

# The Effects of Actual Users on Perceived Crowding and Quality of Experiences in a Marine Park

Samuel V. Lankford, Ph.D.; Yuka Inui, M. S., Ariana Cela, M. Sc. & Oksana Grybovich, M. Sc. at University of Northern Iowa



## Goals and Objectives

A primary goal of this research project is to develop an instrument which can be used to identify social carrying capacity norms, user issues, and values relative to coastal and marine recreation impacts in Hawaii. Secondly the project identifies areas of concern and interest that should be communicated to the various agencies and organizations involved with managing the resource, users and activities at the site.

The following objectives guided this research project:

1. To develop and test the properties of a coastal/marine recreation impact attitudinal scale for future application in Hawaii.
2. To determine if the coastal/marine recreation impact attitudinal scale can be used to work within a varied mix of ocean recreation settings (bays, beaches, reefs) and user types (fishing, boating, diving, snorkeling, surfing etc.) and how these influence the psychometric properties of the scale.
3. To explore the relationship between attitudes toward resource use and its perceived condition, crowding, norms and satisfaction levels, value of the public good (contingent valuation) and the indirect/direct management tactics available to manage the resource.
4. To develop a public participation and decision making model that identifies predictors of potential policy interventions based on values and beliefs.
5. To present the findings in both written and oral presentations for County, State, Federal, and non-profit representatives.
6. To conduct a workshop on how the findings can be of assistance in the public policy process in Hawaii and beyond.
7. To demonstrate how the social sciences can provide data that complements the natural sciences data to influence public policy and resources.

## Rationale

Competition for and use of coastal and marine recreation resources and opportunities has become a major resource management issue within many coastal communities. Specifically, both the environmental and social carrying capacity of these areas are being exceeded. Consequently, local users are being displaced to less desirable areas, and satisfaction levels among tourists can decrease. Yet, decision-makers are usually limited to only environmental data available, and are therefore unable to fully utilize scientific data due to the lack of social and economic valuations. Consequently, there is a need to more fully understand the dynamics of this issue.

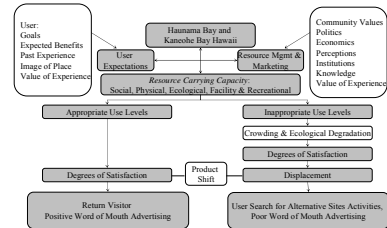
A review of the literature suggests there is a lack of survey instrument that reliably measures attitudes, crowding, satisfaction etc. with an emphasis on identifying social carrying capacity issues and indicators in coastal/marine environments (Lankford & Hetzle, 1996). There is a need to link ecological data with social carrying capacity and attitudinal data, and contingent valuation method (CVM) (Peterson, Driver & Gregory 1988). This proposed study was an attempt at addressing this important need.

## Carrying Capacity

Simply defined, carrying capacity can be defined as the amount of visitor use that can be appropriately accommodated within a park or outdoor recreation area. Wagar (1964) identified that carrying capacity of recreation areas could be determined in terms of ecology and deterioration, but the concept had to be augmented by the consideration of human values. Consequently, carrying capacity has two broad dimensions, social impacts and environmental impacts and thresholds. Within a recreational context (recreational carrying capacity is the level of use an area can withstand while providing sustained quality recreational experiences [Wagar 1964]), carrying capacity is further defined into the following (Shelby & Heberlein 1986):

1. Physical capacity is the amount of space available for the activity based on design and use levels.
2. Ecological or biological capacity is the ability of the resource to withstand recreational use without unacceptable damage to ecological components.
3. Facility capacity involves additions to the recreation environment intended to support visitor needs.
4. Social capacity is the number and distribution of visitors that provide minimal acceptable recreation experiences.

Figure 1 below outlines the basic considerations of this research proposal using social carrying capacity as a model.



## Research Methods/Study Sites

The study site, Hanauma Bay, island of Oahu in Hawaii was selected based upon its unique geography, particular resource, recreation use, conflicts, and crowding.



## Research Methods/ Subjects

The survey was conducted from July 2000 to June 2002 at Hanauma Bay by the Sustainable Tourism & Environment Program, School of Travel Industry Management at University of Hawaii and the samples were randomly selected.

Table 1 indicates the sample size and that response rate. The proportion of residents and visitors of the sample was 16.2% and 83.8% respectively

Table 1: Sample Size and Response Rate

for Hanauma Bay			
	Residents	Visitors	Total
Sample	102	526	628
Pre Response	102	526	628
Post Response	92	496	588
Post Response	90.20%	77.20%	79.20%

## Research Methods/ Instrumentation

Utilizing the attitudinal scaling techniques similar to those used by Lankford and Howard (1994), relevant items were tested and confirmed based upon the psychometric properties of the instrument and subsequent scales developed. Two questionnaires were used to measure the responses using a both a pre and post administration, and using a matched design (Mitra and Lankford 1999).

Perceived crowding was measured using nine-point Likert-type scales where one being not at all crowded to nine being extremely crowded. The level of user satisfaction was measured by two types of scales in the post-test questionnaire: global satisfaction was measured on five-point Likert scale ranging one being highly dissatisfied and five being highly satisfied, while 14 satisfaction items were measured on three-point scale ranging one being added satisfaction, two being neutral and three being detracted from satisfaction.

Principal components factorial analysis with oblique rotation was used. As a result four factors of satisfaction measures have been identified: quality and availability of facilities (0.62), distractions & encounters (0.72), debris (0.83), marine resources (0.62), and one item: weather conditions.

## Research Results/ User Characteristics

Table 2 shows the gender distribution of the sample

	Total		Residents		Visitors		χ <sup>2</sup>	Prob.
	N	(%)	N	(%)	N	(%)		
Male	330	39.2	41	40.2	289	39.6	0.006	0.952
Female	358	57.0	59	57.8	299	56.3		
No response	24	3.8	2	2.0	22	4.2		
Total	628	100.0	102	100.0	526	100.0		

Table 3 shows, the age of the respondents, years of residency and length of visit to Oahu.

Table 3: Age, Years of Residency in Oahu and Length of Visit of the Sample

	Total (n = 628)	Residents (n = 102)	Visitors (n = 526)
Age			
Median	32	30	33
Std. Dev.	13.11	14.42	12.84
Minimum	4	14	4
Maximum	80	80	74
Years of Residency in Oahu			
Median	2		
Std. Dev.	10.68		
Minimum	0		
Maximum	37		
Length of visit to Oahu (Days)			
Median	7		
Std. Dev.	8.32		
Minimum	1		
Maximum	120		

## Research Results/ Satisfaction

The majority of the Hanauma Bay users appear to be satisfied with their visit.

Table 4: Descriptive Statistics of Global Satisfaction

Statement	Total N	Total (%)	Residents N	Residents (%)	Visitors N	Visitors (%)
Highly Satisfied	209	43.2	30	32.6	179	44.4
Moderately Satisfied	144	29.1	33	35.9	111	27.5
Satisfied	95	19.2	20	21.7	75	18.6
Moderately Dissatisfied	33	6.7	5	5.4	28	6.9
Highly Dissatisfied	14	2.8	4	4.3	10	2.5

χ<sup>2</sup> indicates the Chi-square value.  
\*The mean value of residents is not statistically different than that of visitors. \*1 = -1.646, p = 0.100. Residents N = 19, visitors N = 48.

As table 5 indicates, there is a weak correlation between perceived crowding and satisfaction.

Table 5: Correlations among Total Users, Perceived Crowding and Global Satisfaction

Variables	Total			Residents			Visitors		
	r	p	n	r	p	n	r	p	n
Total Users	.498	<0.070	617	.92	<0.076	474	.496	<0.068	617
Perceived Crowding	.490	<0.047	526	.92	<0.152	418	.490	<0.021	617

\*Global Satisfaction was scored on 1 = highly dissatisfied to 5 = highly satisfied.  
\*Nine-point Likert scale where 1 = not at all crowded and 9 = extremely crowded.

Figure 2: Degree of Perceived Crowding within each Scale of Global Satisfaction

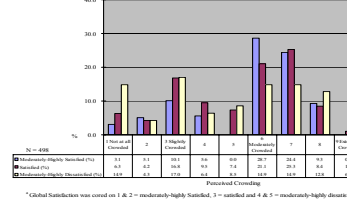


Figure 3: Perceptions of Perceived Crowding and Global Satisfaction According to Actual Use Level

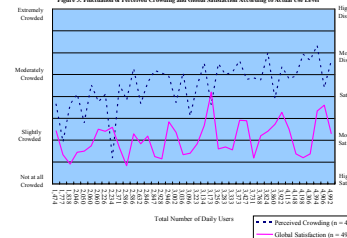


Figure 4: Estimated Total Users, Extrapolated Perceived Crowding and Global Satisfaction

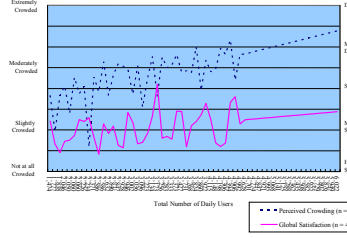


Table 6: Correlations among Total Users, Perceived Crowding and Satisfaction Factors

Variables	Total			Residents			Visitors		
	r	p	n	r	p	n	r	p	n
Total Users	.450	<0.103	617	.79	<0.001	474	.451	<0.118	617
Perceived Crowding	.450	<0.176	617	.79	<0.139	474	.451	<0.184	617
Total Users	.455	<0.120	617	.80	<0.009	474	.455	<0.140	617
Perceived Crowding	.455	<0.241	617	.80	<0.112	474	.455	<0.275	617
Total Users	.468	<0.044	617	.86	<0.026	474	.468	<0.044	617
Perceived Crowding	.468	<0.099	617	.86	<0.069	474	.468	<0.117	617
Total Users	.476	<0.075	617	.89	<0.011	474	.476	<0.072	617
Perceived Crowding	.476	<0.130	617	.88	<0.026	474	.476	<0.158	617

\*1 = detracted from satisfaction, 2 = no effect and 3 = added satisfaction.  
\*Correlation is significant at p < 0.05.  
\*Correlation is significant at p < 0.001.

\*Coded as 1 = highly dissatisfied to 5 = highly satisfied. Total N = 617.

\*The mean value of residents is not statistically different than that of visitors. \*1 = -1.646, p = 0.100. Residents N = 19, visitors N = 48.

\*χ<sup>2</sup> indicates the Chi-square value.

\*As table 5 indicates, there is a weak correlation between perceived crowding and satisfaction.

\*Overall, Figures 5 – 6 also graphically display the lowered levels of satisfaction rating due to crowding.

\*The following Figures (2 – 4) present the global satisfaction and the effects of crowding. Essentially, as the total count of users rise, overall satisfaction declines.

\*Figure 5: Perceptions of Perceived Crowding and Satisfaction Determinants According to Use Level

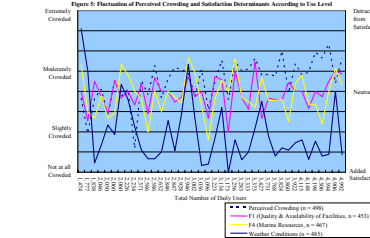
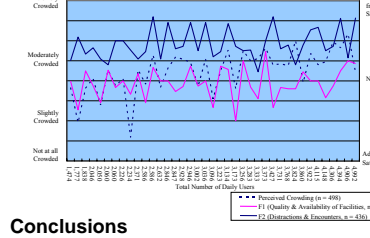


Figure 6: Perceptions of Perceived Crowding and Satisfaction Determinants According to Use Level



## Conclusions

The results showed a weak correlation between perceived crowding and overall satisfaction. The total number of users and overall satisfaction also correlated weakly. On the other hand, perceived crowding and total number of users correlated moderately. This finding may indicate that user perception of crowding may be a reasonable estimation of the real number of people in the Bay. Interestingly, the relatively low r-square of the approximate value of perceived crowding and overall satisfaction indicate that personal perception is subjective and varies greatly. Moreover, the weak correlations among use level, perceived crowding, and satisfaction may reflect the influence of multiple situational factors and setting attributes for users to evaluate recreation experience quality. The findings indicate that it could be meaningful to calibrate situational factors and subjective evaluation of user experiences in marine parks.



Pearson correlation coefficients were employed to identify which factors of satisfaction measures can be associated with actual use levels and perceived crowding. Especially, (Table 6), the satisfaction measures significantly correlated to the actual user count and / or perceived crowding scale. Visitors seem to be more affected by the total user number and perceived crowding.