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METHODS

Do focus groups and individual interviews reveal the same information for natural resource valuation?

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Abstract

Focus groups and individual interviews have become accepted methods used in the initial stages of valuation research. Whether focus groups and individual interviews reveal similar valuation information has not been thoroughly studied. The research tests the hypothesis that focus groups yield the same ecosystem service information as do individual interviews. The research also explores how the focus group and individual interview data might differ. The analysis shows that focus groups and individual interviews are not substitutes. They yield different information about ecosystem services and resource uses. © 2001 Elsevier Science B.V. All rights reserved.

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1. Do focus groups and individual interviews reveal the same information for natural resource valuation?

Focus groups and individual interviews have become accepted methods used in the initial stages of valuation research (e.g. Arrow et al., 1993; Boyle et al., 1994; Carson et al., 1994; Chilton and Hutchinson, 1999b). Qualitative methods may reveal the language and concepts that potential respondents use to discuss and conceptualize resource and environmental issues (e.g. Carson et al., 1994; Hutchinson et al., 1995; Chilton et al., 1998; Chilton and Hutchinson, 1999a). These lay terms and concepts may be incorporated into draft resource valuation questionnaires. Qualitative methods find further service in assessing the performance of these draft questionnaires (Mitchell and Carson, 1989; Johnston et al., 1995).

Existing valuation research makes little distinction between the data produced by focus groups and individual qualitative interviews (also referred to as in-depth and individual interviews). The assumption seems to be that focus groups and individual interviews provide the same informa-

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tion on natural resource activities, concepts, and values; that qualitative individual interview methods may be interchangeable with focus group methods (Johnston et al., 1995). However, the two methods are quite different in their structure.

Focus groups are group discussions designed to learn about subjects' perceptions on a defined area of interest. They involve as many as 12 participants and are conducted by a skilled moderator using a discussion guide. Focus groups rely on the dynamics of group interaction to reveal participants' similarities and differences of opinion (Krueger, 1994; Morgan, 1996, 1997). In contrast, in-depth interviews are guided, one-on-one sessions. The researcher uses the same interview guide for each session and makes comparisons of the interview data to determine similarities and differences (Weiss, 1994).

Focus groups generate data subject to group effects, both positive and negative. Group interaction may facilitate an exchange of ideas and information thereby stimulating individual group members thinking and allowing group members to build on each others ideas. However, members of groups may fail to exchange all information they have and groups may focus only on shared information (Levine and Moreland, 1995). Furthermore, problems of dominant group members, peer pressure and other group dynamics may be responsible for incomplete or biased information processing (Janis, 1982; Morgan, 1997). Individual in-depth interviews generate data in one-on-one settings similar to the settings of typical face-to-face survey questionnaires. Both focus groups and individual qualitative interviews may allow researchers to gain access to, and understand people's activities and perceptions that cannot be directly observed. Both methods, to varying degrees, may facilitate learning from a broad range of informants about their perceptions and may be helpful identifying variables, issues, and hypotheses for quantitative research. However, only individual qualitative interviews can be used to undertake such investigations independent of group effects (positive and negative) (Minichiello et al., 1995).

This paper reports the findings of a statistical analysis of focus group and individual interview data collected in preparation for a valuation study of a mangrove ecosystem. First, the paper describes the research hypotheses, design, and method used to collect focus group and individual interview information. Next, the paper discusses the procedures used to analyze the qualitative data, including the framing of a statistical test of the hypothesis that focus groups and individual interviews yield a similar range of data about a shared mangrove ecosystem. Results of the analysis are then reported and their implications discussed.

2. Hypotheses

Previous theory and results provide mixed guidance regarding the differences between focus group and individual interview data. Morgan (1997) posits that focus group data benefit from group dynamics and interaction. Morgan suggests that focus groups may have an advantage over individual interviews for topics that may not be thought out in detail by individual respondents due to accustomed patterns of thought. However, Janis (1982) and Levine and Moreland (1995) warn that the range of topics raised in focus groups may be limited to ideas and information that are shared by the group. That is, topics raised in focus groups may reflect 'groupthink' (Janis, 1982; Levine and Moreland, 1995). In contrast, Agar and MacDonald (1995) assert that individual qualitative interviews tend to reveal more detailed information than focus groups. Agar and MacDonald (1995) posit that individual interviews may place informants in a one-on-one position that, in contrast to focus groups, forces them to explain themselves. This, according to Agar and MacDonald, may result in the sharing of elaborate and sometimes intimate information. Whether focus groups and individual interviews produce similar data has not been systematically researched (Morgan, 1997).

Previous empirical research is not conclusive regarding the relative performance of focus groups and individual interviews (Morgan, 1997). In a study of idea generation, Fern (1982) found that group discussions did not produce signifi-

cantly more ideas than an equivalent number of individual interviews. An empirical examination of focus group and individual interview results in a technical text evaluation exercise found that focus group participants seemed to raise general problems and that individual interview participants seemed to raise detail-oriented problems (De Jong and Schellens, 1998). Wight (1994) reported differences in the use of stereotypic vocabulary in focus groups and individual interviews. Wight observed the same men to use gender-sensitive terms in individual interviews and sexist/macho in focus groups when referring to women. Gray and Denstein (1998) empirically analyzed data gathered in in-depth interviews but offered no generalizations about the method's relative strengths.

Understanding how focus group and individual interview data might differ may help resource economists choose the appropriate qualitative method or combination of methods for use in conjunction with natural resource valuation. The research was designed to learn about the range of services that the communities' associate with the shared wetland ecosystem. The research explored the general hypothesis that focus groups and individual qualitative interviews differ in the extent and type of information revealed concerning wetland ecosystem services and values. This research does not characterize the relative quality of the focus group and individual interview data.

Focus groups and individual interviews are hypothesized to reveal different types of information concerning consumptive and non-consumptive values associated with a mangrove ecosystem. If focus groups and individual interviews concerning respondents' uses and perceptions of local mangrove ecosystem services yield dissimilar sets of information on the range of ecosystem services, then, all else being equal, we expect that transcripts of those sessions would evidence dissimilar frequencies of ecosystem service information. The empirical analysis tests whether the frequencies of statements regarding the consumptive and non-consumptive values of mangrove ecosystems differ across focus group and individual interviewer data.

3. Research design

The qualitative research reported here was the initial stage of a nonmarket valuation study of mangrove ecosystems in Mexico's Yucatán Peninsula. The research included both focus groups and individual interviews. The qualitative research centered on two villages, Chelém and Chuburná, near the city of Progresso. These are located along a 15-km stretch of coastal fringe that borders the Gulf of Mexico on one side and Chelém Lagoon on the other. The two villages are comprised of families that have traditionally relied upon shared natural resources of the region, including the mangrove wetland, for their subsistence and livelihood. Chelém and Chuburná share similar socioeconomic characteristics and have roughly 475 and 215 households, respectively (Instituto Nacional de Estadística Geografía e Informática (INEGI), 1992). Focus group interviews and individual in-depth interviews were conducted with residents of these communities as part of the design phase for a nonmarket valuation effort supported by the Inter-American Foundation (IAF), the Organization of American States (OAS), and the Centro de Investigación y Estudios Avanzados del IPN, Unidad Mérida (CINVESTAV).

Few families in the research area have telephones; houses are not numbered; voter registration and other 'official' information is not readily available; and accurate area or street maps are unavailable. It was not possible for the researchers to develop a random sampling frame for focus groups and in-depth interviews. As a result, a purposeful sampling strategy was designed and implemented. Research assistants canvassed randomly selected sections of the target communities at staggered times of day to recruit participants for the focus groups and individual interviews. Each focus group was comprised of between four and seven individuals of the same gender from the same community. No respondent or their family members participated in more than one focus group or interview. This allowed for examination of the collected qualitative data across interview type, gender, and community. Roughly equal numbers of focus groups and individual inter-

views were conducted in the two communities, with slightly more men participating then women. A total of 97 year-round residents from the two communities were interviewed in one of 12 focus groups or 19 individual in-depth interviews.

The focus groups and individual interviews were designed and implemented following the generally accepted practices of Weiss (1994) and Morgan (1996, 1997), Morgan et al. (1998), respectively. A Mexican professional moderator used the same specially prepared discussion guide to conduct the focus groups and individual interviews. Figure 1 illustrates a sample discussion guide. The discussion guide was designed to have the moderator promote discussion of ecosystem services relevant to local beneficiaries and was based on the literature of mangrove ecosystem services (e.g. Costanza et al., 1989; Hamilton et al., 1989; Hirsch and Mauser, 1992; Ruitenbeek, 1992; Bennet and Reynolds, 1993; Barbier, 1994; Bann, 1997; Barbier et al., 1997; Carson, 1998). Table 1 illustrates the wide range of consumptive and non-consumptive values that have been associated with mangrove ecosystems. The moderator was instructed to encourage discussion of the widest possible range of values associated with the Chelém Lagoon ecosystem and to explore each service raised by participants with follow-up questions and nondirective prompts. The focus groups were conducted in centrally-located meeting

ECOSYSTEM SERVICES OF CHELÉM LAGOON
DISCUSSION GUIDE

PRINCIPLE QUESTIONS FOR DISCUSSION

1. What is life like here? How do people live here?
2. The area that is on the opposite side from the sea, what is it called? [that area]
3. How would you describe [that area]? What is it?
4. How does [that area] benefit you and others?

Note: When a respondent raises an ecosystem service in the discussion, you are to explore the respondents' understandings and perceptions of such service by inviting further comments.

ECOSYSTEM SERVICES THAT MAY BE RAISED

a) Extractive (consumptive) services may include:
   - i) fish
   - ii) shrimp
   - iii) shellfish
   - iv) wood
   - v) fruit
   - vi) salt
   - vii) honey

b) Nonextractive (non-consumptive) services (direct/indirect) may include:
   - i) recreation
   - ii) water filtration
   - iii) flood protection
   - iv) bird & fish habitat
   - v) hatchery/fishery
   - vi) endangered and rare species

c) Existence/option (also non-consumptive) services may include:
   - i) Value for future generations to have wetlands
   - ii) Value to have possible use of wetland in the future

Fig. 1. Discussion guide.

Table 1
Total value services of mangroves identified in the literature[a]

Consumptive services	Non-consumptive services
On-site fishery	Future use services (option value)
Crabs	Future research and education
Fish	Biodiversity
Shrimp	Potential medicinal plants
Off-site fishery	Spiritual and religious significance
Fish	Carbon sequestration
Shrimp	Storm protection
Lobster	Water purification
Forestry	*Habitat maintenance*
Firewood	Coral reefs
Timber	Migratory birds
Poles	
Roofing materials	
Woodchips	
Charcoal	
Hunting	
Duck	
Small game	
Deer	
Tourism and recreation	
Ecotourism	
Birdwatching	
Agriculture	
Fruit trees	
Animal feed	
Vegetables	
Palm oil, etc.	
Medicinal practices	
Aquaculture	
Shrimp	
Crab	
Fish	

[a] Sources include: Costanza et al. (1989), Aylward and Barbier (1992), Ruitenbeek (1992), Bennet and Reynolds (1993), Barbier (1994), Farber (1996), Janssen and Padilla (1996), Bann (1997), Barbier et al. (1997).

places and lasted for roughly one hour. The individual interviews were conducted at respondents' homes and typically lasted 30 minutes. All focus group and individual interviews were tape-recorded, transcribed, and subsequently coded. The total number of lines of the focus group transcripts (7842) is roughly equivalent to the number of lines of the individual interview transcripts (6933).

4. Analysis

Focus group and individual interview transcript data were sorted and coded as 14 variables in order to quantitatively test the hypothesis that the quantity of focus group information on the range of ecosystem services is substantially similar to individual interview information. One variable, interview type, records the type of interview (e.g. focus group or individual interview) associated with each transcript. The other 13 variables capture those wetland ecosystem services raised by respondents during the focus groups and individual interviews. Such a content analytical approach to qualitative data analysis is generally accepted (Krippendorff, 1980; Weber, 1990) and has been used as an adjunct to contingent valuation research (Chilton and Hutchinson, 1999a; Lunt, 1999).

Table 2 lists the 13 ecosystem service variables derived from the coding process. Table 2 also presents some representative references as well as the relative frequencies that the sessions raised each topic and chi-squared tests. As can be seen, most of the ecosystem services discussed by participants are consumptive use services (e.g. crab, shrimp, and wood collection). Some of the services discussed are non-consumptive uses (e.g. recreation, storm protection). As well, participants raised for discussion a subset of non-consumptive services sometimes referred to as passive use services (e.g. cultural and aesthetic significance, nongame habitat).

In terms of the relative ranking, it can been seen, for example, that cultural and aesthetic significance (e.g. wetland beauty) was raised during every focus group discussion, but that it was only the ninth most frequent service topic raised during individual interviews. While a similar range of ecosystem services was discussed by the focus groups and the individual interviews in aggregate, not every individual interview or focus group raised the entire range of mangrove services.

Table 2
Mangrove services identified by respondents

Type of use	Example	% Raising topic		χ_2	P	Odds ratio
		Focus groups	Individual interview			
Consumptive uses						
Chivita Collection	Small snails collected; food and commerce	100	95		n.s.	
Crab collection	Collected as bait; use for short octopus season	92	42	7.62[a]	0.006	15.1
Salt extraction	Used to be salt ponds; projects ruined mining	92	37	9.08[a]	0.003	18.9
Subsistence safety net	Lagoon will provide for our children; wetland is our safety net	83	68		n.s.	
Shrimp collection	Seawater brings shrimp; all fish for them	75	16	10.87[a]	0.001	16.0
Duck hunting	Ducks sometimes here; few locals benefit	42	42		n.s.	
Wood collection	Some collect fire wood; not much wood lately	17	5	[b]		
Non-consumptive uses						
Cultural/aesthetic significance	Wetland is beautiful; a pretty place to see	100	11	23.77	0.001	9.5
Nongame sightings	Flamingoes; crocodiles; heron; turtles; seagulls	67	42		n.s.	
Tourism	People come here to see flamingoes; tourists from Mérida visit for the day	58	21		n.s.	
Recreation	Take guests for boat trip; sometimes picnic there; celebrate Mass there	42	32		n.s.	
Storm protection	Can protect boats from storm; helps if water rises	42	16		[b]	

[a] d.f. = 1, $N = 31$.
[b] 50% of the cells have expected counts less than 5. Chi-square may not be a valid test.

Cross-tabulation analysis of each ecosystem service variable with the interview type variable was undertaken to test the null hypothesis that, in the sample population, the same percentage of focus groups and individual interviews raised each wetland service for discussion. Table 2 shows the Pearson chi-square test of the distribution of observed instances that focus groups and individual interviews raised each ecosystem service topic against the null hypothesis that each interview type results in the same frequency of the topic being raised. The null hypothesis was rejected for five variables — crab collection ($P = 0.006$), shrimp fishing ($P = 0.001$), salt extraction ($P = 0.003$), tourism ($P = 0.035$) and cultural and aesthetic significance ($P = 0.001$). To examine the strength of the association of interview type with respondents' raising the particular ecosystem service in discussion, odds ratios were computed. As Table 2 shows, it is about nine times more likely that a focus group of local resource beneficiaries raises the topic of the mangrove ecosystem's cultural and aesthetic significance than an individual interview. The topics of salt extraction, shrimp fishing, crab collection, and tourism are respectively 19, 16, 15 and five times more likely to be raised in focus groups than raised by individuals during one-on-one interviews.

To further appreciate the significant differences observed in the frequencies of discussion of ecosystem services by focus group and individual interview data, it should be remembered that four times as many people participated in focus groups (78) than in individual interviews (19). All else being equal, if there are differences in focus group and individual interview data that are a linear function of number of people, the expected odds ratios should be closer to 4. Furthermore, those discussion topics that do differ appear with observed odds ratios two to four times that suggested by a linear relationship with the number of participants. This suggests that more than the larger numbers of participants in focus groups are responsible for the increased frequency that certain topics were raised by focus groups.

Five of the nine most frequently mentioned topics in focus groups differed significantly in the frequency in which individual interviews raised them in discussions. Therefore, the research findings support the rejection of the null hypothesis. The data show that focus groups and individual interviews revealed significantly different ecosystem service information.

To further explore how the focus group and individual interview data on the wetland ecosystem might differ, the hypothesis that focus groups reveal the same type of information as do individual interviews was examined. To do this, the focus group and individual interview data were re-coded using a 'grounded theory' approach and placed into thematic groups (Strauss and Corbin, 1990; Chilton and Hutchinson, 1999b,a; Lunt, 1999). These thematic groups (ecosystem problems, why few fish, names for ecosystem, improvement suggestions, how people live in area, and perception of ecosystem) represent the primary subject matter of the respondents' responses and discussion topics during the focus groups and individual interviews. The qualitative data were further sorted into several discussion topic variables under each thematic category. Each of the thematic categories had between four and six topic response variables. Such thematic-coding, attaching specific codes to text-bits with a more or less clear relevance for a certain theme, is a generally accepted qualitative analytical approach in sociology and other fields (Strauss and Corbin, 1990; Sivesind, 1999).

The relative frequency of the incidence of each response variable enables a comparison of the type of information learned across the methods. Table 3 compares the percentage of focus group sessions raising each theme to the percentage of individual interviews raising the same theme. Disaggregating the several thematic variables into topic response variables allows for a comparison of both the range (i.e. number) as well as the uniqueness (i.e. appearance in one method but not the other) of the topics raised by the respondents. However, the disaggregation of the various topics from each theme, in this case, does not permit further statistical analysis of the observed frequencies (i.e. chi-square analysis) because the expected frequency for many of the topics is too small (< 5).

Inspection of the relative frequencies in Table 3 does shed additional light on differences in the information revealed by focus groups and individual interviews. The frequency that participants discussed particular topics during the focus groups and individual interviews differ. For example, among the problems confronting the ecosystem that participants discussed, more individual interviews raised the problems of decreasing fish populations in the coastal and in the lagoon fisheries than did participants in the focus groups. Conversely, more of the focus groups interviews generated suggestions such as aquaculture, bringing in outside experts, and increasing tourism as means for improving the ecosystem than did the individual interviews. Not only do the amounts of information on similar topics appear to differ between the two methods, but, as Table 3 illustrates, the range of topics also differs between the two methods.

Three themes (ecosystem problems, why few fish, and improvement suggestions) contain two discussion topics that were not raised at all by one of the methods. For example, none of the individual interviews raised the general level of unemployment as an ecosystem problem nor did they raise tourism as a possible means for improving their ecosystem health. Likewise, none of the focus groups mentioned the Ducks Unlimited of Mexico, America and Canada (DUMAC) duck

Table 3
Comparison of focus group and individual interview data sets

Theme	Discussion topics	% Raising topics	
		Focus groups	Individual interview
Ecosystem problems	Lagoon fishing down	42	63
	Unemployment	33	0
	Coastal fishing down	25	89
	Inmigration	25	26
	No salt mining	8	5
	Duck habitat project	0	37
Why few fish	Too many trawlers	17	26
	Too many fishers	17	63
	Weather	8	16
	Pollution	8	11
	Duck habitat project	0	32
	No regulations	0	42
Improvement suggestions	Aquaculture	67	21
	Expert advice	17	5
	Use restrictions	17	21
	Nothing will help	17	11
	Tourism	8	0
	Remove duck habitat project	0	21
Names for ecosystem	Wetland	83	89
	Estuary	83	53
	River	58	58
	Ponds	25	11
How people live in area	Fishing	100	100
	Masonry/painting	58	37
	Factory work in Mérida	33	11
	Seasonal work	17	53
Perception of ecosystem	Beautiful	100	11
	Source of subsistence	83	74
	Connection to sea	58	21
	Threatened	25	53

habitat restoration project. A project that, based on the individual interviews and subsequent investigation, seems to be highly controversial. The individual interviews did raise the DUMAC project as an ecosystem problem, a reason for there being so few fish, and an impediment to ecosystem improvement. This finding was particularly interesting and was amenable to a Pearson chi-squared test. It turns out that the observed difference in the frequency that focus groups and individual interviews raised the DUMAC project was statistically significant ($\chi^2 = 9.079$, $df = 1$, $P < 0.01$). Further illustrating differences in the information revealed by the two methods, the range of reasons suggested for the declining fish populations differed between the two methods. The focus groups raised only four of the six reasons proffered by individual interviews for the decreasing fish populations in the region.

These results demonstrate that the focus groups and individual interviews did not reveal the same quantity or type of natural resource valuation information. Not only do the two methods result in different frequencies of ecosystem service data, they generate different sets of information concerning the reasons local beneficiaries attribute to their current ecosystem problems and the possible means for improvement.

5. Conclusion

The analysis shows that focus groups and individual interviews are not substitutes. The information from each method was complementary, with each yielding somewhat different perspectives on the range of resource services, values, and issues. The observation that the focus groups did not reveal the controversial DUMAC project should be placed in the proper context. Focus groups conducted by specially trained moderators with appropriate discussion guides (scripts) are often used to explore controversial topics. However, the reported results do demonstrate that, all else equal, individuals may feel more comfortable volunteering controversial information unknown to researchers during individual interview sessions rather than sharing that information in a focus group setting among people from their locale. The group dynamics of focus groups may tend to encourage speculation about information. It may be that once groups have identified the obvious, routine activities that the group dynamics lead to consideration of 'what else.' In the case of consumptive and non-consumptive use information, the data suggest that the focus groups revealed significantly more information about intermittent consumptive use activities (e.g. crab collection, salt extraction, shrimp collection) than did the individual interviews. The significant difference in the frequency that the focus groups discussed the ecosystem's beauty support this notion in that the focus groups seem to have easily identified an obvious, routine non-consumptive use.

The key message of this research is not that one method is better than the other. It is that these two approaches to learning from resource beneficiaries about how they perceive, use, and value natural resources are complementary. As a result, nonmarket valuation research should be cautious relying upon information generated solely by one of them: (i) to support assertions that a particular survey instrument adequately addresses relevant passive use values, or (ii) to interpret valuation study results to include respondents' passive use values. Not only do the two qualitative methods provide different types of ecosystem information, reliance on one or the other may provide valuation practitioners with different impressions of the range or relative importance of ecosystem services. It appears that one-on-one qualitative interviews may reveal important insights absent group effects that are complimentary to focus group research. As a result, valuation researchers should typically use both.

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References

Agar, M.H., MacDonald, J., 1995. Focus groups and ethnography. Hum. Organ. 54, 78–86.

Arrow, K., Solow, R., Learner, E., Portney, P., Rader, R., Schuman, H., 1993. Report of the NOAA panel on contingent valuation. Federal Register 58, 4601–4614.

Aylward, B., Barbier, E.B., 1992. Valuing environmental functions in developing countries. Biodiversity Conservation 1, 34–50.

Bann, C., 1997. An economic analysis of alternative mangrove management strategies in Koh Kong Province, Cambodia, Economy and Environment Program for South East Asia, Singapore.

Barbier, E.B., 1994. Valuing environmental functions: tropical wetlands. Land Econ. 70, 155–173.

Barbier, E.B., Acreman, M., Knowler, D., 1997. Economic valuation of wetlands: a guide for policy makers and planners, Ramsar Convention Bureau, Department of Environmental Economics and Management, University of York, Cambridge, UK.

Bennet, E.L., Reynolds, C.J., 1993. The value of a mangrove area in Sarawak. Biodiversity Conservation 2, 359–375.

Boyle, K.J., Desvousges, W.H., Johnson, F.R., Dunford, R., Hudson, S.P., 1994. An investigation of part–whole biases in contingent valuation studies. J. Environ. Econ. Manag. 27, 64–83.

Carson, R.T., 1998. Valuation of tropical rainforests: philosophical and practical issues in the use of contingent valuation. Ecol. Econ. 24, 15–29.

Carson, R.T., Hanemann, W.M., Kopp, R.J., Krosnick, A., Mitchell, R.C., Presser, S., Ruud, P.A., Smith, V.K., 1994. Prospective interim lost use value due to DDT and PC13 contamination in the southern California Bight, Natural Resource Damage Assessment, Inc., La Jolla, CA.

Chilton, S.M., Hutchinson, W.G., 1999a. Do focus groups contribute anything to the contingent valuation process? J. Econ. Psychol. 20, 465–483.

Chilton, S.M., Hutchinson, W.G., 1999b. Exploring divergence between respondent and researcher definitions of the goods in contingent valuation studies. J. Agric. Econ. 50, 116.

Chilton, S., Burton, T., Jones, M., Loomes, G., 1998. A qualitative examination of preference reversals. The 1st World Congress of Environmental and Resource Economists, Venice, Italy.

Costanza, R., Farber, S.C., Maxwell, J., 1989. Valuation and management of wetland ecosystems. Ecol. Econ. 1, 335–361.

De Jong, M., Schellens, P.J., 1998. Focus groups or individual interview? A comparison of text evaluation approaches. Tech. Commun. 45, 77–88.

Farber, S., 1996. Welfare loss of wetlands disintegration: a Louisiana study. Contemp. Econ. Policy 14, 92–106.

Fern, E.F., 1982. The use of focus groups for idea generation: the effects of group size, acquaintanceship, and moderator on response quantity and quality. J. Marketing Res. 19, 1–13.

Gray, J.H., Denstein, I.L., 1998. Integrating quantitative and qualitative analysis using latent and manifest variables. Qual. Quantity 32, 419–431.

Hamilton, L., Dixon, J., Owen Miller, G., 1989. Mangroves forests: an undervalued resource of the land and sea. In: Borgese, E.M., Ginsburg, N., Morgan, J.R. (Eds.), Ocean Yearbook, vol. 8. University of Chicago Press, Chicago, IL.

Hirsch, D., Mauser, A., 1992. The economic values of mangroves: two case studies — Mida Creek and Funzi Bay, University of Amsterdam, Amsterdam.

Hutchinson, W.G., Chilton, S.M., Davis, J., 1995. Measuring non-use value of environmental goods using the contingent valuation method: problems of information and cognition and the application of cognitive questionnaire design methods. J. Agric. Econ. 46, 97–112.

Instituto Nacional de Estadística Geografía e Informática (INEGI), 1992. Yucatán-resultados definitivos: datos por AGEB urbana. XI censo general de poblacion vivienad, 1990. Instituto Nacional de Estadística, Geografía e Informática, Aguascalientes, Mexico.

Janis, I.L., 1982. Groupthink. Houghton Mifflin, Boston, MA.

Janssen, R., Padilla, J.E., 1996. Valuation and Evaluation of Management Alternatives for the Pagbilao Mangrove Forest, vol. 9. Institute for Environmental Studies, Amsterdam.

Johnston, R.J., Weaver, T.F., Smith, L.A., Swallow, S.K., 1995. Contingent valuation focus groups: Insights from ethnographic interview techniques. Agric. Resource Econ. Rev. 24, 56–69.

Krippendorff, K., 1980. Content Analysis: An Introduction to its Methodology. CommText Series, vol. 5. Sage Publications, Beverly Hills, CA.

Krueger, R.A., 1994. Focus Groups: A Practical Guide for Applied Research. Sage Publications, Thousand Oaks, CA.

Levine, J.M., Moreland, R.L., 1995. Group processes. In: Tesser, A. (Ed.), Advanced Social Psychology. McGraw-Hill, New York.

Lunt, P., 1999. Comments on Chilton and Hutchinson: beyond measurement issues in the focus group method. J. Econ. Psychol. 20, 491–494.

Minichiello, V., Aroni, R., Timewell, E., Alexander, L., 1995. In-depth Interviewing: Principles, Techniques, Analysis. Longman, South Melbourne.

Mitchell, R.C., Carson, R.T., 1989. Using surveys to value public goods: the contingent valuation method. Resources for the Future, Washington, DC.

Morgan, D.L., 1996. Focus groups. In: Hagan, J., Cook, K.S. (Eds.), Annual Review of Sociology. Annual Reviews, Palo Alto.

Morgan, D.L., 1997. Focus Groups as Qualitative Research. Sage Publications, Thousand Oaks, CA.

Morgan, D.L., Krueger, R.A., Scannell, A.U., King, J.A., 1998. Focus Group Kit. Sage Publications, Thousand Oaks, CA.

Ruitenbeek, H.J., 1992. Mangrove management: an economic analysis of management options with a focus on Bintuni Bay, Irian Jaya, vol. 8, Environmental Management Development in Indonesia Project (EMDI) and Dalhousie University, Jakarta and Halifax.

Sivesind, K.H., 1999. Structured, qualitative comparison. Qual. Quantity 33, 361–380.

Strauss, A., Corbin, J., 1990. Basic of Qualitative Research: Grounded Theory Procedures and Techniques. Sage Publications, Newbury Park, CA.

Weber, R.P., 1990. Basic content analysis. In: Lewis-Beck, M.S. (Ed.), Quantitaitve Applications in the Social Sciences. Sage Publications, Newbury Park, CA.

Weiss, R.S., 1994. Learning from Strangers: the Art and Method of Qualitative Interview Studies. The Free Press, New York.

Wight, D., 1994. Boys' thoughts and talk about sex in a working class locality of Glasgow. Sociol. Rev. 42, 702–737.