higher number of exit interviews. This meant however, that morning and late evening visitors were not sampled.

The survey teams had to approach 1036 parties to obtain 406 surveys, yielding a 39% response rate. Gate 1B, where visitors awaited their return home by bus, provided an excellent opportunity to collect data and thus had the highest number of surveys (37.2%). Two other gates (5 and 9A) provided over 20% of our sample each. The other gates had higher rates of refusals and therefore had a lower number of completed surveys. A summary of survey dates and the resulting surveys obtained are shown in Table 1.

Table 1. GATE by DATE Crosstabulation
Survey Counts (percentage)

		DATE / daily attendance							Total
		18-SEP-99 102,046	24-SEP-99 75,956	25-SEP-99 130,524	26-SEP-99 107,929	28-SEP-99 50,929	02-OCT-99 135,506	03-OCT-99 84,774	
G A T E	1 B	5	27	20	45	13	19	22	151 (37.2%)
	4		15		3		16		34 (8.4%)
	5		38	28	9		10	3	88 (21.7%)
	7		3		12	18			33 (8.1%)
	9 A			19	11	36	16	18	100 (24.6%)
Sum	5 (1.2%)	83 (20.4%)	67 (16.5%)	80 (19.7%)	67 (16.5%)	61 (15%)	43 (10.6%)	406	

Visitor Characteristics

The first question in the survey identified the number of people in the party. Most attendees to the Big E are couples or pairs, followed closely by groups of three or

four. Table 2 summarizes the distribution of party size. While some parties were larger, about 88% of the sample had four or less people in them.

Table 2. Part Size

		Frequency	Percent	Cumulative Percent
Size Of Party	1.00	14	3.4	3.4
	2.00	197	48.5	52.0
	3.00	81	20.0	71.9
	4.00	66	16.3	88.2
	5.00	23	5.7	93.8
	6.00	13	3.2	97.0
	7.00	4	1.0	98.0
	8.00	2	.5	98.5
	9.00	2	.5	99.0
	12.00	2	.5	99.5
	15.00	1	.2	99.8
	47.00	1	.2	100.0
Total		406	100.0	

After determining the party size, the surveyor asked about the attendee's home residence. This information included hometown and zip code for analysis about the market served by the Big E. Our sample came from all of the

northeastern states and one group from North Carolina. As shown in Table 3, Massachusetts' attendance was the highest with well over 200 groups (53.7%).

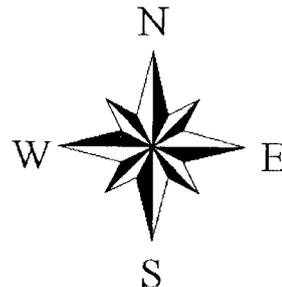
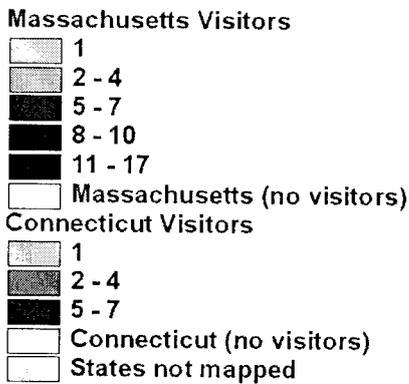
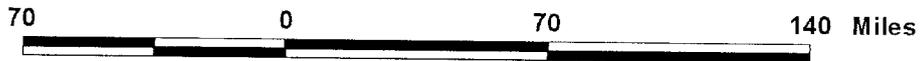
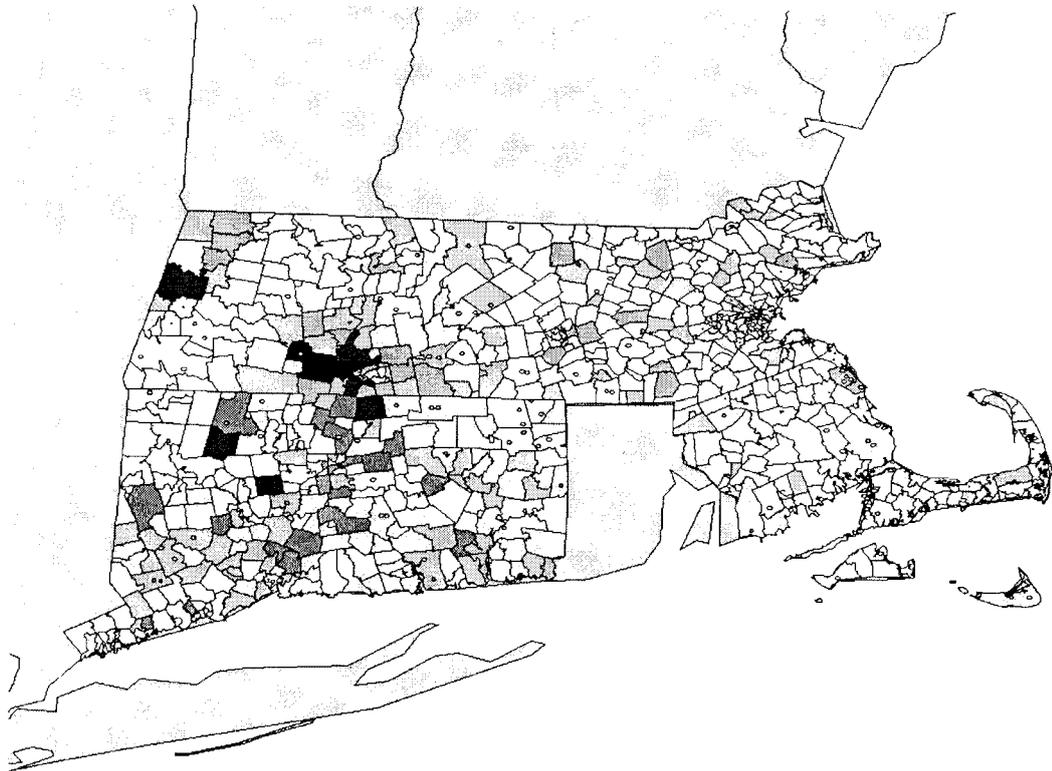
Table 3. Big E Visitors by Home State.

		Frequency	Percent	Cumulative Percent
State	CT	122	30.0	30.6
	MA	218	53.7	85.2
	ME	4	1.0	86.2
	NC	1	.2	86.5
	NH	6	1.5	88.0
	NJ	3	.7	88.7
	NY	21	5.2	94.0
	RI	15	3.7	97.7
	VT	9	2.2	100.0
	Total	399	98.3	
Missing	99	7	1.7	
Total		406	100.0	

The map found in Figure 1 illustrates the spatial distribution of attendees by home zip code and shows a wide coverage for the event. Since 85.2% of our sample live in Massachusetts or Connecticut, only those home communities are shown. One hundred and twenty eight (31.5%) of the respondents indicated they lived within twenty miles of The Big E, one hundred parties (24.6%)

lived between twenty-one and sixty miles and the majority, 168 (41.4%) lived sixty-one miles or more away. Since we had the home zip code, travel distance was calculated to West Springfield using the web site Mapblast (<http://www.mapblast.com>). Average travel distance to the Big E was fifty-seven miles.

The Big E Visitors 1999



WSC - GIS Lab 1999

Figure 1. Map of Big E visitors from Massachusetts or Connecticut home zip codes.

Day Trip vs. Overnight

The majority of the visitors attended the Big E as part of a day trip (n=388, 95.6%). However, ten groups did stay in a local hotel, with an average per night room cost of \$102.70. Five parties stayed for one night, one party stayed for two nights, and four parties stayed in the area for three nights.

Eight parties stayed overnight in the local area with family or friends. Table 4 summarizes this trip behavior. Twelve of the parties who were staying overnight in the area exited the Big E at Gate 1B for a ride on the bus, while the other groups left from one of the other gates to presumably drive a car.

Table 4. Day Trip vs. Hotel vs. Staying with Family/Friends

		Frequency	Percent	Cumulative Percent
DAYTRIP?	DAY	388	95.6	95.6
	HOTEL	10	2.5	98.0
	OTHER	8	2.0	100.0
Total		406	100.0	

Big E Parking

Parking is always an issue for Big E visitors. Visitors typically have the choice to park and ride on the PVTA busses (n=107, 26.4%), drive their own car and park in the Big E's public lot (n=102, 25.1%), or park in a private lot along or near Memorial Avenue (n=183, 45.1%). While the public lot had a fee of \$5, the private parking opportunities varied temporally and spatially. The average cost of parking was \$4.15. Since many of the visitors to the Big E take the bus and may have had the parking fee included in the bus and entrance ticket, the average parking fee is lowered artificially. For the 180 parties (44.3%) paying to park in private lots, the average cost was \$6.12.

Visitor Expenditures

The next four questions sought to get better estimates on group expenditures. An average group spent \$34.09 on food, snacks and non-alcoholic beverages, and another \$5.84 on beer or wine. On average, amusement rides cost the groups \$4.85, and craft purchases amounted to an average of \$31.22. Please note that 72.4 % of the sample did not spend any money on amusement rides; thus the Midway expenses are quite low. The distribution of purchases with maximums and minimums are summarized in Table 5. Be reminded that these represent group purchases.

Table 5. Descriptive Statistics of Group Purchases

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
FOOD	404	\$.00 (3.0%)	\$300.00	\$13,771.00	\$34.0866	\$36.3064
ALCOHOL	402	\$.00 (67.7%)	\$140.00	\$2,349.00	\$5.8433	\$14.1801
AMUSEMENTS	404	\$.00 (72.4%)	\$90.00	\$1,961.00	\$4.8540	\$10.3019
CRAFTS	405	\$.00 (52.0%)	\$500.00	\$12,643.00	\$31.2173	\$68.8920

The survey teams asked the groups about additional purchases. Most common purchases included items for the home and garden, clothing, and food. The more expensive purchases included one gazebo, one piano, one dining room table and two hot tubs. For these extra purchases, one finds a range of \$0.00 to \$7,000.00, with an average of \$83.14 per group.

Total group expenditures, including hotel (if appropriate), parking, and purchases, averaged \$169.43 while the per capita expenses were \$69.02. Since the greatest attendance comes from the local states of Massachusetts and

Connecticut, most money spent at the Big E is from those two states. To see what kinds of expenditures occur from residents of different states, see the crosstabulation found in Table 6. The disproportionate number of larger spenders from states other than Massachusetts and Connecticut seems to suggest that parties traveling greater distances are willing to spend more at the fair. Other interesting facts observed looking at the detailed Table 6 is that the sole \$00.00 spender came from Massachusetts. Over 60% of the attendees spent less than \$100 per group, with Massachusetts leading the pack.

Table 6. State by Group Expenditures Crosstabulation

		Group Expenditures				Total	
		0	1 to 99 dollars	100 to 499 dollars	500 dollars and above		
STATE	CT	Count		71	40	11	122
		% within STATE		58.2%	32.8%	9.0%	100.0%
		% within Group		29.1%	33.6%	31.4%	30.6%
		% of Total		17.8%	10.0%	2.8%	30.6%
	MA	Count	1	138	62	17	218
		% within STATE	.5%	63.3%	28.4%	7.8%	100.0%
		% within Group	100.0%	56.6%	52.1%	48.6%	54.6%
		% of Total	.3%	34.6%	15.5%	4.3%	54.6%
	ME	Count		3	1		4
		% within STATE		75.0%	25.0%		100.0%
		% within Group		1.2%	.8%		1.0%
		% of Total		.8%	.3%		1.0%
	NC	Count			1		1
		% within STATE			100.0%		100.0%
		% within Group			.8%		.3%
		% of Total			.3%		.3%
	NH	Count		5		1	6
		% within STATE		83.3%		16.7%	100.0%
		% within Group		2.0%		2.9%	1.5%
		% of Total		1.3%		.3%	1.5%
	NJ	Count		2	1		3
		% within STATE		66.7%	33.3%		100.0%
		% within Group		.8%	.8%		.8%
		% of Total		.5%	.3%		.8%
	NY	Count		8	10	3	21
		% within STATE		38.1%	47.6%	14.3%	100.0%
		% within Group		3.3%	8.4%	8.6%	5.3%
		% of Total		2.0%	2.5%	.8%	5.3%
	RI	Count		12	3		15
		% within STATE		80.0%	20.0%		100.0%
		% within Group		4.9%	2.5%		3.8%
		% of Total		3.0%	.8%		3.8%
	VT	Count		5	1	3	9
		% within STATE		55.6%	11.1%	33.3%	100.0%
		% within Group		2.0%	.8%	8.6%	2.3%
		% of Total		1.3%	.3%	.8%	2.3%
Total	Count	1	244	119	35	399	
	% within STATE	.3%	61.2%	29.8%	8.8%	100.0%	
	% within Group Expenditures	100.0%	100.0%	100.0%	100.0%	100.0%	
	% of Total	.3%	61.2%	29.8%	8.8%	100.0%	

Likewise, as Table 7 illustrates, the majority of local residents (within twenty miles) spent less than \$100. While one might surmise a larger proportion of major expenditures from the table for those visitors who travel the greater distance, this is not a significant relationship. Note: a gamma statistic of 0.090, significant at 0.249 level

suggests that there is a poor relationship between travel distance (HOWFAR) and expenditures (Group Totals).

The next question sought to identify purchases with local Memorial Avenue merchants, and the survey indicates on average a \$1.46 expenditure (excluding parking). One

party indicated they were planning to eat dinner along

Memorial Avenue and estimated a \$50 meal.

Table 7. HOWFAR * Group Totals Crosstabulation

			Group Totals				Total
			\$0	1 to 99 dollars	100 to 499 dollars	500 dollars and above	
HOWFAR	0 to 20 Miles	Count	1	84	32	11	128
		% within HOWFAR	.8%	65.6%	25.0%	8.6%	100.0%
		% within Group Totals	100.0%	34.9%	27.1%	30.6%	32.3%
		% of Total	.3%	21.2%	8.1%	2.8%	32.3%
	21 to 60 Miles	Count		57	35	8	100
		% within HOWFAR		57.0%	35.0%	8.0%	100.0%
		% within Group Totals		23.7%	29.7%	22.2%	25.3%
		% of Total		14.4%	8.8%	2.0%	25.3%
	61 miles or more	Count		100	51	17	168
		% within HOWFAR		59.5%	30.4%	10.1%	100.0%
		% within Group Totals		41.5%	43.2%	47.2%	42.4%
		% of Total		25.3%	12.9%	4.3%	42.4%
Total	Count	1	241	118	36	396	
	% within HOWFAR	.3%	60.9%	29.8%	9.1%	100.0%	
	% within Group Totals	100.0%	100.0%	100.0%	100.0%	100.0%	
	% of Total	.3%	60.9%	29.8%	9.1%	100.0%	

Projected Expenditures

The next step in the analysis involves the projection of expenditures found in our survey to the total visitor population and to estimate the regional economic impact of the Big E. As indicated above, the average per person total expenditure was \$69.02. Given the 1999 total attendance of 1,146,079 one could estimate a total expenditure of \$79,102,372.58.

Reviewing the results found in Table 8 we see an average group expenditure of \$34.08 for food, \$5.84 for alcohol, \$4.85 for amusements and \$31.21 for crafts. If we investigate per-person expenses, we get \$11.69 for food, \$1.84 for beer or wine, \$1.52 for midway rides, and \$11.59 for crafts. Projecting these per-person expenses against the total 1999 attendance yields \$13,406,373.71 for food and non-alcoholic beverages, \$2,113,484.28 for beer or wine, \$1,750,521.06 for amusement rides and \$13,284,660.12 for crafts.

Table 8. Descriptive Statistics of Group and Individual Purchases

	Mean Group Expenditures	Mean Per-Person Expenditures	Minimum	Maximum
FOOD	\$34.0866	\$11.6976	\$0.00	\$150.00
ALCOHOL	\$5.8433	\$1.8441	\$0.00	\$50.00
AMUSEMENTS	\$4.8540	\$1.5274	\$0.00	\$22.50
CRAFTS	\$31.2173	\$11.5914	\$0.00	\$250.00

The final step in assessing the economic impact is to eliminate local residents from the sample. Since local residents are expected to spend money in the local region anyway, they really do not add to the economy like non-

residents do (Crompton 1999). For this argument, Big E staff requested information on travel distance to the Big E. Therefore only those visitors living 60 miles or more will be counted in this step.

Table 7 shows that 168 (42.2%) of the parties surveyed live 60 miles or more from the Big E. Nearly 60% of those groups spent less than \$100, about 30% spent between \$100 and \$499 and just over 10% spent greater than \$500. For these outside contributors to the local economy we find an average group expenditure of \$166.99 and a per-person expenditure of \$65.23. These figures are slightly less than all attendees to the Big E. Since 42.4% of our sample reside outside the 60 mile area, our new projected economic impact would be 42.4% live outside of 60 miles * 1,146,079 total attendance = 485,937 attendees * \$65.23 per-person expenditures yields \$31,697,670.51 total regional economic impact by visitors!

Miscellaneous Questions

Concluding questions sought information about visitor expectations by asking, "Is there something you expected to find at the Big E, but didn't?" A majority of the parties replied no (n=336), however those who did, commented on the lack of certain ethnic foods and drinks (e.g., German beer garden), other foods like roasted peanuts, chocolate, "blooming onion", and the circus (note: obviously this party did not exit gate 7!) The most common answer was that groups did not see the unexpected, that is, they knew what to expect but had hoped to see something new!

Asked if they had attended another State Fair, most indicated they had attended fairs, but not the larger State Fairs. Most common fairs attended prior to the Big E included the New York State Fair and miscellaneous State Fairs across the country. Many visitors had visited local or county fairs, with the Tri-County Fair and Topsfield being the most popular. Dates of attendance were widely distributed and indicate that parties tend to visit only one fair a year.

A final thank you ended the survey and the surveyor recorded the date, time, gate, and current weather conditions.

Discussion

First of all, it must be stated that given the academic schedules of the student surveyors, data collection occurred primarily on weekends and shortly before dusk. Thus, no data is available for parties attending the fair on most of the weekdays and leaving the grounds in the morning or late night. One could suggest, however, that most day trip visitors would spend the "day" at the fair and leave at supertime anyway.

Gate 7 had the fewest surveys with thirty-three. A very high refusal rate occurred here and might be explained by the parties leaving the circus arena (often with screaming children!). Yet despite this, the overall response rate of 39% is quite good. Most parties, seeing that the survey (Appendix A) was only one page, cooperated. Since the survey team identified themselves as Westfield State College students, many of the groups immediately related to the college students and were willing to answer the questions.

We found expenditures to be quite lower than previous market research. There are several possible reasons for this. First, consider the over-sampling at Gate 1B where most of the visitors awaited a bus to return home or to the hotel. Not wishing to carry bulky items on the bus may reduce the expenditures of many of the groups. Since the survey did not collect demographic characteristics of the bus riders, these details (age, income, family size etc.) could be incorporated in future studies.

However, since the surveys asked for expenditures in broken down categories (e.g., hotel, parking, food, drink, craft, miscellaneous etc.), one could better calculate total expenditures rather than asking for a single total expense. Therefore the data collected should be fairly representative of group (and per capita) expenses at the fair.

Determining travel distance was a problem for some of the surveys, but easily corrected and checked in the post processing stage. For example, for incomplete responses to travel zones (many could not determine if they lived nineteen or twenty-one miles away) the data encoding calculated average travel distance from zip code to zip code. Given that someone estimated travel to Adams was less than sixty miles meant an underestimation of travel distance. Often people know the time of travel but will under or overestimate travel distance.

The experience overall was very positive and an eye-opening one for the students. Most of the students had only attended a fair as a visitor. This experience permitted them to experience the fair through the eyes of other attendees. And while many of the survey teams experienced a high level of survey rejection from the fair visitors, this behind the scene opportunity was educational.

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Appendix A

Hi, I am a student from Westfield State College and am conducting a survey for the Big E on tourist expenditures. Would you mind if I ask you a few questions? (Seek one adult from group.)

1. How many in your party? _____
2. What is your hometown and zip code? _____
 How far is that? ___ <= 20 miles, ___ 21 to 60 miles, ___ 60+ miles
3. Is your visit to the Big E a day trip, or are you staying overnight?
 Drive ___ Staying local with family/friend? ___
 Hotel? ____, If so, which one and how much per night? _____ \$ _____
 How many nights? _____
4. Where did you park? _____. How much? \$ _____

Now I want to ask about your Big E purchases. How much did your party....

5. Spend on food/snacks and non-alcoholic drinks? \$ _____
6. Spend on beer or wine? \$ _____
7. Spend on amusement rides? \$ _____
8. Spend on crafts? \$ _____
9. Any other purchases, list and price?
 _____ \$ _____ \$ _____
 _____ \$ _____ \$ _____
 _____ \$ _____ \$ _____
10. How much have you spent with local merchants along Memorial Ave. (gas, restaurants etc.)? _____

Only a couple more questions...

11. Is there something you expected to find at the Big E, but didn't?

 12. Have you ever been to another State Fair before? Yes / No
 If yes, where and when? _____

 If yes, how would you compare The Big E to these other fairs?
 Better _____ Same _____ Worse _____
- That's it! Any questions/comments for me? Thanks for the help on the survey!

Gate # _____ Date _____
 Time _____ Weather _____ Interviewer _____

SUSTAINABLE TOURISM DEVELOPMENT: THE CASE STUDY OF ANTALYA, TURKEY

Latif Gurkan Kaya

Doctoral Candidate, State University of New York, College of Environmental Science and Forestry, Faculty of Environmental Studies, 1 Forestry Drive, Syracuse, NY 13210

Richard Smardon

Professor, State University of New York, College of Environmental Science and Forestry, Faculty of Environmental Studies, 1 Forestry Drive, Syracuse, NY 13210

Abstract: This paper discusses ideas about how tourism can be made base for sustainable tourism development in Antalya, Turkey. The introduction is a general overview of sustainable tourism development in coastal areas. The paper also addresses the role of NGOs in the course of development. Information is given about coastal tourism facilities in Turkey. Finally, sustainable tourism development in the case study area, Antalya, is discussed extensively as a characteristic region in Turkey.

Introduction

Sustainable tourism is tourism that combines high standards of quality with environmental constraints, tourists and local residents in a friendly and stimulating manner which would prove to be a better way to conduct tourism all over the world. In other words, it is self-maintaining tourism solving problems without a harm to its surroundings.

Compared to the other areas surrounding the City of Antalya, this is a remarkable example exhibiting both the prosperity and problems of rapid development from the local tourism industry. To make the development more sustainable, some efforts can be made by local businesses that contribute to tourism including NGOs, government and residents who both directly and indirectly have become a part of the tourism industry. As an example, local businesses should strictly obey the plans and guidelines set up by government agencies and NGOs. Moreover, they should collaborate with them when necessary. Though NGOs are newly established, they have proven to be quite useful and effective in planning and protection of sensitive land resources.

Last, but not least, the case of Antalya can be a pilot region in Turkey in which perspectives of sustainable tourism development can be applied. Results of special techniques, planning and implementation that are used in the case of Antalya can then be used to reshape the tourism industry in various other coastal touristic regions.

The following discussion is organized as follows. First, we discuss sustainable and tourism development in general. A

combination of these, namely sustainable tourism development in coastal areas, is our next topic. The role of NGOs, general structure of tourism sectors in Turkey with its tourism policies for coastal region follows. Finally, the case area, Antalya, with its sustainable development problems and proposed approaches for their solutions are considered. Some concluding remarks are made.

Sustainable Development:

The World Commission on Environment and Development (WCED) introduced the concept of sustainable development in the Brundtland Report in 1987, defining sustainable development as "development that meets the needs of the present without compromising the ability of the future generations to meet their own needs." In addition, the Second World Conservation Strategy (1990) used the term sustainable development with the following meaning "to improve the quality of life of human beings by living within the carrying capacity of the ecosystems that supports life."

The concept of sustainable development also includes the strategy to establish a balance between individual motives and intragenerational motives of the society. Though this is not always possible, most the time there are strong cultural and historical complications that make such programs difficult to apply. Therefore, defining a concept that supports the strategy of sustainable development, must take into account various aspects of the region, whose benefits may not always coincide, and may in some cases directly conflict with nature (Ozaydin and Ozaydin 1998).

Tourism and Tourism Development

Tourism is a practice of travel for pleasure. Sometimes it is hard to define but easy to recognize. From the point of view of Troost (1998) "tourism is a necessary activity as a result of the negative impacts of modern life such as traffic congestion, sound pollution, over-crowding, and working hours." Tourism, which causes both undesired development and regeneration, helps people to be aware of the real value of assets existing in their region.

Tourist activity should form part of a broader framework of sustainable development in the world. Tourism is not an end in itself but should be as means to ensure more harmonious development of the societies.

The tourism industry is based on cultural and natural resources that are not produced by tourism itself, but countries are making both short and long term investments to attract tourism and to supply it with such means as accommodations, catering facilities, entertainment, etc.

Tourism development and its impact on the landscape and the environment should be taken together. Troost (1998) advocates the opinion that "tourism development should take into account the pre-existing situation of the natural, built and social environment." Tourism development activities can be directly responsible for serious actions against the environment. A couple of them are extremely serious. First of all, construction of excessive touristic facilities on coastal areas has significant impact on the natural landscape and resources of the region. Pollution

caused by bathers and by debris dumping on uncontrolled beaches is another problem faced in such coastal regions. Moreover, natural (rock, cliff, wetland, etc.) landscape features suffer from the interventions being encourage and develop the tourism industry.

Tourism is indirectly responsible for unwise use of water resources and intensification of the remaining crops using chemicals. Incompatibility of specifications and health provisions for the disposal of hotel sewage is yet another issue encountered in coastal regions. In these respects, the author strongly agrees to the opinion of Troost (1998) who claimed that "the beauty of the natural environment of the coastal cities, combined with cultural heritage, their age-long cultural history, the tradition, the mild climate are transforming quiet and low economic development areas into tourist areas in brisk demand. Tourism gradually becomes mass tourism and its impacts on coastal areas are serious, threatening the particular character of the place."

All these conditions lead to the necessity of tourist accommodation facilities to be built at rates corresponding to the demand that can lead to massive construction activities.

Sustainable Tourism

Sustainable tourism has several definitions. According to the definition of the Federation of Nature and National Parks (FNNP 1993), sustainable tourism is "all forms of tourism development, management, and activity that maintain the environmental, social and economic integrity and well being of natural, built and cultural resources in perpetuity." A publication by the Tourism Concern and the World Wide Fund for Nature defines sustainable tourism as a tourism which "operates within natural capacities for the regeneration and future productivity of natural resources; recognizes the contribution that people and communities, customs and lifestyles, make to the tourism experience; accepts that these people must have an equitable share in economic benefits of tourism; and is guided by the wishes of local people and communities in the host areas" (T.C. and WWF 1992).

Sustainable tourism means tourism that combines tourist development with respect for and preservation between the tourism industry, the visitors, the host communities and the environment. Recently, Troost (1998) brought forward a new definition to sustainable tourism, according to him "sustainable tourism is tourism that ensures the preservation of quality in harmony with the environment, the tourists themselves, the local population and all other factors involved in tourism."

Sustainable tourism can be subdivided into four attributes (Figure-1) according to its economic, environmental, geographical, and sociological aspects (MED Forum):

- Long-lasting: Sustainable tourism should have properly planned long-term economical aims.
- Environment Friendly: Sustainable tourism should respect the carrying capacity of the natural and

cultural spaces, being aware of seasonal effects and searching for ways to minimize them.

- Diversified: Sustainable tourism should be designed, in relation to the hinterland, by establishing a delicate equilibrium between the local enterprises and personality of the site, that would work in favor of the preservation of natural beauty when a deviation from equilibrium is perceived.
- Participatory: Sustainable tourism requires the participation of the local residents, which benefit from tourism as well.

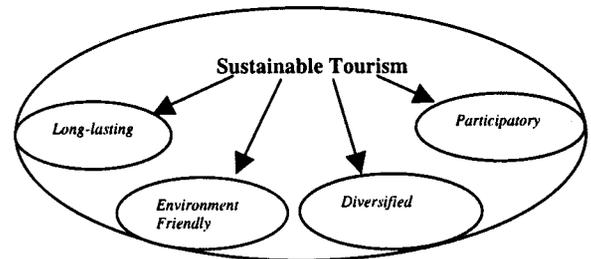


Figure-1: Sustainable Tourism

Sustainable tourism development has to be economically viable and naturally and culturally sensitive at the same time. As inappropriate tourism development results in increasing stress on destinations and consequently in negative changes in the destinations' physical, economic, and economic, and socio-cultural characteristics.

Sustainable Tourism Development in Coastal Areas

Historically, settlements have been generally located in coastal areas for ease of trade and defense. This is, because coastal areas constitute a very valuable and limited asset for economic development due to their natural resources and are mostly irreplaceable once misappropriated (Eke 1996; Eke et al. 1997).

It requires special techniques and innovative ways of planning and implementation to develop sustainable tourism in coastal regions that are popular places for touristic activities. Sustainability can be incorporated into tourism planning in coastal areas if programs and tools are designed or devised.

According to Eke (1998) there are some legal institutional frameworks for sustainable tourism development in coastal regions:

- "Multiple activities in the coastal areas require the coordination of many sectoral policies and several public bodies. It is necessary to create a public body to coordinate the dispersed activities, objectives and implementation of different ministries and organizations.
- Sustainable coastal area management requires regional and local initiative to be brought forward. Environmental protection needs the cooperation of local communities, public bodies, voluntary groups, and local NGOs to be effective."

Non-Governmental Organizations (NGOs) role in Development.

The rapid developments in coastal regions necessitate more intense cooperation between local and central command research institutions, related sector representatives and NGOs where the effects of certain developments transcend the national boundaries.

Many countries have set some rules that allow States to assist NGOs in their work for protecting natural areas. These rules arm NGOs with legal instruments for land management. States can also allocate some funds to help NGOs in their conservation activities. This may include tax exemptions to individuals that donate either money or land to NGOs (Leitmann 1998).

General Overview about Turkey

Turkey, geographically between east and west; developed and underdeveloped; unsustainable and sustainable, has a coastline, including islands, of 8333 kilometers. Turkey is bordered by four seas. The Black Sea covers the north shores of the country, while the Marmara Sea is basically an inland sea situated in the northwest of the country connecting the Black and the Aegean Seas together. The Aegean Sea extends up to southwest connecting the Mediterranean Sea at south part of the country. Table-1 illustrates the size of coastal zones, coastline and their share in total.

regions, and have become popular for migratory movements from the inland regions of Turkey. In a recent analysis by Altaban (1998) this issue has been addressed as follows:

“Starting from 1960s onwards the fast rate of the urbanization and the increase of employment in tourism and other service sectors supported by an efficient highway network and well-developed transportation facilities in the western part of Anatolia, Mainland in Turkey, have stimulated increasing demand on coastal regions.”

As a result of this, the City of Antalya offers unique opportunities for the international tourism market and it has the largest share in the foreign currency accumulation within Turkey.

Tourism of Turkey

Growth of tourism, as a new sector in the Turkish economy, coincides with the settlement of the 5-year fold economic development plans introduced by government in the mid 1960s. It was soon realized that the tourism sector could be very effective for solving the foreign currency shortage within the economy, as well as support the increase of National income (Altaban 1998). This is an alternative way for the economic development of the country and the main target of planning has been formulated to increase bed capacities of tourist regions.

Table-1: Coastline of Turkey , 1985 (Gunay, 1985)

<u>Coastal Zones</u>	<u>Coastline of Mainland</u>	<u>Coastline of Islands</u>	<u>Total</u>	<u>%</u>
Black Sea	1695 km	6 km	1701 km	20.4
Marmara Sea	1189 km	252 km	1441 km	17.3
Aegean	2805 km	679 km	3484 km	41.8
Mediterranean	1577 km	130 km	1707 km	20.5
Turkey	7266 km	1067 km	8333 km	100.0

According to the 1985 census approximately 30% of the population of Turkey, 15.3 million, lived in coastal areas, which covered nearly 14% of the total area of the country. From 1975 to 1985, the ratio of urban population living in coastal regions increased from 47.7% to 64.0% (Gunay 1985; Altaban 1998). It is believed that this rate should be around 70% since past experience shows that southern coastal zones of Turkey posses every potential factor that is needed for economic growth as well as social development. The high-increase of tourism sector is another important factor affecting the economic and social development during the past twenty years. On the average 10 million foreign tourists have visited Turkey each year and 60% of them mostly stayed in the Aegean and the Mediterranean regions.

The most favorable coastal zones are the Mediterranean and Aegean regions because the coastal structure and climatic conditions predominant in both regions make them attractive for resort and summerhouse development. Izmir in Aegean coast and Antalya in Mediterranean coast are the largest urban settlements, each of them having large commercial seaports. Summer houses and resorts, have developed alongside the Mediterranean and Aegean coastal

Many authors (Gunay 1995; Eke 1996; Altaban 1998) strongly believe that tourism planning should also consider all aspects of the demands of native populations while estimating its share in the international tourism market. In other words, we may assert that the conservation, preservation and protection of natural and cultural environment and possessions should take the first priority while developing tourism. In the last three decades, these two approaches have been in conflict, but the former has been more powerful in guiding investments. In 1982, the Tourism Incitement Act was enacted and encouraged the tourism sector through credits, tax exemptions, allocation and provision of the 'fundamental foundation'. This act enables the decree of Council of Ministers to declare 'tourism regions', 'tourism areas', and 'tourism centers'. In particular tourism areas are defined as, "areas inside or outside the tourism regions, where cultural and natural wealth is concentrated, the location and boundaries are decided and declared by the decree of Council of Ministers, following the proposal of the Ministry of Tourism" (Ozhan 1996). This act provided many outstanding opportunities to developers. These include 49 years lease of land, low interest loans, tax exemptions, etc. As a result investments

in tourism development projects have enormously increased after the mid 1980s.

The licensed bed capacity was as low as 55,000 in 1980, but has increased almost six times in fifteen years reaching a value over 300,000 beds in mid 1990s. Table-2 illustrates the licensed bed capacity in coastal regions as of 1996. The South Aegean and West Mediterranean regions have received the highest scores in the provision of tourism facilities.

Table-2: Distribution of Licensed Beds in Turkey

Regions	Bed Capacity	
	1985	1996
Black Sea	3310	7706
Marmara Sea	27260	63777
Aegean Sea	39091	93225
Mediterranean Sea	40991	105801
Coastal Regions	110652	270509
Inland Regions	38080	31015
Turkey	148732	301524

General Information about Antalya

Antalya is located to the center of Antalya Bay in the southwest coast of Turkey. The province of Antalya has 657 km. coastline, 42 km of which is within control of the greater city's municipality. Approximately 10 km of coastline in West Side is under the authority of State Forestry Department. The City of Antalya stretches along the bay bearing the same name and is built at 39 meters altitude above sea level. Mostly cliffs and caves constitute the coastline. Immediately to the north, Antalya is bounded by the Taurus Mountains rising to 3086 meters above the sea level that are interspersed with valleys of varying sizes. Small and large streams emerge from the west side of the Taurus Mountains and then water the plains on their flow to the Mediterranean Sea. On the east and west part of the Antalya plateau, large sandy beaches extend for kilometer's with high sand dunes covered by pine trees.

The plant life of Antalya is extremely varied and every kind of tropical plant can be found along the coast. Visitors to Antalya are struck by the size attained by different species of plants such as cacti. In particular cotton, sesame, citrus, and banana plants have a very diverse beauty of their own, and are hardly encountered to the same extent in other parts of the world (Uysal 1998).

The four climatic seasons only appear on the calendar in Antalya because no real winter exists. The summers are hot and rainless while the other months are warm and often rainy, with a mean annual temperature of 18.7 C and about 309.5 days in a year with no rain.

The population of the City of Antalya has almost doubled every ten years since the 1970s. The present population is over 700,000. Figure-2 pictures how the population of Antalya has been booming and has almost doubled in last three decades, which can be mainly attributed to the higher rate of immigration since the late 1960s.

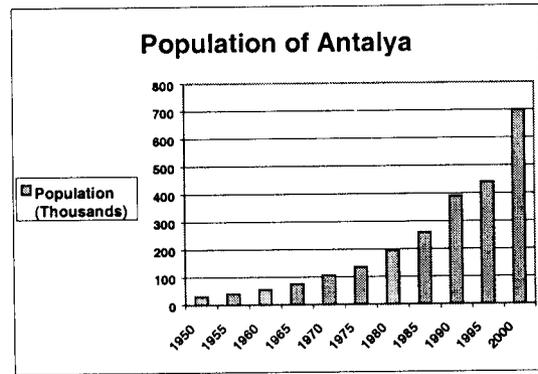


Figure-2: The population of Antalya

History of Antalya

The history of Antalya goes back to antiquity, when it was a part of Pamphilia region. Antalya was founded by Attalos, the king of Pergamum, in 138 BC and became a counter development pole with its natural harbor and easier connections with the Aegean and central Anatolia regions. Main Towns of the Pamphilia region were Thermessos, Attaleia (Antalya), Perge, Aspendos, Silium and Side. Antalya was a naval and commercial center following the occupation by Seljuk Turks in 1207 AD. From the beginning of the 15th Century, Antalya was a part of the Ottoman Empire, and become a city of Turkish Republic after 1923.

Before the development of the tourism sector, Antalya was a sub-regional center controlling commercial and agricultural activities over some part of the Mediterranean region of the country (Altaban 1998). Nevertheless, tourism development starting in the late 1960s has moved this area into a rapidly developing city receiving migration from inland regions of Turkey.

Tourism of Antalya

Tourism of Antalya, affected by the economic and physical structure, has had the largest portion of the licensed bed provision since the 80s. According to the latest statistics, Antalya has 40% of the total existing bed capacity in all coastal regions of Turkey. The largest two tourism development projects, namely the Side and the South Antalya Tourism Projects, have been implemented within the Province of Antalya creating the largest bed capacities. The Province of Antalya has a planned potential of 235,000 beds implemented within its territory, 45,000 of which has already been provided (Gunay, 1995). Such a capacity, created mostly within two decades, would certainly affect both the physical and the economic structure of the city. Many of the current socio-economic problems of the city can be traced to this rapid development of tourism.

Problems and Features:

In Antalya, tourism development activities are directly responsible for serious actions against environmental, socio-economical, and political structures. Among them are the following major issues:

- The population of the city has been almost doubled every ten years since the 1970s.

- Rapid development, alongside the coast in the both east and west, has endangered the cliffs.
- Local governments have welcomed most of the new settlement inquires, disregarding many of the constraints of spatial planning and environmental values.
- Construction in the city is mainly in the housing sector; therefore, there is a large surplus in the housing stock, residential areas are still continuing to erode the agricultural land, coastal zones and forests.
- Land developers are not concerned about the agricultural areas. In addition to this, farmers are attracted by the profits they can make by opening their land to residential development which increase the trends of loss of agricultural lands (Sircan 1998).
- Need for housing persists even though there are many vacant apartments and houses in the city to be sold or rented. Therefore, "the short-run incomes of land developers and the land owner have been far more effective in determination of the present land use in Antalya" (Sircan 1998).
- Cultural and historical assets of the city were, at some points, threatened by new development and the city began to lose its original identity to some extent.
- The urban economy of the city has been revitalized by the progress in the sector of tourism over the province at the beginning. However, at present, tourism has been the most critical economic sector because the urban economy is completely based upon it.
- Social equity should be a major issue in coastal planning and management. Especially, this is mainly important in case of beach access, since some coastal developments have tended to become as prestigious enclave for groups of people. In the coastlines, wire-mesh barriers are still encountered which is a direct evidence of the social inequality experienced by the most of the population.

Proposed Approaches

- Disorganized and uncontrolled development attempts in urban and agricultural lands should be avoided via the control forces of the local government in collaboration with federal government agents whenever necessary.
- Governments should update their environmental, coastal and tourism policies according to developing needs of the regions. Once these updates are put in action, they should persist in their implementation.
- A more strict taxation system can be put forward by local governments on the urban properties.

Both differentiation of taxation combined with urban zoning and increasing the cumulative level of taxation could be a useful tool in allocating the land and resources of the city. We could expect that this will block the desires of the land developers to some extent.

- In the city district, construction permits and zoning regulations should be released in relation with infrastructure.
- Tourism development should be designed to be long lasting in order to increase feasibility and avoid over-crowding in certain periods.
- Governments should revise the tourism policies aiming at mass tourism in such a way that will allow the development of soft tourism which is more environment friendly.
- Sustainable tourism development should imply a harmonized relationship between the protected environment and economic growth. This can be done by implementing sustainable tourism in such a way that will not consider the tourism in the region as a prime alternative for increasing national income and closing the trade gap of the country.
- To choose development areas in the city limiting factors and thresholds should be taken into account. For instance, the cliffs in Antalya have a quality of a seldom-seen present from nature which should be protected and valued together with the their landscape. Moreover, same sensitivity should be shown for protecting the natural beauty of coastlines and beaches.
- NGOs should release information to the public and try to make people more sensitive about the environmental issues within their neighborhoods.

Conclusion

Looking to the future, there are indications that the growth of tourism in coastal regions of developing countries such as Turkey would probably be subject to two current global trends. First of all, in the upcoming years, economic output of international travel and tourism should be expected to grow more rapidly. This fact would predictably affect the touristic coastal regions of developing countries more than the others would. Secondly, tourism development in the city of Antalya in Turkey and other similar countries will be determined by the growing interest in, and demand for, "specialty" tourism. In particular, it might be expected that nature tourism would grow in considerable extent by the increasing environmental awareness. Apparent global warming trend and rise in sea level are extremely important global challenge whose results should be carefully planned and managed to minimize its effects on coastal tourism.

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THE ROLE OF AVOCATIONAL ARCHAEOLOGY AND HISTORY IN MANAGING UNDERWATER CULTURAL RESOURCES: A MICHIGAN CASE STUDY

Gail A. Vander Stoep

Associate Professor, Department of Park, Recreation and Tourism Resources, Michigan State University, 131 Natural Resources Building, East Lansing, MI 48824-1222

Abstract: Increasingly, diminished monetary resources to pay for full-time or project-based professional archaeologists limits the scope and speed with which professional archaeology occurs, particularly for underwater resources such as shipwrecks. However, such resources are being found with increasing regularity; human activity on wrecks combines with natural forces to degrade the wrecks -- whether intentionally or unintentionally -- and reduce the amount of knowledge to be gained from them. More easily accessible due to technology developments, such resources are difficult to protect through access restrictions, enforcement and litigation. Thus, alternative strategies must be considered. Avocational programs, both in underwater archaeology and maritime history research, are being developed in Michigan and elsewhere as a way to help document, assess and monitor these wrecks and develop an ethic of stewardship.

Introduction

Increasingly, diminished monetary resources to pay for full-time or project-based professional archaeologists limits the scope and speed with which professional archaeology occurs, regardless of location. However, this is particularly true for underwater cultural resources that often are considered "out of sight, out of mind." Nevertheless, the value of and interest in such resources are extensive and growing, particularly with release of the recent movie *Titanic* and the blockbuster *Titanic* exhibition in Chicago, which have popularized intrigue with shipwrecks. Additionally, technology advances have increased diver and ROV (remotely operated vehicle) access to once-remote submerged resources, thus increasing potential for human impacts, many of them ultimately destructive to the vessels, artifacts, and the knowledge contained therein. Because such resources are "hidden" from sight, and often located in remote areas, they are difficult to protect through access restrictions, enforcement and litigation; therefore, alternative strategies must be considered. Building on depreciative behavior literature (including using communication and education as a resource management tool), exploration of selected avocational underwater archaeology programs, and a recent Michigan study of the shipwreck discovery process, specific recommendations for cooperative approaches are presented. In this proposed model, avocationalists (archaeologists, historians, interpreters) can work with professionals to protect submerged resources while simultaneously increasing their own awareness, understanding, appreciation and stewardship as well as sharing their experiences and knowledge with others.

Win-Win as the Basis for Partnerships

Controversy swirls around the topic of shipwrecks, particularly when motives of salvors or "treasure hunters" and archaeologists are discussed together. This issue is so constant that it even forms the basis of an exhibit panel at the recently opened *Treasures of Texas* museum in Port Isabel, Texas that focuses on maritime history and shipwrecks. Those involved in the debate appear to represent "different sides;" yet the controversy, arising from strongly held values and reinforced by the passion of various stakeholders, is rooted in similarity: interest in and concern for protection and appropriate use of historic shipwrecks. However, what is deemed "appropriate" often is at the center of the debate. To this debate stakeholders on all "sides" bring their personal experience, academic or avocational perspectives and priorities, professional philosophies, personal values, policy and politics, economic arguments, and legal underpinnings -- all of which can create a tangle of issues that involve ownership (legal and perceived) of the resources, rights (individual and societal, private and public), attendant responsibilities (or lack thereof), short and long term impacts, and natural versus human impacts.

The issues are debated within an external context of constantly changing factors. Technology advances increase access to once-remote submerged resources, thereby increasing potential for destructive human impacts. New laws and new interpretations of old laws have implications for ownership, values and uses of these resources. Target dates for designating resources as "historic" or eligible for the national historic register constantly change as the calendar does. Environmental processes (e.g., currents, ice, storms, chemical and electrolytic processes, native and invasive biological impacts) and human activities (e.g., dredging and pipeline-laying, land and water-based activities resulting in water pollution, fishing, anchor-dropping, vessel-caused wave action, recreational activities, and shoreline stabilization projects) continually impact the resources. Political priorities change, and with them so do budget allocations. Public opinion, constantly in flux and often influenced by news and entertainment media, also impacts the debates.

In Michigan, as in much of the United States, suspicion and distrust are directed at "the government" by some people. Concurrently, government employees charged with protecting, preserving or managing underwater cultural resources often are frustrated by citizens who disregard or fail to respect and understand the government's role and responsibilities as "caretakers of public goods." Often they feel disempowered to meet legal and mission-based mandates due to limited staff and financial resources. Thus, managers feel hamstrung and private citizens feel that their rights are impinged upon by government restrictions.

Battles -- attitudinal, verbal, behavioral, and legal -- have seemed to define many of the past relationships and activities related to underwater cultural resource use, study and protection. The challenge is great; the issues are complex. Within this controversial context, there is need to tear down the battlements, to look for common ground, and

to develop solutions rooted in win-win approaches. Avocational efforts can provide one approach to win-win and can contribute extensively to the documentation and historical understanding of shipwrecks and other submerged cultural resources. However, to assure win-win, avocational efforts must be conducted through cooperation of multiple stakeholders, including recreational/avocational divers and historians, designated resource managers, professionals (e.g., archaeologists, recreation and resource managers), and associated government organizations (e.g., law enforcement, educational entities, legal and policy development units). Thus, partnership development, collaboration, and/or co-management are necessary. Win-win partnerships, to be successful over the long term, must engage in approaches that objectively assess specific resources and resource sites, assess alternative uses and management approaches, and empower stakeholders to contribute as well as receive benefits.

The Michigan Context for Avocational Underwater Archaeology

Public Act 184 (revised in 1988 by Public Act 452) first designated Michigan bottomland preserves. Ten underwater preserves have been designated, with final approval currently pending for one additional preserve. However, no state funds, though authorized, have ever been appropriated for their management; rather, any management, operational, and interpretive or educational efforts are the responsibility of local volunteer preserve committees. Preserve committee membership and activities are uneven across the preserve system, and have been uneven over time as interest, time and individuals shift.

One state preserve (Thunder Bay) currently is under consideration for additional designation as a National Marine Sanctuary, which would focus on protection of a significant collection of historic shipwrecks rather than a single vessel (e.g., *Monitor*) or the natural aquatic resources, as are other national marine sanctuaries managed by NOAA (National Oceanic and Atmospheric Administration). Various management models, including a state/federal partnership, have been considered; a final decision by the governor is pending. Such a partnership could provide stability and some federal funding for preserve/sanctuary management and serve as a model for others. In the meantime, all preserves continue to rely on volunteer efforts.

Avocational underwater archaeology programs were first developed in Michigan in 1989, with the first program training about 60 students. An additional course, proposed for 1990, was canceled because too few people were registered. Potential reasons -- market saturation and lack of projects on which graduates could work -- are discussed in more detail later. Some graduates of the first program still are actively involved in shipwreck documentation and historical research. No additional training was offered in Michigan until October 1999. Nevertheless, avocational and recreational shipwreck discovery activities continue. No laws, official policy, or permit requirements specifically restrict search and discovery activities, though permits are required for activities that physically alter sites or the

wrecks themselves (e.g., dredging, excavation, artifact removal, attachment of signs or monitoring pins).

Data and Information Sources for Avocational Program

This paper incorporates information from depreciative behavior literature (with a focus on reducing human-caused damage to resources), results from a shipwreck discoverer research and outreach project, input from a group of recently trained (Nautical Archaeology Society [NAS] Level I) avocational archaeologists, and discussions with Canadians involved in avocational underwater archaeology and maritime resource protection through non-governmental organizations (NGOs). Most of the work has been conducted in Michigan; however, because Ontario shares the Great Lakes basin with the United States, Canadian perspectives and approaches are included.

Newly discovered shipwreck assessment and monitoring project. In 1998 the Center for Maritime and Underwater Resource Management (CMURM) at Michigan State University (MSU) received a grant from the Michigan Coastal Management Program to develop recommendations for assessment and monitoring of newly discovered shipwrecks in Michigan waters. It is believed that between 1,100 and 1,400 such shipwrecks lie on or embedded in Michigan bottomlands. Michigan legally has the responsibility to protect and preserve, for the public interest, the abandoned historic shipwrecks it owns. It quickly became apparent that studying assessment and monitoring activities, and stakeholder attitudes about such activity, could not be done without also considering the shipwreck search and discovery process. To gather input from as many stakeholders as possible, a six-component process was developed, to include: (1) a review of relevant federal and state/provincial law, policy, and practice associated with Great Lakes shipwrecks; (2) a mail survey of Great Lakes shipwreck discoverers; (3) two modified nominal group workshops with shipwreck discoverers; (4) a workshop on shipwreck assessment and monitoring involving stakeholder group representatives; (5) a telephone survey of Great Lakes shipwreck resource managers (U.S. and Ontario); and (6) two current shipwreck discovery case studies.

Round table discussion with avocational underwater archaeology trainees. In early October of 1999, 26 people participated in an underwater archaeology and maritime historical research training program. The program, developed in response to results of the shipwreck assessment and monitoring project, offered two training tracks: (1) the Nautical Archaeology Society's (NAS) Level I underwater archaeology program; and (2) conducting maritime historical research, structured around development of nominations for the National Register of Historic Places. While all participants were introduced to concepts in both tracks, each participant chose to focus on one of the two tracks during parts of the two-and-a-half-day program. The two-track approach was used (1) to broaden knowledge in all participants about the varied topics and processes involved in understanding, researching, and managing shipwrecks, and (2) to encourage interaction and partnership development among people having varied

interests in maritime history, shipwrecks, and other maritime cultural resources. During the final day of the workshop, all participants engaged in a guided discussion about shipwreck documentation and management, their interest in and ability to participate in future shipwreck documentation projects, factors that would facilitate their participation, and their ideas about overall access to and management of shipwrecks.

Characteristics of Canadian avocational programs and organizations. As part of a 1998 Canadian Studies Faculty Enrichment Grant, sponsored by the Canadian Embassy to encourage U.S./Canadian relations and partnership development, a series of guided interviews was conducted with provincial ministry personnel, resource management agency employees, and several members of the avocational groups Save Ontario Shipwrecks (SOS) and Preserve Our Wrecks (POW). Discussions involved the roles, structure, activities, contributions and challenges of avocational underwater archaeology, maritime history, and maritime preservation organizations working either independently or in partnership with governmental organizations.

Theoretical Perspectives Applied to Reducing Depreciative Behavior

Concerns of resource managers, historians and archaeologists with regard to underwater cultural resources include physical damage to the resources and loss of information from those sites due to irresponsible human actions. A body of theory has developed to help explain reasons that people engage in depreciative behaviors, including those that negatively impact natural and cultural resources. By understanding the motives, precursor variables, and intervening and other contextual variables that contribute to depreciative behaviors, managers can develop relevant strategies to discourage such behaviors and, thus, minimize the damage. While numerous theories have been applied to resource management situations and have relevance for underwater cultural resource management, they can not all be discussed here. Key concepts only are presented; a more complete summary is available in Vander Stoep and Roggenbuck (1996) and Anderson, Lime and Wang (1998).

Motives. People engage in behaviors for many reasons. Motives for behaviors that potentially result in damage include intentionally destructive behaviors (malicious vandalism or behaviors engaged in to achieve some other goal, such as to acquire an attractive or valuable souvenir -- a block, a bell, a brass porthole frame); status-confirming behaviors, or peer pressure ("I was the first to dive wreck X, and here's the nameplate, or bell, or capstan cover to prove it!"); and careless, unskilled, uninformed or unavoidable actions that result in unintentional or inadvertent damage (such as when a diver breaks off a piece of wreck while grabbing it to control buoyancy or get a closer look into a hatch) (Gramann and Vander Stoep, 1987; Roggenbuck, 1992). The management strategy selected should address the reason for the damage-causing behavior rather than being applied uniformly to all people in all settings. Education and skill development would be more appropriate than legal threats and imposed sanctions in minimizing diver damage to shipwrecks in most cases,

yet legal actions are necessary in others. The role of avocational underwater archaeology will be discussed further as regards its role in protecting resources and developing a stewardship ethic.

Precursor variables. As with any human behavior, a variety of precursor variables affect behavioral intentions and, ultimately, actual behaviors or actions. Among these are cognitive structures such as beliefs (including beliefs about impacts of specific behaviors on personal, social, physical and economic outcomes), values (e.g., economic, historical, and recreational values of shipwrecks), and attitudes that interact to influence activation of personal norms in given situations (Heberlein, 1972; Schwartz, 1977; Ajzen and Fishbein, 1980; Ajzen, 1985). So also do a person's beliefs about what others (peers, family, society) think about what their behaviors should be in various circumstances (Ajzen and Fishbein 1980; Ajzen 1985). Peer pressure, especially of significant or salient "others" (such as dive buddies or dive heroes) falls within this realm. Locus of control (an individual's belief about personal ability to impact or control outcomes) and a related phenomenon, called "ascription of responsibility" by Heberlein (1972) and Schwartz (1977) (placement of responsibility--self, others, external environmental factors--for specific outcomes or for personal behaviors), also have implications for the effectiveness of avocational underwater archaeology programs, particularly in protecting shipwrecks through development of stewardship values and behaviors. Finally, a person's knowledge about given objects, processes and situations, including about the impacts of specific behaviors on others or resources (labeled "awareness of consequences" by Heberlein [1972] and Schwartz [1977]), affects their behavioral decisions. Other social scientists indicate that a person's level of moral development strongly affects their behavioral choices (Kohlberg et al., 1983; Dustin et al., 1989).

Contextual variables. A variety of contextual or environmental factors present in any given situation can alter intended behaviors (e.g., excitement about being at a new dive site leading to careless dive behavior; equipment or physiological problems leading to use of a shipwreck structure for personal support that simultaneously results in damage to the vessel). Inappropriate behavior also can occur if a person believes there is a low degree of behavioral choice (e.g., the equipment failure scenario); they can shift blame (e.g., "my more experienced dive buddy said it was OK to take pieces of pottery from the wreck" or "winter storms will cause more damage than my fin kicks or moving the telegraph handle") (Heberlein, 1972; Schwartz, 1977); or visual clues, called releaser clues (Samdahl and Christensen, 1985), indicate that certain behaviors are engaged in by others and, therefore, must be acceptable (e.g., a row of plates and brass hardware lined up by previous divers on a deck railing for easy viewing and aesthetic photos).

Discussion: Developing Win-Win Approaches Based on Study Results and Theory

In developing successful win-win partnerships to engage and empower people while simultaneously protecting the

resources, both barriers and facilitating factors to avocational involvement must be considered. When asked to identify barriers to discovery, documentation and monitoring activities, experienced shipwreck discoverers as well as newly trained avocational underwater archaeology divers and maritime history researchers describe personal factors (distance, limited time and money), environmental and logistical factors (unpredictable lake and weather conditions, freighter traffic, lack of nearby support services and facilities), government restrictions and "bureaucratic attitudes," and difficulty maintaining secrecy about their activities. Government staff indicate the challenges of and their frustrations with uncoordinated discovery of so many shipwrecks (often by avocationalists) without plans, financial resources, or human resources to conduct post-discovery research, to monitor and manage the sites, or to conserve any artifacts that might be recovered. This, they believe, is irresponsible. Development and regular use of a cadre of skilled and dedicated avocational documenters, archaeologists, and historians could help fill the existing "gap" by involving them in post-discovery documentation, assessment, and monitoring. It is hoped that their active involvement would simultaneously increase their understanding of multiple values of shipwrecks, expand awareness of the vast amount of "hidden" information held within sites, and help develop in them a sense of responsibility and stewardship about the shipwrecks' long-term care. Involvement of non-divers in historical research, development of interpretive and educational materials, and other activities could expand contributions to both cumulative knowledge and stewardship of the resources.

Discoverers and other avocationalists indicate that their activities are or could be facilitated by easier access to a variety of historical resources and helpful individuals (e.g., fishermen, archives, technical assistants), access to appropriate technology, minimal legal restrictions, simple and rapid permit process for site alteration as needed for documentation and archaeology, and the ability to earn money for shipwreck-based products (e.g., books, videos, CDs). Additionally, they indicate that incentives (such as tax deductions for money spent during discovery, documentation and other research activities; reduced or no-cost dockage for boats at public marinas near shipwreck sites; loan of high tech equipment; provision of trained underwater archaeologists with whom to work; access to a list of trained avocational divers; choice about project crew members; and voluntary as opposed to imposed or forced collaboration) would go a long way in facilitating their voluntary involvement as project partners with government entities. Newly trained avocational divers indicate a willingness to participate in partnership documentation and historical research projects. They recommend many of the same incentives and indications of need for government trust and support of their efforts, but prefer that someone more experienced (and with adequate time to dedicate) take the leadership and responsibility of organizing, planning and coordinating shipwreck documentation activities.

Collectively, research results indicate that current models for avocational underwater programs focus primarily on diver techniques. While this approach does increase divers' skills and knowledge, and results in their contributions of

time and research results, the approach is exclusive. Many non-divers also have a strong interest in shipwrecks and maritime history, and can contribute extensively to shipwreck projects. Many participants in studies referenced in this paper strongly recommend that avocational partnership programs expand beyond involving only divers, professional archaeologists, and government resource managers. They suggest that partnerships include underwater preserve committees, universities, museums, local historical societies, educators, school and youth groups, tourism and economic NGOs, and anyone else interested in maritime history, especially in coastal towns. Such a model takes more effort to plan, coordinate and implement, but is more inclusive and ultimately results in expanded benefits, both in the number of people involved and in their long-term contribution to research, monitoring and education related to maritime history and shipwreck management.

Additional recommendations emerging from the collective research can be categorized into (1) personal training and involvement factors, (2) partner involvement, (3) application of individuals' skills to specific projects, and (4) development of a coordinating organization.

Personal training and involvement factors. Some people indicate an interest in optional formal acknowledgment of their participation in or completion of training courses. Examples include Continuing Education Units (CEUs), university credits, certifications recognized nationally or internationally (e.g., NAS certification), or specialty dive certifications connected with existing dive training associations (e.g., PADI, SSI, NAUI). Such "proofs of training" could be required for approval to work on project teams, though many discoverers want to reserve the right to hand-select their project teams.

Partner involvement. Involvement of local stakeholders in partnerships for both training and subsequent project work is critical. Local dive shops might (1) provide divers for workshops and documentation projects, (2) provide a certification card (connected with existing certification programs) for those wanting it, (3) enhance and encourage cultural resource stewardship through inclusion of such topics in all their training programs and charter trips, (4) receive a portion of course fee profits for co-sponsoring training programs, (5) promote training courses in their newsletters, and (6) actively develop relationships with local historical associations. Similar lists of potential contributions could be developed for other stakeholder groups, such as the local historical societies. Local historical societies could focus on conducting historical research and developing nominations of sites or shipwrecks for the National Historic Register. Preserve committees could offer their site(s) as training and project sites and specify priorities for their preserves, then organize and coordinate the avocational efforts.

Application of individuals' skills to specific projects. One of the factors deemed most detrimental to long-term interest and involvement of trained avocationalists is the availability of easily accessible, specific shipwreck projects in which they can be involved. While participating in a

training course does enable divers to better appreciate and enjoy their recreational dives as a result of increased knowledge about what they're looking at, most want to be involved and have ways to apply, practice, and improve their skills. Without these opportunities many may become discouraged. Therefore, training programs should be conducted in areas that have some kind of existing local organizational interest, such as a maritime museum, underwater preserve, or active dive club. Also critical to success is development of a centralized data/information collection and storage site. Initially, while projects are in progress, a local museum or preserve committee could coordinate the efforts and provide the space and equipment. Ultimately, a statewide (or province-wide, or other locally relevant structure) database, most of which is accessible to the public, should be developed and maintained.

Development of coordinating organization. Active avocational control or cooperative control of their activities is important. Most agree that some type of coordinating entity or organization is needed so that efforts can be coordinated and people have a central place to go for information and to find project partners. Save Ontario Shipwrecks (SOS) often is viewed as an example of a successful NGO. However, as with any organization -- especially those operated exclusively or primarily by volunteers -- there are characteristics that both contribute to their success and can create challenges to long-term success (also evident in Michigan's underwater preserve committees). Positive characteristics of volunteer organizations perceived by members include: (1) sincere interest in the mission of the organization; (2) perception of organization leaders as peers who thus have perceived credibility; (3) self-governance and autonomy in developing and implementing projects; (4) the potential and flexibility to partner with other organizations to achieve goals; (5) ability to fund-raise without constraints of a government organization; and (6) production of significant contributions to resource knowledge, resource protection, and community education. Potential threats to long-term viability of such organizations include: (1) disagreement among leaders or members about the organization's mission and priority activities; (2) changing needs and priorities over time; (3) burn-out of the most active leaders and members; (4) power-grabbing or power-hoarding by individuals if the organizational structure does not ensure multiple stakeholder or regional representation and does not provide for regular change in the leadership; (5) challenges to fiscal accountability if no system of checks and balances is built into the system; (6) uneven activity across time (and members) as members have varying personal and work demands placed on their time, energy and resources.

If NGOs are structured to minimize threats to long term survival, they can provide experiential benefits to members and simultaneously contribute to project work and knowledge creation. Maintaining regular and effective communication among members; periodic review of mission, activities and outcomes; and having established criteria and processes for dissolution also are important to long-term success. However, regardless of the passion, skills and contributions of NGOs, many believe that some

type of partnering or contribution via government is important to development and long-term viability of win-win partnerships. Recommendations for government (broadly to include the academic and professional archaeology community) organization involvement include: provision of continuity and/or stability, preferably through a dedicated position, such as marine archaeologist; availability of technical assistance; development and maintenance of a publicly accessible central database, information clearinghouse, and archives; provision of recurring seed money; provision of facilitating legislation and policy; and contribution of incentives, such as tax deductions and low-cost docking fees, for volunteer work contributed on approved projects. Such an approach would increase the number of people and resources available to conduct the work (benefit to resource managers), provide some financial and technical assistance to avocationalists, and protect and selectively make available underwater resources for use in recreation, education and tourism.

Education, Training and Involvement as Part of Win-Win

Repeatedly, on surveys and in discussions and interviews, education is identified as a crucial factor in developing knowledge and appreciation of underwater and other maritime cultural resources, in developing an ethic of stewardship toward the resources, and in reducing depreciative behavior resulting in damage to and theft of the resources. Educational target audiences include recreational divers, charter operators, local communities -- residents, business people and local officials, youth, and non-diver tourists. Educational messages include the stories of people, events and historical context associated with ships and their wreck events; diving skills; technical skills associated with documentation and archaeology, shipwreck construction; and values of information contained in intact wreck sites. Training and involvement of avocationalists -- to assist with maritime historical research, shipwreck documentation, assessment and monitoring, writing of nominations for the national register, development of educational and interpretive materials -- link strongly with these educational concepts and outcomes.

Clearly avocational involvement itself, as well as use of resulting information and work, contributes to win-win in preserving, sharing and using maritime heritage resources. Under fiscal and human resource constraints, the work simply cannot be done entirely through traditional academic and governmental channels. Even if funding and staff were sufficient to conduct all the work, benefits that accrue through public interest and involvement would be lost. Other professions already are recognizing and reacting to this philosophical shift. In the museum world -- whose professionals traditionally were collectors, researchers and curators of objects and artifacts -- philosophies and approaches are shifting to using public and community involvement to identify, research, develop meaning, and share their heritage and their past. Thus, museums are used as tools for community development. Community stakeholders participate collaboratively with museum professionals in creating the meaning in the stories of their lives, and in developing exhibits and other ways to share those stories.

Increasingly, perhaps in efforts to temper some of the depersonalization created by over-saturation of technology in daily lives, people are seeking unique and authentic experiences. Involvement in avocational programs not only addresses this personal need. Avocationalists provide the labor and love to assist with archaeology and knowledge generation; they benefit from working with experienced professionals; they develop a sense of pride, ownership and stewardship for the resources; and they share their passion with others. There will always be those few with self-centered or destructive motives, but their behaviors should never discount the interest and contributions of the vast majority of people who, if provided the education, training, and opportunities to work with professionals, can contribute significantly to creating win-win for society, for the resources, and for themselves.

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TORNADO CHASING: AN INTRODUCTION TO RISK TOURISM OPPORTUNITIES

Heather Cantillon

Geography and Regional Planning, Westfield State College
Western Avenue. Westfield, MA 01086

Robert S. Bristow

Geography and Regional Planning, Westfield State College
Western Avenue. Westfield, MA 01086

Abstract: Tours devoted to tornado storm chasing have become popular in recent years, especially with the emergence of many profit and non-profit storm chasing organizations. While most literature in risk recreation has been directed toward rock climbing or other high-risk outdoor recreation activities, tours devoted to storm chasing are quite unlike these traditional activities. The purpose of this paper is to provide a review of these organizations from information collected in a mailed survey. Areas to be discussed are specific tour details for each company, basic demographics of tour attendees, and other areas of tour requirements. Keywords: Risk tourism, tornado chasing.

Introduction

Since the movie "Twister" premiered in 1995 there has been increased interest for storm chasing. The activity of storm chasing requires participants to locate and "chase" after a tornado-producing super-cell thunderstorm. Although this is an extremely risky activity, storm chasing is becoming a popular form of tourism. For example, storm chasing is a sport not unlike rock climbing, in that to participate in either activity you must first have an understanding of basic techniques and safety measures. Further there is some level of danger associated with the activity. Americans are more now than ever likely to engage in high risk outdoor activities (Ewert and Schreyer 1990; Greenfield, 1999, McGraw 1998). Although storm chasing is considered a new tourist activity, it has existed since the late 1940s; only now it is becoming a popular form of tourism.

Risk recreation traditionally has been applied to rock climbing, mountain biking etc. (Ewert 1995, Hollenhorst 1995). This paper explores a new form of risk tourism: tornado chasing. To get a better understanding of this new phenomenon, a short survey was sent to the six major operators that provide storm-chasing opportunities to the public. The survey was designed to solicit information about the clients served, basic tour information and some motivations of the clients. This paper highlights the findings.

History

Essentially storm chasing began after World War II. The reason it came about was because an abundance of

airplanes and pilots that had a working knowledge or radar technology were given an opportunity to study storms first hand by flying through them. This research project, which operated out of Ohio and Florida, became the baseline for understanding tornado-producing storms. Along with the beginning of storm study, highways were modified, helping to bring the chase from the air to the ground.

The Tornado Intercept Project, based out of Norman, Oklahoma was the first organized ground-based group of storm chasers. This project was sponsored by the National Severe Storms Laboratory (NSSL) to conduct research about storms that cause tornadoes and the effect they have on communities located in the region known as Tornado Alley. The project was declared a success on May 24, 1932 when the scientists and chasers met face-to-face with a tornado in Union City, Oklahoma. This is also where one can see storm chasing being born as a hobby rather than just for scientific reasons (Marshall 1993).

Tornado Formation

Many prospective tornado tourists need to have a rudimentary understanding of tornadoes and how they work. A brief description of what a storm chaser should know about tornadoes follows. Tornadoes are produced as a thunderstorm develops an organized internal structure of sufficient strength to extend the vortex from the cloud base to the ground. The severe thunderstorm that develops a tornado is normally the largest thunderstorm in a squall line or a very large isolated thunderstorm. These storms are able to produce tornadoes because they have the organized internal structure that can support a tornado.

Risk Recreation Defined

Unlike traditional risk recreation, storm chasing uses its own definition that is geared towards just the act of storm chasing. Traditionally, risk recreation is a self-initiated activity in a natural environment that people partake in due to the activity's uncertain and potentially harmful nature and it's cognitive and affective involvement (Robinson 1992). In terms of storm chasing, the following definition is utilized: the recreational pursuit of an uncontrollable meteorological event (Cantillon, et al 2000)

Storm chasing is an activity that is associated with many risks, and those that chase storms should be aware of these risks. There have not yet been any media frenzies concerning the death of a storm chaser, but many think that when this happens, regulations and sanctions will be put into effect that will alter one's ability to chase a storm effectively (Doswell 1998). For example, climbing Mount Everest is an activity that people participate in, and there are many recorded deaths of such attempts. This fact has not discouraged a lot of people from climbing the mountain, and similarly, any fatalities that may occur during a storm chase should not effect the way that chasers conduct themselves while hunting a storm.

Storm chasing can be considered a risk tourism activity. Although it was initiated for scientific purposes, there are many that chase simply for the joy of the chase. "The thrill for storm chasers is tracking nature out of control, finding themselves eye-to-eye with...the great grand-sucking twisters of Tornado Alley" (Paddy 1994:32). As with any recreational activity, there is a challenge to chasing, and it seems as though there is more challenge and frustration to chasing than a lot of other activities. Storms are not spawned on command. Nature acts in mysterious ways and there has yet to be a method of knowing exactly when and where are tornado will hit. Tornado chasing is basically a guessing game with some help from scientific information to make these educated guesses. Besides the thrill of the chase, "what compels storm chasers to drive tremendous distances across the plains?...You can see forever...the sky and the air are clear, and what you see is tremendous—it's simply awe-inspiring" (Wolkomir 1994:52).

Another way that storm chasing is a recreational activity is that there has been an increase in those interested in storm chasing, causing a noticeable influx in traffic on prime chase days. According to research by Wolkomir (1994), there are so many storm chasers out there that on prime chase days there are too many cars on the roads to drive. If storm chasing was not a popular activity, there would not be such a demand for space for these chasers.

Table 1. Storm Chasing Groups to Contact on the Web

Cloud 9 Tours	http://www.pair.com/storms/cld9.html
Silver Lining Tours	http://silverlining.pair.com/chase.html
Storm Chasing Adventure Tours	http://www.storm-chaser.com
Tornado Alley Safari Tours	http://www.pair.com/talley/tours.html
Tornado Research and Defense Development (TRADD)	http://www.abilene.com/tradd
Widespread Weather Services	http://www.widespread.com

These tour groups have different packages to offer, with a range of prices, tour lengths, and requirements. The following tables outline some of the major similarities and differences between the various tour groups. It must be mentioned that Widespread Weather Services, Cloud 9 Tours, and Tornado Alley Safari Tours responded to the mailed survey, while the information for the other tour

Table 2. Length of Average Tour

Cloud 9 Tours	14 days
Silver Lining Tours	10 days
Storm Chasing Adventure Tours	14 days
Tornado Alley Safari Tours	8 days
TRADD	5 days
Widespread Weather Services	7-14 days

At first glance, Tornado Alley Safari Tours may appear the least costly as the cost per day is only \$113 (see Table 3). This is misleading, as it needs to be remembered this is only an eight-day tour. In reality, the most cost-efficient tour (based solely on cost-per-day information) would appear to be either Cloud 9 Tours or Storm Chasing

Data Collection: Storm Chasing Tour Groups

This section of the paper gives some information about what exactly is entailed in a storm chasing package, and web sites are provided for those that wish to seek out additional information. Many people wish to try such a thing and joining one of these groups is the perfect way to enjoy an experience of a lifetime.

Storm chasing in the past has mainly been done for scientific reasons rather than for pleasure or recreation. Now that more people have become interested in storm chasing, it has opened a door leading to a new hobby. Since it is not a hobby that you can pick up very easily, there are experts that you can seek and join their storm chasing expedition. Often, they may consist of expert storm chasers that do not mind having a novice along for the ride. They operate in a territory throughout Tornado Alley.

A short survey was sent to the six companies that cater to storm chasers in the United States (Appendix A). Three or 50%, responded to the request. A summary of all six companies follows, with information from the survey as well as web based literature. Table 1 lists the six companies and their web site.

companies is based on information found on their web pages during the winter of 1999/2000.

Table 2 shows the length of tours offered by each of the companies. Most of the tour lengths are relatively the same with a few exceptions. TRADD offered the shortest of the six tour options, and Widespread is the only group to offer a choice of one or two week packages.

Adventure Tours, each with a cost-per-day of \$143. The most costly tour is TRADD at \$234 per day. This cost is lower in comparison to Silver Lining Tours, which has a cost-per-day of \$240, but TRADD only runs for five days while Silver Lining Tours provides a ten-day tour.

Table 3. Average Tour Cost

Cloud 9 Tours	\$2,000 - \$143 per day
Silver Lining Tours	\$2,400 - \$240 per day
Storm Chasing Adventure Tours	\$2,000 - \$143 per day
Tornado Alley Safari Tours	\$900 - \$113 per day
TRADD	\$1,170 - \$234 per day
Widespread Weather Services	7 days - \$1,750 - \$250 per day – 14 days \$2,750 - \$196 per day

From information from the survey or web sites, the tours offer similar amenities. No tour includes airfare to their base city in their tour price. Some of the companies cover snacks, drinks, and meals while others do not. Both Widespread and Cloud 9 include a video of the experience.

Tornado Alley Safari provides training in chasing as included in tour, but most of the other tours are assumed to provide this as well, given the nature of the tour. See Table 4 for a summary.

Table 4. Tour Package

Cloud 9 Tours	Lodging, T-shirt, Highlights video, Snacks
Silver Lining Tours	Daily snacks and drinks, Ground transportation during tour
Storm Chasing Adventure Tours	Does not cover meals
Tornado Alley Safari Tours	Ground transportation, Forecasting services, Instruction in chasing/watching
TRADD	No information available
Widespread Weather Services	Lodging, Pick-up/Drop-off at airport, Travel during tour, Highlight Video

The tornado season is in the late Spring and early Summer. Table 5 shows the frequency of tours per season for each company. Widespread offers the most chances for people

to take a tour, which would cater to many different schedules of the tourists. Tornado Alley Safari has the least amount of tours, with only two per season.

Table 5. Tours Per Chase Season

Cloud 9 Tours	3
Silver Lining Tours	No information available
Storm Chasing Adventure Tours	5
Tornado Alley Safari Tours	2
TRADD	9
Widespread Weather Services	10-12

As can be seen by looking at Table 6, these tours are for small groups. This is undoubtedly due to the fact that people are being carted around in vans with varying amounts of equipment and luggage. This is also probably due to the fact that each tour group does not have a large

staff, typically only 3, and can only carry as many people as available drivers of vehicles. This limits the number of tourists since they share space with scientific equipment in the vans.

Table 6. People Served Per Tour

Cloud 9 Tours	14, possible 20 people
Silver Lining Tours	No information available
Storm Chasing Adventure Tours	No information available
Tornado Alley Safari Tours	9 people
TRADD	No information available
Widespread Weather Services	1-8 people, more if necessary

The survey next queried information about the clients who participate in storm chasing. Table 7 identifies the general characteristics. All tourists are either out-of-state or out of the country. This is undoubtedly because those people that

live in the area of Tornado Alley are used to the sight of tornadoes, and are probably not thrilled at the prospect of chasing the beast that could knock down their house.

Table 7. Tourist Demographics

Cloud 9 Tours	85% out-of-state, 15% foreign
Silver Lining Tours	No information available
Storm Chasing Adventure Tours	No information available
Tornado Alley Safari Tours	100% out-of-state
TRADD	No information available
Widespread Weather Services	90% out-of-state, 10% foreign

Table 8 shows the universally accepted minimum age of participants to be 18 or older. This is not very surprising. There is always the issue of liability, and at least being eighteen a person is considered an adult. Storm chasing

has a high element of danger, even the chance of putting their life at risk. Solmonsson (1990) warns that companies involved in high-risk activities need to be aware of the different clients abilities, since risk is highly subjective.

Table 8. Age Restrictions to Take A Tour

Cloud 9 Tours	Must be 18 or older *
Silver Lining Tours	No information available
Storm Chasing Adventure Tours	No information available
Tornado Alley Safari Tours	Must be 18 or older
TRADD	No information available
Widespread Weather Services	Waiver signed by a parent/guardian if under 18

Finally, the survey requested additional information about what a tourist should bring on the chase. Tourists are asked to pack as lightly as possible, as all items need to be mobile. People do not stay in the same hotel every night, but are being transported over miles of ground, and may

never make it back to where they originally started. Since waiting was often an element of the chase, participants were also asked to bring a book or music to help pass the time.

Table 9. Items to Bring on A Tour

Cloud 9 Tours	Clothes, Toiletries (1 Suitcase, 1 Carry-on), Money for Souvenirs/Food, Video camera (Optional), Laptop (Optional), Walkman
Silver Lining Tours	No information available
Storm Chasing Adventure Tours	No information available
Tornado Alley Safari Tours	Rain gear, Cameras
TRADD	No information available
Widespread Weather Services	Clothes (1 Suitcase, 1 Carry-On), Cameras, Video camera, Walkman, Video games, Books/Magazines

Discussion

With movies such as "Twister," interest has increased in the activity of storm chasing. This is apparent as seen by the increased traffic along the roads of Tornado Alley and with the institution of many storm-chasing groups. Although storm chasing in real life is nothing like the movies, there is still a real rush that come from seeing one of Mother Nature's most destructive forces. People will pay large amounts of money to have the opportunity to chase after something that most people would prefer to flee. True storm chasers are into this form of risk tourism for many reasons, to learn about tornadoes as much as possible, to help create warnings systems, but mainly to experience the thrill of the hunt.

"jump on the bandwagon"! It would also be interesting to explore the psychological "rush" a chaser gets after long dull waits in the great plains, perhaps similar to the changing excitement a river rafter gets during and after rapids. Lastly, a comparison of tornado storm chasers to "hurricane partyers" may be an area to explore. What motivates people to expose themselves to severe weather?

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Since the field of Risk Tourism is relatively new, there is little research in the topic. Future research should consider the risk chasers may place on the citizens who live in Tornado Alley. While most companies stress safety and the scientific gain of knowledge, many rogue and inexperienced operators may attempt to enter the market to

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Appendix A.

I. Please Answer These Questions Based On Last Season's Tours

1. How long does your standard tour run? _____ days
 2. How much does your standard tour cost? \$ _____
 3. What does this cost encompass (i.e. food, lodging, etc.)? _____
-

II. Please Answer These Questions Based On Your Tour Clientele

4. How many people can you serve per tour? _____
5. If you offer multiple tours per season, how many tours do you run _____ and how many total people are served? _____
6. On the average, where are your tour attendees from?
_____in-state _____out-of-state _____foreign

III. Please Answer These General Questions

7. Do you have any AGE restrictions in order to participate in your tours?
_____yes _____no

If yes, what are these restrictions?
____must be 18 or older ____must be 21 or older ____must be under____(put age here)
8. Do your clients need to meet any specific educational criteria to participate in your tours?
_____yes _____no

If yes, what are these criteria (check all that apply)
____high school diploma ____some college classes ____college degree
____weather-related experience ____pervious chasing experience
____other (please explain) _____
9. Are there any major expectations that attendees have to fulfill in order to attend your tours?
(i.e. physical fitness) If yes, please describe _____
10. What are some reasons that people give for attending your tours (i.e. gift, chase interest, etc.)

11. What specific items do your attendees need to bring with them on their tour? _____

COMMUNITY BASED OPEN SPACE PLANNING: APPLICATIONS OF A GIS

Christian Mettey

Brian Demers

Nicole Halper

Robert Bristow

Stephanie Kelly

Geography and Regional Planning, Westfield State College
Western Avenue, Westfield, Mass. 01086

Abstract: The purpose of this paper is to illustrate the usefulness of a GIS in community open space planning of undeveloped recreational opportunities. The study area is a small New England village in the western region of Massachusetts. Like most of the Northeast, Northampton is a rural community with a growing population. Proposals for public recreation lands compete for commercial development.

Introduction

In order to meet the future needs for recreation, proper land use planning must be addressed today. Land use planners employ the technique called a "build-out" in order to plan for future growth of communities. Geographic Information Systems (GIS) is the tool utilized in this build-out since the computer-based analyses are efficient in time and cost. For the scenario here, a build-out scenario of the existing open space is queried to show the impact of population demand on open-space in the study area. Highlighted in this paper will be an overview of the process including steps in data collection, data management and analysis. Data of these types are collected from remote sensed imagery, MassGIS databases and fieldwork. After these steps, data are entered in multiple spatial databases. From these data, open space and existing land use will be evaluated and one can create maps appropriate for analysis.

In order for GIS data to be useful for recreation resource decision-making, alternative scenarios are considered. Alternative scenarios could include a build-out scenario tied with passive public recreational demands or a "no-build" possibility, preserving current land use. Once the GIS analysis is prepared, decision-makers can then make informed choices to provide for growth in the community as well as provide for recreational opportunities.

The reader should be able to recognize the importance of a build-out analysis and the usefulness of a GIS. Through the research presented the reader will develop an understanding of the town of Northampton's open space issues and at the same time develop an understanding of what a build-out analysis can accomplish using GIS technologies.

Background

A Build-Out Analysis illustrates the form and pattern that development can be expected to take under a continuation of current trends and the manner and degree to which this form and pattern are contrary to planning goals (Marriot, 1995). A description and illustration of the consequences of current trends help to identify the kinds of action that are needed and to build public support for these measures (MassGIS 2000). Like many other cities, Northampton will continue to experience more growth. Alternatives to build-out analysis can be time consuming, however, they help provide positive actions towards the recreation environment.

There are three alternatives that are used in mainstream build-out alternatives, 1. No Build - Avoiding development as a whole, 2. Designate open space for recreational purposes such as parks and trails, 3. Use existing resources such as renovated buildings, former hospital grounds and landfill property (known as Recycle & Facilities). These alternatives are vital in the development of build-out analysis.

GIS is very important in the development of alternative build-outs. A GIS can show what open space could possibly look like if development does come into a town. A GIS uses a system of computer software, hardware, data and personnel to help manipulate steps, analyze and present information that is tied to a spatial location or geographic location (ESRI, 2000). GIS are "smart maps" linking a database to maps and layers consisting of many different themes such as rivers, lakes, roads, greenways, landuse, open space, and buildings. Data sources provide documentation of GIS data at various scales. For example, data are available at the global scale and can show continents and watersheds, while at the local scale, one would like to study vegetation or trails (MassGIS 2000). This research analyzed existing open space that could possibly be developed into commercial properties and thus unavailable for passive recreation. Several sites were chosen for possible development based on the greatest amount of open space in Northampton.

Case Study: Northampton, Massachusetts

The City of Northampton, Massachusetts contacted Westfield State College to provide an inventory of open-space properties within the City. The purpose of this study is to examine the open space areas to determine which are of high priority for purchase by the City. The purchased areas would be designated for conservation and recreation to prevent additional resource damage. Therefore, an inventory of vegetation, slope, topography, soil and wildlife was conducted. Three main sites were studied based on areas that the City of Northampton was interested in acquiring. See Figure 1 for the location of the case study area.

Fieldwork included several visits to the open space areas to conduct a natural resource inventory. This included a geographic survey of surrounding land, and adjoining

zoning, brook course, and tributaries; a sampling of vegetation using and a visual inventory of brook obstructions, natural or otherwise.

Parsons Brook is located in south central Northampton, an area that is prime for open space protection. Throughout Parson's Brook's course, it varies in width and velocity. It starts out rather small and slow near the source, often spreading out into a small marshy area for a few yards before resurfacing. Further downstream, the brook begins to widen and pick up more velocity and depth as tributaries and runoff from the roads add to the brook.

There are few man-made obstructions in the stream. And aside from the beaver dam, there are no other major obstructions besides brush and fallen trees. The terrain varies around the stream from slightly sloping to slopes of 15% or more. The vegetation inventory includes various species of maples, ash, pine, ferns and mosses. Soil maps were reviewed to identify the different soil types that surround the stream are typically loams. Wildlife in the area consists of the usual array of birds, raccoons, deer, squirrels, chipmunks and skunks. Beavers are also in the area and have created an impressive system of terraced dams to form a fairly large pond.

Data Collection

In this section of the paper, the details of the resource will be discussed. Starting at the source, the transect moves downstream, section by section to complete the inventory.

Beginning in Parcel 1, the brook surfaces roughly 20 feet from the road and begins its southeasterly course. At this point, the brook is very shallow, often spreading out into a marshy area before collecting into a solid brook. The terrain is fairly flat, with a slight incline to the road on the north side. The soil characteristic of the area consists of PcB or Paxton very stony fine sandy loam with 3-8% slopes. After about 50 feet, the brook crosses Parcel 2. By this point, the brook has established itself into a single stream. The flow is slow and shallow. The lawns of Parcel numbers 3,4 and 5 (south of the brook) come relatively close to the brook itself, within 10 feet. Lawn debris is piled up in spots along the brook. Fallen trees and old tree stumps block the stream in some places, causing the stream to form small pools. After another 20 feet the yards begin to slope upwards to about 3%.

The brook at Parcels 6, 7 and 8 becomes a bit wider and the velocity of the water picks up. The terrain becomes slightly more inclined on either side of the brook, with the greater slope on the southern side. The debris in the brook still consists of fallen trees, yet there is a picket fence gate thrown over the brook between Parcel 6 and 7. The soil composition has changed to ReB or Ridgebury very stony fine sandy loam 3-8% slopes. Within Parcel number 8, the terrain is increasingly steep with a slope of about 20%.

Parcel 9 is a transition point for the composition of the brook. There is a path running from Burts Pit Road across the brook to the road to the south. At the brook crossing,

there is a makeshift bridge made of an old door, some logs and old planks. There were many bicycle tracks observed on this path, indicating a popular route for local mountain bikers.

The vegetation for this area was relatively uniform, consisting of a few white pine trees, Red maples, Swamp Oak, and Yellow and American Beech trees. Cinnamon Fern as well as Crested and Sensitive were seen in the area as well. Common mosses also grow on the rocks in the stream. Scattered Birch trees are to be found downstream.

At this point, the brook has picked up speed and becomes deeper. The terrain is now steeply inclining on the north side of the brook, and the lawns are now up the hill and about 30 feet from the stream. The southern side of the brook is still slowly inclining, but not yet becoming steep. This area is also marshy in nature and the land surrounding the brook is saturated. The soil content is Ma or Maybid Silt Loam.

Vegetation is denser in this area. It still includes the White pine, Swamp Oak, Red Maple and Beech trees, but there are more Birch trees and several types of low brambles. The same types of ferns exist near the brook as above, and mosses are abundant. Mountain Laurel and Swamp Azalea are also found here. Small chutes of Princess Pine were also noted.

The southern side of the brook begins to slope upwards at a steeper angle when crossing Parcel 11. Tributaries begin to join the brook at different intervals on both the northern and southern sides. By the time the brook reaches Parcel 12, the topography is very steep on both sides and the vegetation consists of mainly White Pine and Hemlock trees. There are no nearby houses or lawns in this vicinity.

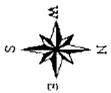
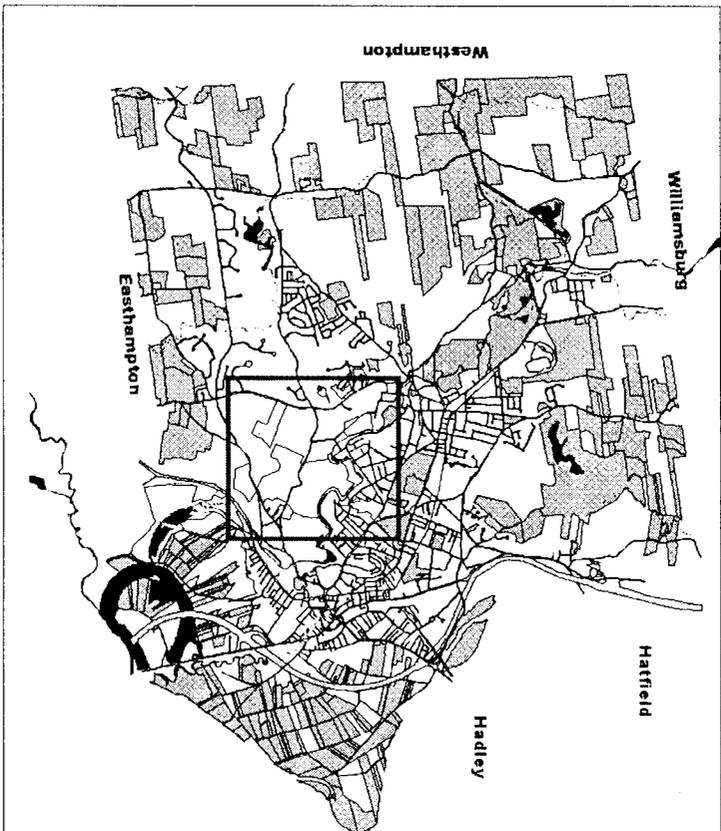
Now the brook empties out into a beaver pond. Surrounded on all sides by steep slopes, this pond looks to be several years in the making, with an active network of beavers adding to it. The pond covers approximately an acre and a half of Parcel 12. There are felled trees all around the pond yielding evidence of beaver intervention. It is here that the brook turns south. In the southwestern corner of the pond, lies a very large beaver dam of about 100-150 feet in length. Another 2 dams and what looks to be the making of a third follow this main dam.

The house on Parcel 13 has a network of paths that lead down past the pond and along the brook. After the dams, the brook then widens to about 10-20 feet across and deepens to 1 or 2 feet. It moves fairly swiftly. Topography in this area is still steeply inclined on either side, but gradually decreases downstream. The houses on the western side of the brook are very close to Parsons Brook. The house on Parcel 14 sits on the edge of the incline overlooking the brook. There are no further obstructions until Parcel 16. There is a bridge made out of telephone poles that connects a network of trails between Parcel 15 and 16.

The soil here becomes visibly sandy and increasingly darker while the vegetation consists of an abundance of White Pine, Eastern Hemlock and Oak. As the terrain

Figure 1. Northampton, Massachusetts Build-out Scenario

Northampton, Massachusetts Build-Out Scenerio

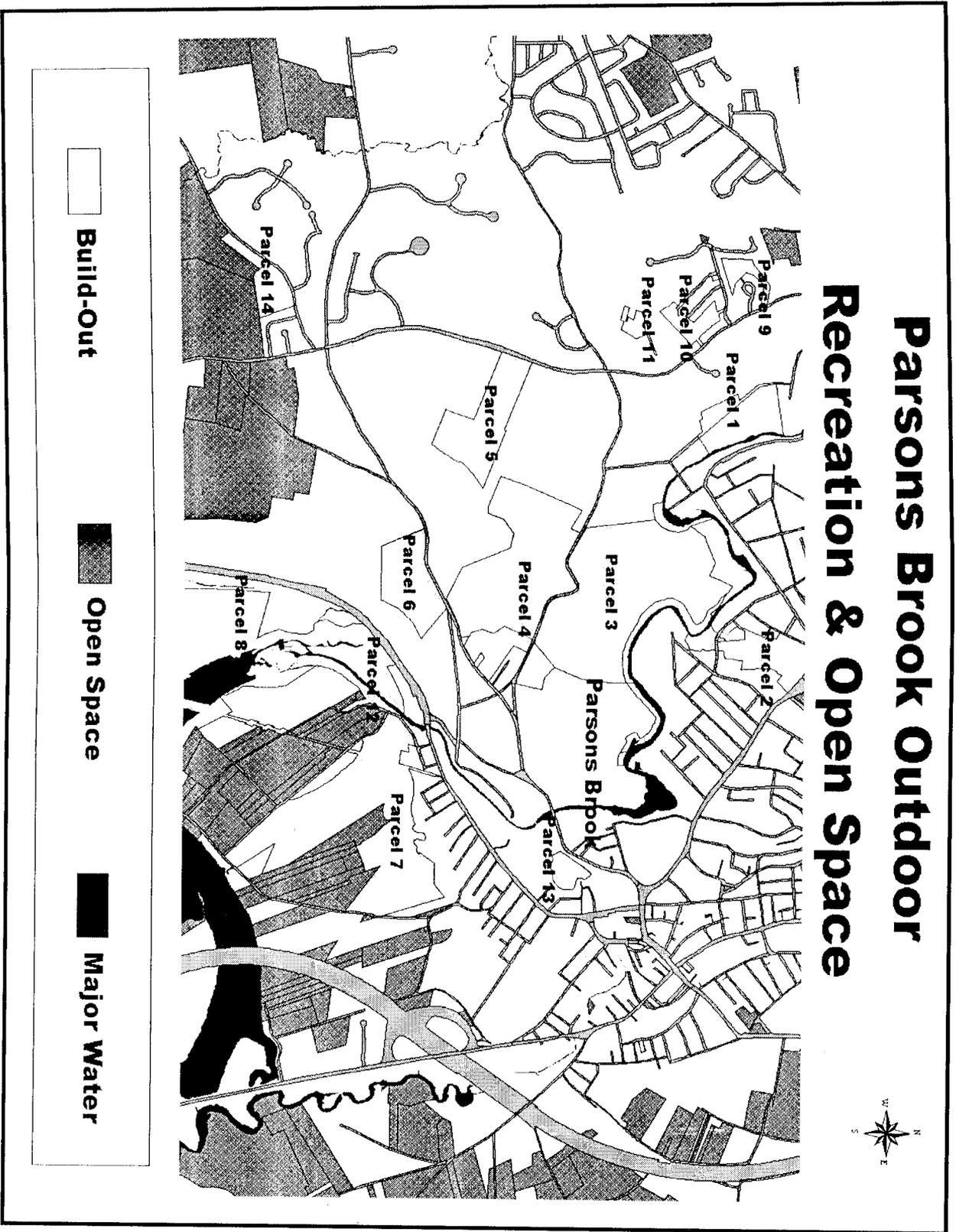


This Build-Out represents an illustration of the consequences of a continuation of current growth trends in Northampton, Massachusetts.

-  Major Water
-  Open Space
-  Build-Out

Figure 2.

Parsons Brook Outdoor Recreation and Open Space Opportunities



which is a poorly drained soil. The survey of the brook ended near the southern edge of Parcel 16.

The ultimate conservation of Parson's Brook in the City of Northampton would provide a small yet important habitat for local wildlife. The brook provides a drinking source for many woodland animals, a habitat various species, and a very aesthetically pleasing area for the surrounding community. Purchasing some of the land buffering the brook may prove to be a worthwhile investment. Some parcels may be easier to come by than others and some owners may not agree to the idea, but an overall effort should be made to protect the brook and to preserve the natural character of the area.

Results

The parcels that may be of some interest to the city are as follows. Parcel 1 contains the area where Parsons Brook originates. The area is wooded and vacant. It would be an excellent area to preserve. The brook crosses Parcels 2 and

3 near the edge of the property and could be considered a priority. Parcels 4, 5 and 6 may be a little more difficult to acquire because there is no direct public access to the property. Secondly, adjoining residential landowners may oppose open-space purchase in their back yard for fear of crime. An easement in this case may be the best option. Parcel number 7 is oddly shaped, and Parsons Brook crosses it in an area that is uninhabited to the viewer. This parcel contains the path used by mountain bikers, and may be of importance for erosion prevention purposes. Parcel 8 is cut in half by the brook, but is also an area where an easement could be procured. The back land on this property is fairly wooded and would be very beneficial in preserving as well. Parsons Brook cuts across Parcel 9 at the very edge, and could be considered a priority spot, whereas parcel 10 is bisected by it and may be harder to obtain. Parcel 11 houses a great length of the brook and is heavily wooded. This spot would be a wonderful piece to preserve, even though it is bisected by the brook and may be met with some difficulty in obtainment. Table 1. illustrates this priority.

Table 1. Priority of open-space land in Northampton

Parcel Number	Priority	Parcel Number	Priority
1	Hi	8	Hi
2	Hi	9	Hi
3	Hi	10	Lo
4	Lo	11	Hi
5	Lo	12	Hi
6	Lo	13	Hi
7	Hi	14	Lo

From this point Parsons Brook enters the gravel pit area and then forms the boundaries between several different parcels. This is a very aesthetically pleasing area and one that should be of high priority. The only area that may be of some concern is along the edge of Parcel 14 because the house on that property is very close to the brook. The rest of the parcels have the brook as a border between them and should be considered a high priority as well.

Discussion

The build-out is a very useful tool for land use planners. GIS, with accurate and complete data, can be used to inventory these resources with the ease and precision of a computer. Alternative scenarios can be created and compared with a click of a mouse button.

The field work part of this project was more extensive than originally thought, but following the old adage "garbage in - garbage out", it is a necessary component in any GIS application. One cannot skimp on data collection. And available data in digital form is often not readily available for municipalities. Data may amount to as much as 75% of the total expense of the project, so one must recognize the importance of complete data collection.

This study may have over emphasized the need for soil data. For example, open space lands are less dependent on

soil type, then would agricultural lands. But it was felt that complete data would be preferred since it is easier to not include something instead of having to build the geographic layers after the fact. It is recommended that future studies in open space planning consider specifically their data needs before conducting the inventory.

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A SPATIAL ANALYSIS OF WILDERNESS CAMPSITES IN LYELL CANYON, YOSEMITE NATIONAL PARK

Steven R. Lawson

Ph.D. Candidate in Natural Resources,
University of Vermont, Burlington, VT 05405

Peter Newman

Ph.D. Candidate in Natural Resources,
University of Vermont, Burlington, VT 05405

Abstract: During the summer of 1999, Yosemite National Park staff collected GPS data to inventory the number and distribution of wilderness campsites in Lyell Canyon, Yosemite National Park. The data were collected after one month of campsite restoration work had been conducted by a student work crew. This study integrated the GPS data with digital raster graphics data for Lyell Canyon to create a wilderness campsite monitoring system tool based on a Geographic Information System (GIS). The monitoring tool developed in this study gives resource managers the ability to identify the number and spatial distribution of campsites in Lyell Canyon that are within and out of compliance with park guidelines for wilderness campsites. The monitoring tool can also be used to record the history of specific campsites from season to season, track changes in visitor use patterns, and identify potential problem areas. Further, this monitoring tool provides managers with insight into the successes and potential failures of management efforts.

Introduction

Yosemite National Park is located in the heart of the Sierra Nevada, in east central California. Yosemite National Park was established in 1890, and is considered to be one of the "crown jewels" of the National Park system. The establishment of Yosemite National Park as the second park in the National Park system (Yellowstone National Park was established in 1872) represents one of the nation's first significant commitments to wilderness preservation (Nash, 1967).

Today, approximately 94 percent of Yosemite National Park's 760,000 acres of land are designated as wilderness under the 1964 Wilderness Act (Yosemite National Park, 1999). The 1964 Wilderness Act mandates the National Park Service to maintain designated wilderness areas in their natural condition "...where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain" (1964 Wilderness Act).

As part of their effort to meet the mandates of the 1964 Wilderness Act, Yosemite National Park officials have developed guidelines for the location of campsites in designated wilderness areas of the park. The guidelines

require that all campsites established in wilderness areas be located 100 feet or further from the nearest water body (i.e., river, stream, lake, pond). In addition, the guidelines require that wilderness area campsites in Yosemite National Park be located 100 feet or further from the nearest trail.

The study area for this research project is Lyell Canyon, located in designated wilderness in eastern Yosemite National Park. Lyell Canyon is formed by the Lyell Fork of the Tuolumne River and runs north to south at an elevation of approximately 9000 feet. Park visitors can access Lyell Canyon by hiking the John Muir Trail from Tuolumne Meadows. The Lyell Canyon section of the John Muir Trail is considered by many to be a highlight of the Pacific Crest Trail, which runs from Mexico to Canada. The canyon is an easy hike from Tuolumne Meadows, and as a result, sees intense use during the summer months.

In an effort to manage the physical and social impacts of intense visitor use, Yosemite National Park operates a trail head permit system. During weekends from June through Labor Day, Lyell Canyon's trailhead is typically at capacity (i.e. all available permits for the area are issued to park visitors). The intense use of Lyell Canyon is accompanied by a high demand for places to camp in the Canyon. The high demand for campsites in Lyell Canyon presents a challenge to park managers who must minimize recreation-related impacts to the resources while providing places for visitors to camp. This study focuses on providing managers with a wilderness campsite monitoring tool that will assist them in meeting this challenge.

Specifically, one of the goals of this study is to provide Yosemite National Park officials with spatial information about the existing campsites located in Lyell Canyon. This information will allow park officials to determine whether the campsites located in Lyell Canyon meet their guidelines for wilderness campsites. Three objectives were identified to achieve this goal:

1. Identify the number and location of existing campsites in Lyell Canyon.
2. Identify the number and location of existing campsites in compliance with wilderness campsite regulations (i.e., distance from water, distance from trails).
3. Identify the number and location of existing campsites not in compliance with wilderness campsite regulations.

During the summer of 1999, Yosemite National Park staff removed approximately 30 campsites from Lyell Canyon. The primary purpose of this management action was to remove campsites that violated the park's guidelines for wilderness campsites (i.e. were located within 100 feet of trail or water). The second goal of this study was to provide Yosemite National Park staff with information to help them assess the effectiveness of management actions taken to meet park guidelines for campsites located in Lyell Canyon. Three objectives were identified to meet this goal:

1. Identify the number and location of campsites removed from Lyell Canyon during the summer of 1999.

2. Identify the number and location of campsites removed from Lyell Canyon during the summer of 1999 that were in compliance with wilderness campsite regulations.
3. Identify the number and location of campsites removed from Lyell Canyon during the summer of 1999 that were not in compliance with wilderness campsite regulations.

Data

During the summer of 1999, Yosemite National Park staff recorded the location of existing and removed campsites in Lyell Canyon, using a Trimble Pro-XR GPS device. Park staff used the software package GPS Pathfinder Office (version 2.10) to correct the GPS data. The resulting output included two vector coverages (existing and removed campsites) represented as point features. The campsite point data were obtained from Yosemite National Park division of Resources Management for this study.

In addition to the vector data coverages of existing and removed campsites in Lyell Canyon, digital raster graphics for the entire park were obtained from the park staff. The digital Vogelsang Peak Quad was used to heads-up digitize the Lyell Fork of the Tuolumne River, smaller tributaries, wetland/lake areas and the John Muir hiking trail. Digitizing output included three vector coverages - a coverage of line features representing streams and rivers in Lyell Canyon; a coverage of polygon features representing wetland/lake areas in Lyell Canyon; and a coverage of line features representing the John Muir trail in Lyell Canyon. The "Clean" command in ARC/INFO was used to build topology for the three digitized vector coverages.

The completed GIS database contains a total of six coverages, each at a scale of 1:24,000. The projection and datum of all six data coverages are Universal Transverse Mercator and NAD 1927, respectively. Five of the coverages are vector data, and the sixth coverage is raster. The vector data coverages are existing campsites, campsites removed during the summer of 1999, rivers and streams, wetland/lake areas, and the John Muir Trail. The raster data coverage is the digital Vogelsang Peak Quad.

Analysis

The spatial analysis operations for this study were performed using ArcView Version 3.1 and ARC/INFO (version 7.2). The analysis was conducted in two stages. First, analysis of existing campsites data was conducted. Second, analysis of campsites removed during the summer of 1999 was conducted.

In the first stage of the analysis, the "Theme on Theme Selection" command was used to identify existing campsites located within 100 feet of any water body (i.e., rivers, streams, lakes, ponds). A second "Theme on Theme Selection" was performed to identify existing campsites located within 100 feet of the John Muir hiking trail.

In the second stage of the analysis the "Theme on Theme Selection" command was used to identify campsites removed during the summer of 1999 that had been located within 100 feet of water. A second "Theme on Theme Selection" was performed to identify campsites removed during the summer of 1999 that had been located within 100 feet of the John Muir hiking trail.

Three dichotomous variables were added to the attribute table for existing campsites and to the attribute table for campsites removed during the summer of 1999. The dichotomous variables were developed based on the results of the theme on theme selections. The first variable indicated whether or not a campsite was located within 100 feet of water, the second indicated whether or not a campsite was located within 100 feet of the nearest trail, and the third indicated whether or not a campsite was either within 100 feet of water, within 100 feet of the nearest trail, or both.

In addition to the theme on theme selections described above, the "Join" command was used to derive the distance from each existing campsite to the nearest river or stream, and to the nearest trail. The distance of existing campsites to the nearest river or stream and to the nearest trail were added to the table of attributes for existing campsites by the "Join" command. This procedure was repeated for the data set of campsites removed during the summer of 1999.

Results

The results of the data analysis suggest that further management actions need to be taken in Lyell Canyon to meet Yosemite National Park's guidelines for the location of wilderness campsites. Analysis of the data indicate that park officials have been relatively effective at locating campsites in Lyell Canyon relative to water bodies - more than three-quarters (77.1%) of existing campsites are greater than 100 feet from the nearest river, stream, lake, or pond (Table 1). However, park managers have been less effective at locating campsites in Lyell Canyon with respect to trails - more than two-thirds (65.7%) of existing campsites are within 100 feet of the John Muir Trail (Table 1).

Table 1. Number and percent of existing campsites in compliance with Yosemite National Park regulations*

	Greater than 100 feet from nearest water		Greater than 100 feet from nearest trail		Full compliance	
	Yes	No	Yes	No	Yes	No
Number of existing campsites	27	8	12	23	11	24
Percent of existing campsites	77.1%	22.9%	34.3%	65.7%	31.5%	68.5%

*Park regulations require that campsites be located at least 100 feet from water bodies and trails.

These findings are reinforced by the fact that the average distance of existing campsites in Lyell Canyon from the nearest river or stream is greater than 100 feet (220 feet), while the average distance of existing campsites from the nearest trail is less than 100 feet (85 feet) (Table 2).

Overall, the spatial analyses indicate that of the thirty-five existing campsites in Lyell Canyon, more than two-thirds (68.5%) are not in compliance with one or both of the park's guidelines for siting wilderness campsites.

Table 2. Distance of existing campsites from nearest trail and water (feet)

	Distance from trail	Distance from water
Mean*	84.5	219.8
Standard Deviation	71.0	99.0
Median	73.9	201.4
Minimum	1.0	74.6
Maximum	285.4	433.0

*n = 35

The management actions taken by Yosemite National Park to remove non-compliant campsites from Lyell Canyon during the summer of 1999 appear to have been effective. More than half (53.3%) of the thirty campsites removed from Lyell Canyon during the summer of 1999 were within 100 feet of the nearest trail (Table 3). A much smaller percentage (26.7%) of the campsites removed from Lyell Canyon during the summer of 1999 were within 100 feet of

the nearest river or stream (Table 3). The most compelling evidence that the park has been successful in their selection of campsites to remove from Lyell Canyon during the summer of 1999 is the fact that nearly three-quarters (70.0%) of the campsites removed were not in compliance with one or both of the park's guidelines for siting wilderness campsites.

Table 3. Number and percent of removed campsites in compliance with Yosemite National Park regulations*

	Greater than 100 feet from nearest water		Greater than 100 feet from nearest trail		Full compliance	
	Yes	No	Yes	No	Yes	No
Number of removed campsites	22	8	14	16	9	21
Percent of removed campsites	73.3%	26.7%	46.7%	53.3%	30.0%	70.0%

*Park regulations require that campsites be located at least 100 feet from water bodies and trails.

Conclusions

The information generated by this study provide Yosemite National Park managers with an important backcountry campsite monitoring tool. Park managers can use the GIS database created in this study to accurately assess the number and spatial distribution of campsites in Lyell Canyon that are not in compliance with Park guidelines. This information can be used by Park managers to prioritize the location of future backcountry campsite management in Lyell Canyon. In addition, the GIS database can be used by park managers to assess their progress toward achieving backcountry campsite management objectives and protecting visitors' wilderness experiences.

The GIS database developed in this study enhances the Resource Management division's institutional memory. This is a significant contribution to Resource Management, given that a large amount of the division's field operations are conducted by a seasonal staff. This monitoring system tool, based on GPS Universal Transverse Mercator (UTM) coordinates, gives resource managers the ability to record the history of specific campsites from season to season in a consistent manner. Having a monitoring system that remains consistent from season to season allows managers to accurately track changes in visitor use patterns, identify potential problem areas, and evaluate the successes and potential failures of restorative efforts.

There are, however, several issues to consider in using a GIS database as part of a backcountry campsite monitoring system. First, wilderness management is not a black and white science. Rather, it is an art of balance. Some campsites identified in a GIS database as non-compliant with park guidelines might be maintained because they are better than the next closest option. Second, the accuracy of the spatial data used to monitor backcountry campsites must be taken into consideration. For example, USGS topographical maps are accurate to plus or minus 40 feet. Therefore, some campsites identified in the results of the data analysis as being in compliance with park guidelines may in fact be out of compliance, and vice versa. Lastly, perhaps the greatest challenge in developing a wilderness campsite GIS database is obtaining reliable and usable

spatial data. The data used in this study are the product of a systematic monitoring effort on the part of the Resources Management Division of Yosemite National Park. However, monitoring efforts in many other park and wilderness areas are constrained from collecting spatial data due to limitations on funding and/or staff. As a result, the data needed to create a wilderness campsite monitoring system based on a GIS database may be difficult to come by in some instances.

The results of our research indicate that Yosemite National Park officials have been successful in their efforts to reduce the number of campsites in Lyell Canyon that are not in compliance with their wilderness campsite guidelines. The GIS database developed in this study can be used to identify and remove non-compliant campsites in Lyell Canyon. Further research should focus on developing similar GIS databases for other wilderness camping areas in the park. By developing additional GIS databases, Yosemite National Park will be better equipped to manage the location of campsites in wilderness areas of the park, and act in accordance with the legal mandates of the 1964 Wilderness Act.

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