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PROGRAMA DE PÓS-GRADUAÇÃO EM OCEANOGRAFIA

PERCEPÇÃO DOS USUÁRIOS QUANTO À EROSÃO COSTEIRA NA PRAIA DA BOA VIAGEM, RECIFE (PE), BRASIL.

MÔNICA MÁRCIA VICENTE LEAL

RECIFE, FEVEREIRO DE 2006

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Orientadora: Drª Monica Ferreira da Costa

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SUMÁRIO

APRESENTAÇÃO

A iniciativa de realizar esta pesquisa começou em 2002, a partir da veiculação de uma matéria de jornal que falava a respeito de uma obra de contenção proposta pela Prefeitura do Recife. Na ocasião, a praia da Boa Viagem enfrentava um acelerado processo de erosão costeira, especialmente na porção sul. Esta obra, a ser implantada em substituição ao enrocamento existente na porção Centro-Sul da praia, consistia em colocar blocos de granito paralelos à linha de costa, com extensão de aproximadamente 2 km e distante 250 m do calçadão. Seria formada ainda uma linha de blocos perpendicular, que permitiria o acesso dos caminhões até o local de deposição dos blocos de granito no mar. Após este procedimento, seria feito o engordamento da faixa de areia dragada da plataforma adjacente. A notícia despertou a atenção da comunidade científica nacional e internacional. Uma série de reuniões foi realizada, e o conteúdo do projeto, suas vantagens e potenciais riscos, discutido por pesquisadores e gestores locais.

A partir dos questionamentos levantados sobre a natureza do projeto de contenção da erosão costeira na praia da Boa Viagem, pesquisadoras do Laboratório de Ecologia e Gerenciamento de Ecossistemas Costeiros e Estuarinos (LEGECE), do Departamento de Oceanografia da Universidade Federal de Pernambuco, levantaram a idéia de realizar uma pesquisa a fim de compreender de que forma os usuários de praia valorizam e usam a praia, e que decisão escolheriam a respeito da iniciativa da Prefeitura, caso fossem formalmente consultados.

Um estudo preliminar da opinião dos usuários da Boa Viagem foi realizado pelas pesquisadoras do (LEGECE), em parceria com um grupo de pesquisadores da Washington & Lee University. Foram elaborados uma metodologia de coleta de dados e um questionário, aplicado em um estudo piloto a um pequeno número de usuários.

O presente trabalho de dissertação consiste na continuação e desfecho do referido estudo preliminar. Neste estágio, uma série de mudanças e adaptações foram feitas a fim de

otimizar e tornar o estudo mais aplicável de acordo com o contexto da realidade sócio-ambiental do local. Para isso, foi desenvolvida uma ferramenta de pesquisa sócio-ambiental na forma de um questionário semi-estruturado, bem como um método de amostragem voltado para populações flutuantes de usuários de praia. Para tanto, foram levantados os conceitos teóricos e práticos que subsidiam as pesquisas sociais. O desenvolvimento do questionário levou a um produto final que continha 34 perguntas divididas em três partes (identificação, perfil e percepção). Nesta nova fase, o foco da pesquisa estava centralizado em quatro questões principais: (i) quem são os usuários da praia; (ii) de que forma eles freqüentam e usam a praia; (iii) o que eles conhecem a respeito dos problemas ambientais da praia, especialmente erosão costeira; e (iv) quais as suas prioridades quanto a investimentos e gerenciamento da praia.

Partindo das perguntas de pesquisa citadas acima, este trabalho teve como principal objetivo analizar as preferências, percepções e opiniões dos usuários da praia da Boa Viagem, com ênfase à erosão costeira e obras de contenção implantadas e previstas para o local, e com isso, fornecer subsídios ao processo de tomada de decisão acerca da gestão da praia.

Foi feito um teste piloto do questionário em agosto e setembro de 2004. A coleta de dados foi realizada em fevereiro e março de 2005, por meio de entrevistas pessoais e anônimas a 453 usuários escolhidos randomicamente dentro de critérios de prioridade. O trabalho de campo foi realizado com o auxílio de uma equipe de 12 entrevistadores recrutados e devidamente treinados acerca do funcionamento da metodologia e do questionário, a quem e como abordar para a entrevista, como agir em diferentes situações e como de fato realizar a entrevista e coletar os dados.

As praias da Boa Viagem e do Pina foram consideradas uma só unidade ambiental, denominada praia da Boa Viagem. A praia foi dividida em quatro áreas de acordo com características ambientais e morfológicas. A praia do Pina corresponde à Area I da praia da Boa Viagem. A quantidade de entrevistas foi proporcionalmente distribuída ao longo dos

diferentes trechos da praia, definidos segundo sua qualidade ambiental, dias da semana e horas do dia.

Devido à grande quantidade de informações geradas pelos dados coletados, os resultados foram divididos em três capítulos, na forma de manuscritos de trabalhos científicos escritos em Inglês, para submissão a periódicos internacionais: (i) sobre o desenvolvimento da ferramenta de trabalho, o questionário; (ii) sobre o perfil do usuário das praias da Boa Viagem e do Pina e; (iii) sobre a percepção ambiental dos mesmos quanto a erosão costeira e opinião sobre as obras de contenção existentes e planejadas. Estes manuscritos correspondem aos capítulos 2, 3 e 4 desta dissertação.

Nos apêndices de 1 a 5, dispostos no fim deste trabalho, encontram-se as ferramentas de apoio à realização da pesquisa na etapa piloto e na coleta de dados propriamente dita.

Palavras-chave: oceanografia, erosão costeira, Boa Viagem, Pernambuco.

APPLYING CURRENT SOCIAL RESEARCH METHODS IN THE ENVIRONMENTAL SCIENCES: ASSESSING FLUCTUATING POPULATIONS OF BEACH USERS.

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ABSTRACT

The methodology used for assessing users environmental perception on Boa Viagem beach is discussed. The objective was to describe beach users' socio-economic profile, frequency, habits, type of use and perception regarding the beach environment, with emphasis on coastal erosion and its prevention. The procedures adopted in each steps of the research are described and compared with the literature. Useful suggestions and tools are given as a methodological basis on how to construct a questionnaire, form and manage a research team, make interviews, conduct fieldwork, treat and analyze the data. This material is for anyone who turns their interest in doing a socio-environmental study, and especially assessing fluctuating populations of beach users. Since the study of the relation between human and environment is a relatively new approach in the environmental sciences, it is essential to environmental scientists to be acquainted with the principles largely used by the social sciences. Current social research methods can be applied to beach users, respecting the necessary adaptations. The suggestions given in this paper are focused on team-based research. However, the principles discussed and the resulting questionnaire can also be applied for small-scale studies.

KEYWORDS: Beach users, quali-quantitative data, social research bias, sample design, interview, questionnaire, tropical beaches, beach management, Boa Viagem beach.

INTRODUCTION

We are presently in the age of interdisciplinarity. The number of research works covering several areas of knowledge is increasing dramatically. These works aim to understand complex environmental phenomena and its relationships, finding applicable solutions (KAY and ALDER, 1999). The barriers that divided science into stationary, Cartesian, compartments have gradually been overcome (MARQUES, 2002). The complexity of the environmental problems, its causes and effects are now driving research interests.

This emergent perspective results from the recognition that a special factor has a large influence on recent environmental changes: human beings. Since its beginning, mankind has been interacting with the environment, acting and suffering action, modifying the landscape and leaving its records.

In the scientific community it is largely accepted that, for the majority of environmental impacts, man-induced causes are preponderant. However, the inclusion of man as a parameter to help the interpretation of environmental conditions is less practiced. Naturally, new paradigms are not accepted in the scientific community until clear and replicable objectives, methods and results are widely available (ALVES-MAZZOTTI and GEWANDSNAJDER, 2001).

On the other hand, the social sciences followed a historical orientation aimed at the comprehension of the perceptions, attitudes, knowledge and practices, social culture and structure (MARQUES, 2002). These issues embrace either individuals within society or cultures. Social research works have produced a wide range of knowledge focused on anthropological, psychological, behavioral, nursing, and educational variables (SHAFFIR and STEBBINS, 1991), in which environmental issues are less approached. These issues are approached more frequently than the environmental ones.

The union of the environmental and social variables around the solution of problems can add important elements to a discussion, which is still open. It can also allow the achievement of more likely to succeed formulation of suggestions for solving the problems and mitigating actions.

Therefore, terms as ‘environmental management’, ‘coastal management’, ‘collaborative and community-based management’ are growing in the scientific literature. KAY & ALDER (1999) state that coastal management could be interpreted as directing the day-to-day activities occurring on coastal lands and waters. In their vision, collaborative and community-based management are powerful tools, which have the potential to help

addressing coastal problems at the local level, and also to contribute to the socio-economic development of the local community. ABELEDO (2003) reinforce this idea and add that it is necessary to finance more studies with this approach, which can bear advances in both fundamental and applied science. To be successful in coping with the huge amount of coastal problems, coastal management initiatives must be flexible and involve as much management of humans, as well as physical aspects (VILES and SPENCER, 1995). In this new paradigm, communities and individuals within a specific environment have their lifestory, perceptions and perspectives taken into account. Some interesting socio-environmental researches have been made, with special regard to communities and coastal management (TRAN *et al* 2002; BALANCE *et al*, 2000; DUCROTOY and PULLEN, 1999; MORGAN, 1999; SUMAN *et al*, 1999; MAKOLOWEKA and SHURCLIFF, 1997; WILLIAMS and NELSON, 1997; DE RUYCK *et al*, 1997; BRETON *et al*, 1996; KING, 1995).

In spite of their importance, socio-environmental works are not easy to be done. Due to the subjective nature and complexity of one of its main subjects (man), it does not present the same objectivity of methods and results as the environmental sciences. Social studies vary according to the context of the research problem. In compensation, the research can provide data directly related to the target community, being more applicable to them (ALVES-MAZZOTTI and GEWANDSNAJDER, 2001; MILES and HUBERMAN, 1994). Though the evidences, this type of research is not well accepted or widespread among environmental scientists. However, with the increase of participative, multidisciplinary research, a great number of environmental scientists turn their interest to working with it (MILES and HUBERMAN, 1994).

Since social research focused on environmental issues is a new approach in environmental sciences, many scientists still look suspiciously to research of this nature. This concept can be easily changed if the environmental scientists who get interested in doing a research like this have a properly methodological basis to follow.

Many papers, sourcebooks and hand guides about this issue have been published worldwide. Some examples, used in this paper, are the works of SHAFFIR and STEBBINS, 1991; MILES and HUBERMAN, 1994; MACQUEEN and MILSTEIN, 1999; FODDY, 1995; KAPLOWITS and HOEHN, 2001; MCLELLAN *et al*, 2003; BOEIJE, 2004. Clear methodological principles, largely proved and used are discussed in them. It is necessary only to be acquainted with, and adapt them, to environmental themes and issues.

The present work aimed to establish a reliable and reproducible tool to assess the environmental perception of Boa Viagem beach users, regarding coastal erosion problems. These beaches are in Recife City, Pernambuco State capital, in Northeast Brazil (Figure 1). It has the objective to make considerations, regarding how the socio-environmental research must conducted, as well as to give recommendations to environmental researchers who are not acquainted with the methods used in social sciences.

Considering the large proportions of the issues in social research methods, it is not the intention to discuss everything related to it, but some hopes, principles and tools are given, together with general research experience.

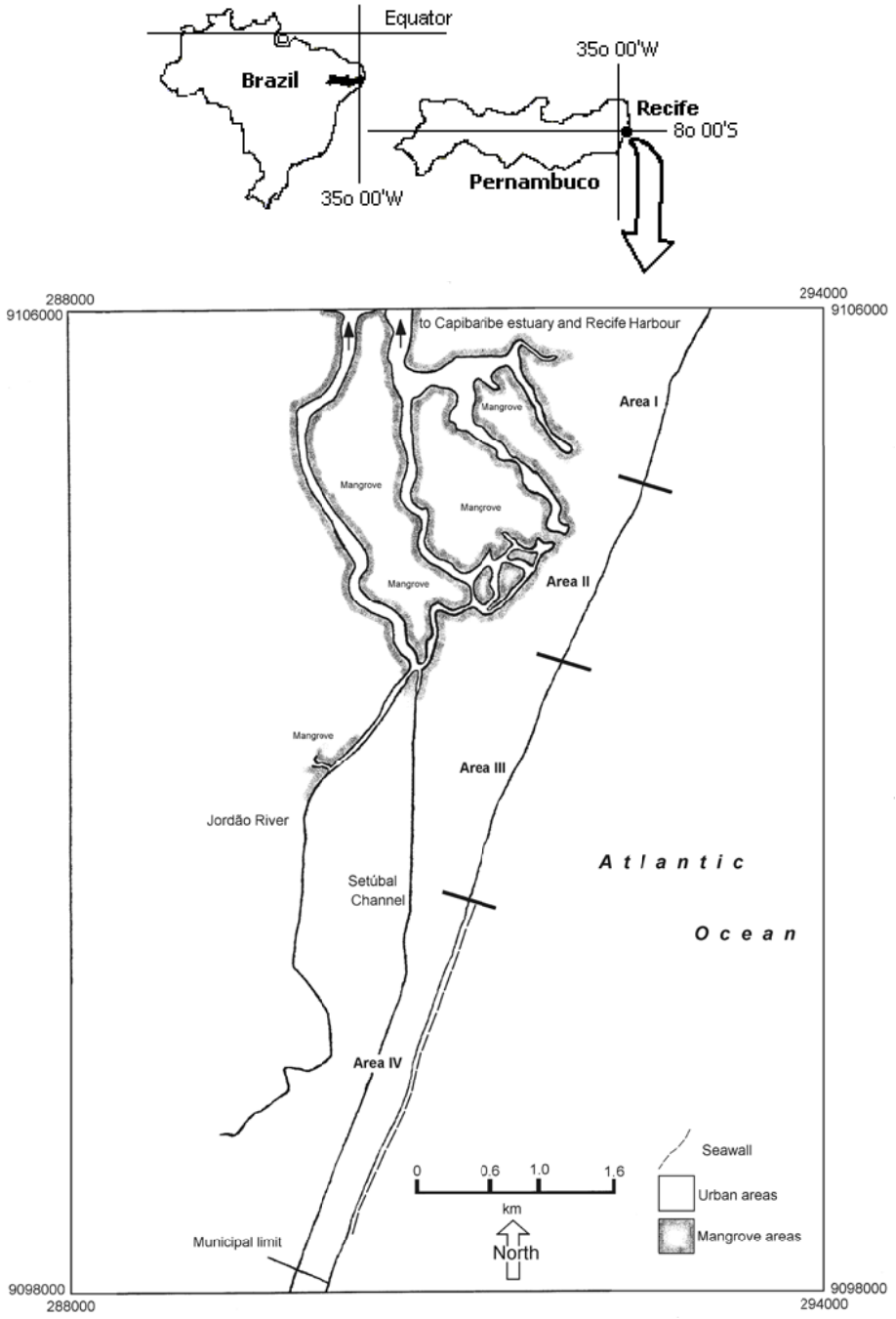

Figure 1: The Boa Viagem beach, Recife City, Pernambuco State, Northeast Brazil and the four Areas (I, II, III and IV) according to Silva *et al.* (2006) along which the sampling was conduced.

THE RESEARCH STEP BY STEP

As a result of the inductive feature (lack of previously established structure) of the social qualitative studies, the stages of data collection, analysis, and results treatment do not follow an ordered sequence, as in the traditional sciences. Most of the steps are made simultaneously, as the research process goes (ALVES-MAZZOTTI and GEWANDSNAJDER, 2001). This is an interesting point in qualitative research. However, despite this characteristic, this work will attempt to explain the steps followed in as much detail and order as possible to facilitate the comprehension. The research chronology, from March 2004 to February 2006, can be seen on Table 1, to provide a notion about the distribution of the effort to be mobilized.

Table 1: Research chronology. PE-previous exploration; TP-target population definition; RD-research design; QD-questionnaire design; SS-sample size definition; TR-team recruitment; TT-team training; PS-pilot survey; FW-fieldwork; CA-data coding and analyzing; RR-results reporting.

STEP	**MONTHS**																							
	2004										2005													2006
	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
PE	x	x	x	x	x																			
TP	x	x	x																					
RD	x	x	x	x	x			x	x	x	x													
QD	x	x	x	x	x			x	x	x	x													
SS			x	x	x																			
TR			x	x	x						x	x												
TT					x	x	x					x												
PS						x	x																	
FW												x	x											
CA								x	x	x				x	x	x	x	x	x	x	x	x		
RR								x												x	x	x	x	x

PREVIOUS EXPLORATION

There was a first initiative to develop the research in 2003. At this time, Boa Viagem beach was facing increasing coastal erosion, which was hitting the wall and the pavement along the beach, as well as threatening the sea-side road. Then, the Municipality of Recife city presented a project to mitigate the problem.

Their initiative to create an artificial beach structure to protect the shoreline and increase the area of sand available for beach recreation was discussed (COSTA and KAHN, 2003). It was investigated how beach users value and use the beach, and what would they decide about the municipality initiative if they were asked. Afterwards, an experimental survey was designed and executed with a small sample.

This study is the continuation of the initial survey done by COSTA and KAHN (2003). From this moment, as a second research team started working, some changes were made in order to improve the methodology. In this new phase, the research was focused on four main questions:

1. Who are the beach users?
2. In which basis do they frequent and use the beach?
3. What do they know about the beach environmental problems, especially coastal erosion?
4. Which are their investing priorities and initiatives for the beach management?

With all this material in hand, we continued the previous exploration, to enhance our existing knowledge and to pass to the next steps of the research.

DEFINITION OF THE TARGET POPULATION

From the sociological point of view, beaches are also a diverse environment. It is possible to find people exerting a wide range of activities and interests, as swimming, doing sports, relaxing, fishing, and working. They are all beach users. We can consider beach users everyone who goes to a beach (regardless the frequency) and uses it in any level of environmental affinity, type of activity and expectation. This concept does not depend of the origin and/or role played by the user on the beach. They can, for example, be found seated, doing apparently nothing, or running. Some examples: (1) general beach users- residents, visitors and tourists; (2) other users- fishermen, policemen, lifeguards, food and goods sellers.

The user's roles and expectations suggest different perceptions about the same environment. It can lead to different answers for the same question. So, in order to shape the collection of data, only one group of beach users was chosen, the general ones. The choice of a target population is of great importance for socio-environmental studies, mainly because in most of the environments, there is a range of people occupying, using and impacting it in several ways. It was not easy to make this choice, but it showed to be the best decision according to the research focus and objective.

In terms of contribution to coastal management, KAY and ALDER (1999) state that qualitative research on coastal users' perceptions and expectations can provide socio-economic information more efficient and effectively than most agencies.

People who work on the beach can be easily found because their frequency is more regular, even though some of them are not formal workers, who have to follow a daily working scale or routine. The other types of beach users, including local residents, are randomly distributed along the beach (DE RUYCK *et al*, 1997). Their frequency is random. It means that the general beach users are a fluctuating population. Their amount cannot be exactly previewed or counted, except approximately.

RESEARCH DESIGN

Studies focused on real phenomena are not easy to be done. They need to be planned with care. In general, due to natural complexity of reality, it does not fit perfectly in pre-existing, conventional, research designs. According to ALVES-MAZZOTTI and GEWANDSNAJDER (2001) in opposition to quantitative research, qualitative investigations are more diverse and flexible. And as a result, it differs significantly in respect to the level of previous structure (*e.g.* aspects defined early in the project).

Some scientists defend the opinion that the most efficient social research is the one in which the researcher molds the design according to the data collected. But to other scientists, it's possible to have a certain degree of organization already in the project, because when a researcher chooses some issue (a community, an institution), it is done with a clear objective and some questions in mind. In front of this, there is no reason to leave these objectives and questionings out of the research design, even though some changes could be done along the research process (MILES and HUBERMAN, 1994).

The research on Boa Viagem beach was designed with some level of organization. We tried to preview, with as many details as possible, each step of the research. We tried to plan the procedures to every possible situation but sometimes it was necessary to make further realignments in the methodology during the research process. This happened especially during the fieldwork. SHAFFIR and STEBBINS (1991) state that most projects depending on fieldwork are exploratory, and this means that the researcher approaches the field with special orientations, like *flexibility* in looking for data and *open-mindedness* about where to find it. In addiction, it is positive to establish a design for the research before setting the methodology in action. It can be useful to compare whether the data collection previews and the results will be confirmed or not. Nevertheless, it is essential to be open, flexible to receive what comes from the population under study. This may be the most important guidance to the research further

design. In the case of qualitative research regarding environmental issues, we share the vision of MILES and HUBERMAN (1994), that the amount and type of instrumentation should be a function of your conceptual focus, research questions and sampling criteria. These authors discuss two types of research organization: loose and tight. The tight design is better to avoid an overload of data. They advise that in the flurry of the research design the researcher cannot forget to take into account some issues such as the labor-intensiveness of data collection, frequent data overload, the distinct possibility of researcher bias, the time demanded for processing and coding the data, the adequacy of sampling, the generalization of findings, the credibility and quality of conclusions, and their utility in the world of policy and action.

QUESTIONNAIRE DESIGN

Since the exploration phase, it was decided to have semi-structured interviews, helped by a questionnaire with both open and closed-ended questions to ease the analysis (VIERTLER, 2002). FODDY (1995) presented some of the most important claims that have been made regarding these two kinds of question. MILES and HUBERMAN (1994) point out that the way chosen for collecting data must provide a satisfactory material in both form (numbers or textual data) and amount (number of samples), always keeping in mind the research objectives.

Interviews and questionnaires have been largely used in coastal management studies (POLLNAC and POMEROY, 2005; MALAVASI and MALAVASI, 2004; MYATT *et al*, 2003; PEREIRA *et* al, 2003; TRAN *et al*, 2002; NELSON and BOTTERILL, 2002; MACLEOD *et al*, 2002; ESTEVES and SANTOS, 2001; PENDLETON *et al*, 2001; NORDSTRON and MITTEAGER, 2001; MORGAN, 1999). The technique of interviewing has the great advantage to give the researcher the opportunity to stay in the field, in contact with the individuals of the target population.

In the beginning of the research it was a little difficult to formulate new questions based on the first questionnaire. In the pilot survey, the questionnaire designed was based on the one used by COSTA & KAHN (2003). After, the pilot questionnaire revealed its weak points, and the necessity to make great changes was obvious. Generally, questions emerged from the researchers' immersion in the research topic and the environment under investigation. So, it was decided to concentrate the design of the final survey questionnaire on these experiences.

The pilot survey questionnaire was composed of an Identification Part (ID), containing the number of the questionnaire, interviewer's name, the beginning/ending hours of the interview, the day period, the part of the beach (1, 2 and 3, adapted from SOUZA, 2004), site (pavement or sand area) and the tide (low or high). A second part with 22 numbered questions was divided into: beach user profile (questions 1 to 7); type of use and frequency, laws and policy/investing priorities on the beaches (8 to 18); and finally, the users opinion regarding the artificial structures built and planned to contain coastal erosion (19 to 22).

This questionnaire presented pros and cons based on the ideas explained above. From the total of 60 questionnaires applied, 47 (78%) presented at least one non-filled question. Such happened probably because of the inexperience of the interviewers, lack of familiarity with the instrument, speed of the interview and in the failure of the formulation of some questions. Question 10 'in which days and hours of the day do you prefer coming to the beach and why?' was the main responsible for this high percentage of non-filled questions. However, this experience helped the team to improve the quality of the subject approach, questioning and the tool itself bringing it closer to the methodological principles necessary to this research. The questionnaire was also checked by a specialists to enhance its quality (ALBUQUERQUE *pers.comm.*; ANDRADE *pers.comm*.) The pilot study resulted in a set of possible responses to be given by the respondents and, from this set, we decided which questions would be open or closed-ended.

The questionnaire for the full-scale survey was arranged in four parts: an ID (not numbered) followed by 34 numbered questions. The ID part was designed to help analyze the research performance as well as to help store and retrieve information. The day period and the part of the beach were adapted from SILVA *et al.* (2006). The priorities of beach user to be approached were added to help the interviewer. The numbered questions encompassed the beach user profile (Questions 1 to 8), the frequency and usage of the beach (Questions 9 to 22.1) and finally, the perception regarding coastal problems, mainly coastal erosion and beach artificial structures (Questions 23 to 34). A field called 'observations/notes' was used at the end of both pilot and full-scale questionnaires. The interviewers' personal notes about the respondent (e.g. if drunk, tedious, attentive, or if the questionnaires needed to be discarded or not) could be written here.

A visual aid was showed before the last question of both questionnaires to provide respondents with the necessary information to form an opinion regarding the artificial beach structure planned. It contained a scheme of the structure and a balanced list of advantages and disadvantages in several aspects, based in the description of Costa and Kahn (2003). After the exposition of the visual aid, the respondents were asked to give his/her opinion regarding the project. This resource was also improved for the full-scale survey by balancing the number of pros and cons on the list. All the questionnaires, survey protocols, and visual aid resources used in the research can be obtained from the corresponding author.

A difficulty pointed out by the pilot questionnaire was that the expression 'coastal erosion' is too technical for the non-academic population. According to our preview about beach users, which was confirmed by the pilot survey, we realized that it would be difficult to obtain data referring to a topic that, although part of their daily life, is named by a wide variety of popular expressions, but is very little know by its "real name".

As FODDY (1995) points out, when potentially difficult words (e.g. words that are not commonly used or have a technical meaning) have to be included, it is clear that they should

be defined for respondents. In our case it was impossible to give all the concepts involved to the respondents, because apprehending from them was part of the objective. We decided to use terms as ‘coastal erosion’ and ‘sea level rise’, assuming the predictable risk of achieving a great percentage of “don’t know” responses (FODDY, 1995). It was not possible to find good enough substitutes for these terms.

It is worth to the researcher to be familiar with the day-by-day local language. The questions should be written using a contextual vocabulary. It needs to be informal and at the same time keep a good language level (standard words, correctness, clarity).

Another important point to be emphasized is the ‘yeast effect’. It means a natural tendency to gradually increase the number of questions trying to gather more data. Topics seem to be so interesting that more and more questions keep on emerging. The researcher can think that if he/she has to disturb people on the beach, it ought to be the first and the last time to ask everything that matters. If he/she is not careful, or experienced enough, the yeast effect is unavoidable. However, as ALBUQUERQUE and LUCENA (2004) recommend, the questions should be formulated thinking ahead about how to treat and analyze the data generated. A great number of questions can mean a data overload, and a lost researcher (MILES and HUBERMAN, 1994; ALVES-MAZZOTTI and GEWANDSNAJDER, 2001). It is better to choose a topic and to concentrate on it. MILES and HUBERMAN (1994) recommended that a number of 12 or 13 questions are reasonable for a single questionnaire. The full-scale questionnaire we used risked to fall into the overload situation. It had a large number of questions (34), and it could be a dangerous procedure, mainly for novice researchers, but we took the risk.

In the process of formulating questions we also tried hard to follow the steps described by FODDY (1995), asking first what do they know and, after this, specific questions about their knowledge. We could not, for example, ask what do they understand by beach erosion without asking first if they had ever heard about it. This was done in order to avoid asking the opinion

about something without knowing whether the respondent was aware of the issue (Questions 24 to 29).

Also, we tried to avoid asking two questions in one. The other recommendation followed was to avoid putting bias, or formulating the questions driving the response to a certain direction. The steps to formulate questions are described in the literature (FODDY, 1995; ALBUQUERQUE and LUCENA, 2004). Based on the Boa Viagem beach users perception research, we add our own suggestions:

- Order the fields to be filled in as simply as possible, and give an adequate space between them. The interviewer tends to read the questions in a descending line from the left margin. This procedure helps to avoid forgetting to fill any question, as well as using the space of the next question in the case of long responses.
- The questionnaire must be simple, and avoid a large number of response possibilities in each question, opinion scales and the need of visual aids. It is worth choosing only one of these techniques, if it is the best way to gather the information wanted. Visual aids can also work as an icebreaker or warm up for the interview, because it calls the respondent's attention and break the monotony of the battery of questions. It serves as an extra incentive.
- The number of pages is also important. If the questionnaire has more than 2 or 3 pages the odds are that more refuses to answer or annoyance of the respondents.

SAMPLE SIZE DEFINITION AND SPATIAL AND TEMPORAL DISTRIBUTION

The fluctuating characteristic of the population is the main aspect that differs markedly the qualitative socio-environmental research on beaches. At other social sites, as school, hospitals, and neighborhoods the groups of people have a definite number and regular habits.

The individuals are known, and the frequency is regular (SHAFFIR, 1991). Therefore, the sample definition is just a matter of choosing the type and limiting it within the universe. However, in fluctuating populations, the lack of regularity in frequency makes these tasks a challenge. In this case it is still possible to make use of numerical criteria derived from stable populations for qualitative sampling.

Another peculiar aspect of field studies on beaches is the uniqueness of the chance to interview the subjects. Added to this, there are specific periods of the year (summer, vacations), when to find the greatest number of people using the environment. It is necessary to plan carefully the distribution of the targets along the best frequency periods. It happens mainly in cold regions, where periods of warm weather are restricted to a couple of months. It was also the case here, but with a much lesser intensity, since at the Brazilian Northeast the beaches are intensely used all year long.

The solution we recommend is to make a previous study regarding the amount of people on the beach where the research will be carried out. It may seem to be an extra-work, but actually, it is determinant of the sample size and spatial and temporal distribution. This first procedure can help the researcher in the exploratory phase to gather knowledge about important aspects of the target population. In addition, this calculation can also help the researcher to be confident in relation to the sampling effort, avoiding fieldwork beneath or beyond the absolutely necessary to answer the research's question.

The full-scale sample for the Boa Viagem beach users' perception research was defined based in the work of SILVA *et al* (2006). In their work, the beach was divided in four areas, according to the environmental health studied by SOUZA (2004) (Figure 1). The beach users were them directly counted, five times a day, during one week at each area. This study was carried out in one month during winter and one during summer months of 2004. Still under the light of the results from SILVA *et al* (2006), three periods of 2 hours per day were chosen for the application of the questionnaires: 8 to 10 a.m., 11 a.m. to 1 p.m. and 2 to 4 p.m.

Since this beach is more frequented in the summer (three fold), only this higher counting was considered for the sample size definition. A relevant question to be asked while the research is designed is: at which time (hours, days, months and years) it will be more probable to find the greatest amount of people from the target population on the beach? Afterwards, it is important to concentrate the working effort on these periods of time.

The number of summer users counted was 104.871 ind. per week along 25 stretches of 100m, evenly distributed along the 8km of beach. This number was entered in the table of BERNARD (1988) *apud* ALBUQUERQUE and LUCENA (2004), which shows the recommended sample sizes according to the populations' size for probabilistic samples. A number of 384 interviews were calculated as the most adequate sample size for our work, added of 16 more to keep a margin of error. This number was distributed proportionally among the days and hours in a week for each part of the beach. An example corresponding to Monday, Area I is given (Table 2). The five counting hours of SILVA *et al.* (2006) were grouped to form three distinct categories (Table 2; column 1). The % of people derived from the summer total weekly counting (104,871) was calculated (Table 2; column 3). After, it was calculated how many interviews, did this % represent in a sample of 400 interviews (Table 2; column 4). Rounding up the number we determined the target (Table 2; column 5). The targets intended and reached for the full-scale research sample are shown on the Table 3. The sample effort resulted in a number of 453 interviews, 115 in Area I, 127 in Area II, 183 in Area III and 28 in Area IV respectively. However, this is a raw product of the field effort. Later, we will discuss about the final number of questionnaires applied and used.

Table 2: Example of sample size on Monday, Area 1 to explain how targets were calculated. H1 to H5 are continuous hours of counting.

Hours of counting (Silva et al, 2006)	Number of people in 100m	% of total summer weekly users (104.871)	% of sample of 400 interviews	Target
H1 + H2	270	0.2	1.0	1
H3 + H4	1980	1.8	7.5	8
H5	1106	1.0	4.2	4

Table 3: Target of interviews for each area of the beach, days of the week and hours of the day. In brackets the real number of interviews made.

AREA I				
	8 to 10	**11 to 13**	**14 to 16**	**TOTAL**
Mon	1	8	4	13
Tue	1	3	1	5
Wed	1	2 (3)	1	4 (5)
Thu	1	2 (3)	1(2)	4 (6)
Fry	1	2	1	4
Sat	2	6	2	10
Sun	11 (15)	43 (44)	11 (14)	65 (73)
Total				105 (116)

AREA II				
	8 to 10	**11 to 13**	**14 to 16**	**TOTAL**
Mon	1	2 (3)	1	4 (5)
Tue	1 (2)	3 (5)	1	5 (8)
Wed	1	2	1	4
Thu	1	3	1	5
Fry	1	8	1	10
Sat	6	25	4	35
Sun	13 (15)	39 (34)	8	60 (57)
Total				123 (127)

AREA III				
	8 to 10	**11 to 13**	**14 to 16**	**TOTAL**
Mon	2 (3)	3 (6)	1	6 (10)
Tue	2	5	1	8
Wed	12 (10)	29 (37)	4	45 (51)
Thu	2 (3)	4	1	7 (8)
Fry	2	5 (8)	2	9
Sat	6 (9)	18 (17)	8 (12)	32 (58)
Sun	14 (24)	27 (41)	11	52 (76)
Total				159 (183)

AREA IV				
	8 to 10	**11 to 13**	**14 to 16**	**TOTAL**
Mon	1	1	1	3
Tue	1	1	1 (2)	3 (4)
Wed	1	1 (2)	1	3 (4)
Thu	1	1	1	3
Fry	1	1	1	3
Sat	1	2	1	4
Sun	1	3 (5)	1	5 (7)
Total				24 (28)

TEAM RECRUITMENT

As a result of the sample size required, it was necessary to form a team. This kind of procedure leads the necessity to establish criteria to choose the people who will integrate the team. It is necessary to consider personal profiles and skills. For instance, the level of specialization required for the interviewers depending on the research design and focus. Another thing to be mindful about is the number of team members necessary to develop the research roles keeping a good performance: staff support and to reach the target number of

interviews. We calculated an ideal maximum of four questionnaires for each interviewer every two hours of sampling, according to the performance reached in the pilot survey.

MILES and RUBERMAN (1994) point out that in qualitative research, issues of instrument validity and reliability ride largely on the skills of the interviewer. These two authors consider the interviewers as information-gathering instruments, and give some markers of a good qualitative researcher-as-instrument:

- Familiarity with the phenomenon and setting under investigation;
- Strong intellectual interests;
- Multidisciplinary view, as opposed to a narrow grounding in a single discipline;
- Good "investigative" skills (doggedness, ability to draw people out and to ward off premature closure).

These markers need to be considered for choosing the interviewers, and to guarantee the recruitment of a well-qualified team. In a small-scale qualitative research, one or two researchers can manage all the tasks. In this case there is not the necessity of recruiting, training and leading, as well as, the problems caused by different performances and bias. Notwithstanding, an advantage of working in a team is that if they are well trained, the quality of the data gathered is going to be satisfactory and the bias diminished by the dilution among them.

The research team for Boa Viagem beach users perception research was recruited from a list of students of Pernambuco Federal University who were interested in participating in the research. The subjects were recruited from the list used in the previously work of COSTA and KAHN (2003). All of the candidates registered were contacted by e-mail and/or telephone. The candidates who were still willing to participate were invited for a meeting. For the pilot study only two interviewers were selected from the list. The female was reading Civil

Engineering and the male, Geography. Only the female continued participating in the full-scale survey.

For the full-scale study students from the list and our circle of friends were contacted and asked to look for more candidates within the Uni. A number of eleven more interviewers were recruited.

A mentor, a coordinator, and twelve interviewers, formed the researcher team. The mentor had PhD in Environmental Sciences, the coordinator was a BSc in Biological Sciences and, among the interviewers there were: a MA in Tourism, two BSc in Biological Sciences, seven under-graduation students from the Environmental Sciences course, one under-graduation student Civil Engineering course and one Graduated in Secretarial Studies. In terms of gender there were ten women and four men in the team. The interviewers recruited were all volunteers. Due to our tight budget, they received only financial support for water and snacks at the field and a document asserting their participation as interviewers. Depending on the possibilities, more advantages, as bus fares can also be provided.

TEAM TRAINING

Right after the definition of the research team for both pilot and full-scale studies, a meeting for training and instruction was booked. This step is essential before starting the fieldwork to assure that all the team is aware of the things they are required to do, as well as how to do it properly. The main advantages of a meeting for training are listed on Table 4.

The briefing before the fieldwork demonstrated that some of the members of the group had more affinity with the nature of the research, while some were slightly timid. The meeting is an opportunity for the research managers to know the interviewers profiles, and help them during the research work through personal feedbacks.

In relation to the questionnaire, which is the collecting data instrument, it is important that the interviewers are aware of exactly what the questions want to ask, in which dimensions, how to address the questions, gather and record the information from the respondents. The question must be understood by the respondent in the way intended by the interviewer, and the answer given by the respondent must be understood by the interviewer in the way intended by the respondent (FODDY, 1995), closing a full communication cycle.

It is also important to give the interviewer a list of each others and managers' phone numbers and e-mails, and a written summary of the topics approached during the briefing. The material used during this research can be obtained from the corresponding author.

Table 4: The main advantages of a briefing for the research managers and the interviewers.

For the research managers:	For the interviewers:
•To explain the theoretical framework and expected results of the research	•To know the possibilities of application of the research results
•To personally explain the research design	•To be acquainted on how the research works
•To define everyone's roles and work	•To be aware of their roles and work
•To better know each one in the group	•To know each other and the research managers and be well integrated
•To share experiences and knowledge in order to help the group to develops know-how	•To solve doubts and know how to proceed in each situation
•To motivate the group for doing the fieldwork	•To decide for participating or giving up the group

PILOT SURVEY

Before the full-scale study it is essential to do a pilot survey. It consists of the application of the methodology, for instance, interviewing a few number of people from the

target population in the research setting. This procedure has the objective of verifying the adequacy and the effectiveness of the methodology (instrument + interviewer) before the beginning of the final, full-scale survey. It can identify and solve non-previewed problems in the questionnaire, for example, if the language, sequence and number of questions, length, and physical dimensions are conforming to the research objectives (FODDY, 1995; ALBUQUERQUE and LUCENA, 2004). Some works such as TUDOR and WILLIAMS (2005); MACLEOD *et al* (2002) adopted this procedure in their works.

In the pilot study, the research team can have a first opportunity to practice the techniques approached during the training. It means that, for the research team, the pilot sample works as a practical training. It allows them to rise and solve doubts, becoming better prepared for the full-scale sample.

Another point that deserves attention is to check how many minutes does each interview take. Thinking of beach users it is better to take the minimum time possible, to avoid bothering the interviewee with a tedious or inopportune interruption of their leisure activity.

Our pilot study was carried out in August and September 2004. For the interviewers, two students and the coordinator, the target was to interview 60 beach users, 20 in each of the three main parts of the beach. Their effort was focused mainly on interviewing along the three time sampling intervals (6 to 8 a.m., 11 a.m. to 1 p.m. and 4 to 6 pm.), until reaching the target. Their procedures in the field were based on the topics explained during the briefing.

A blank sample was carried out in a daily journey in the beginning of February 2005. By this time, the research team of twelve interviewers plus the coordinator was formed and the adjustments were done in the survey protocol, questionnaire and visual aid. The questionnaire consisted of two versions with some of the questions open and closed-ended, to test which option would be better for these questions. In this phase, the twelve researchers worked in pairs and each one received one copy of the two versions. Them, they were spread

on the beach. Their task was to approach and interview a person while the partner was observing and vice-versa. They were also recommended to ask the respondent about his/her opinion about the interview, and whether there was any difficulty in understanding or answering to the questions. These procedures were recommended by FODDY (1995).

At the end, the group was reunited and asked to recall theirs and respondents' experiences, impressions, doubts and the best version of the questionnaire. The group concluded that the method was not difficult and the questionnaire was easy to apply. Regarding the respondents, the majority enjoyed the way the interview was conducted by the interviewers and thought it was not difficult to answer the questions.

FIELDWORK

In this topic we discuss the procedures and performance of the information collected during the research on the beach. The members of the research team were coded from A to N. The coordinator corresponds to I.

Fieldwork is the hallmark of research for many social scientists. The method is essentially the same for these researchers – working with people for long periods in their natural settings. Societies are composed of a myriad of manifestations of the same human spirit. Exploring those manifestations is colorful and exciting, despite the group under study (FETTERMAN, 1991).

For the full-scale survey, the fieldwork was carried out from the second week of February to the end of March 2005. It was spent a week interviewing in each of the four areas of Boa Viagem beach. The researchers were divided in two groups. In this way we covered Areas I and II in the first week, and III and IV in the second week of sampling. March was used to complete targets and replace questionnaires where needed. For doing the work, all the

team received the research material (work schedule, badge, pen, clipboard, copies of the questionnaire and visual aid).

The choice of respondents

The beginning of the fieldwork is generally accomplished with anxiety about subjects' receptivity. This feeling is strong in the shy interviewer. Some even confessed to have started participating as an attempt to overcome this limitation. FETTERMAN, 1991 related the same impression from his first contact with some religious groups under study. This author reasoned that if you are in a school, for example, it is easier to approach respondents because the participants are asked to contribute by a person in whom they trust, like a teacher or the dean. But on the beach, you will not have the same facilitation. It is then worth to exercise the lessons learned during the briefing, putting to action efficient self-presentation and interviewing techniques.

Due to the variety of activities done by beach users, some of them are more accessible than others. According to MACLEOD *et al* (2002) this factor can introduce bias in the choice of the interviewees. These authors attempted to minimize this problem by approaching the apparently inaccessible beach users before or after their activity. This procedure was used in order to avoid under or over representation of groups engaged in water-based activities such as surf or windsurf, for instance.

On Boa Viagem beach there is no tradition of water sports, and neither jet skis nor boats are commonly used. Most people just seat and sunbathe, or take a quick dip in the sea. Some use to walk or run along the beach pavement, play football or other ball games. Fewer even are seen doing amateur fishing from the reefs. Based on these characteristics, we ranked the choice of the respondents by the interviewer according to the highest possibility to accept responding and give attention, as well as, to avoid stopping them from doing their activities

when they were approached: (i) people seated and alone; (ii) people standing up and alone; (iii) people seated and in group; (iv) people standing up and in group and (v) people walking.

This procedure seemed to be efficient, once the interviewers reported that the process of approaching and interviewing was easier than expected, and the rate of refuses was considered low (40 in total; less then 1 refusal for every 11 acceptances).

In relation to the choice of respondents alone or not, BOEIJE (2004) asserted that in the presence of a third person in an interview, the interviewee can change the manner to answer the questions. They attempt to show different self-presentational styles, which can threat the validity of the data gathered.

There were no sensitive questions in our questionnaire. In fact, the main reason for preferring to interview people alone, beyond the mentioned before, was the unavoidable interference of a third person. The third person, being present and listening to the questions cannot resist answering and giving their opinions. On the other hand, the interviewee when asked about something that needs thinking or remembering, tend to look first to the horizon, and second to the third person to search for an answer. On top of this, the respondents can interpret that it does not matter whether they or the third person is answering, and abandon the interview incomplete.

Sometimes, it is so difficult to find a person alone on the beach, that the interviewer is forced to approach a group. Either in the case of beach users or in any similar situation regarding other subjects, the interviewer should be trained to separate the answers coming from the respondent or from the third person. The danger of interviewing a person in the presence of a partner is that, in the same way of focus group interview, the responses can arise by commonsense between respondent and partner (KAPLOWITS and HOEHN, 2001; BOEIJE, 2004).

The self-presentation

The manner to approach the potential respondent is decisive regarding the acceptance to answer the questionnaire, and consequently, the sample effort needed to reach the targets. There are some important tips to enhance the abilities of self-presentation and interviewing.

Interviewing is the method in which the questions are presented to the respondent by an interviewer. For ALBUQUERQUE and LUCENA (2004) the advantage of this technique is the face-to-face contact between interviewer and respondent. In interviews the questions can be clarified to the respondents (FODDY, 1995). The technique stands among the extremes of the emic and ethic perspectives. The emic perspective is the insider's or native's perspective of reality. It helps understanding, and accurately describing, situations and behaviors. The ethic perspective is the external, social, scientific perspective on reality (FETTERMAN, 1991). These authors add that most ethnographers start collecting data from the emic perspective, then try to make sense of what they have collected in terms of both the native's view and their own scientific analysis.

As for the level of organization, interviews can be non-structured (no use of a written form to guide the information gathering, just a free conversation about the research issue); partially structured (uses both open and close-ended questions); and structured (use only closed-ended questions) (VIERTLER, 2002; ALBUQUERQUE and LUCENA, 2004). In fact, we can assert that interviewing, more than a technique, is an art, which the researcher learns progressively through practical experience.

It is valid to start the interview explaining, or maybe reading the protocol to allow the respondents to be aware of how it works. However, this kind of *praxis*, which is useful for most of the studies, is not proper for a research with beach users. Generally, they are in a leisure time, and do not want to be disturbed. So, it is more productive to be straightforward,

and focus the energy on establishing the rapport, to warrant the quality of the data. Our research team was instructed to approach the person politely and say, in general words:

> *__Good morning/afternoon. Excuse-me. My name is (first and last name). I'm from the Federal University (show the badge). We are doing a research here with the beach users regarding some social and environmental aspects of great importance to improve the quality of the beach. Could you please respond our questionnaire? It will only take a few minutes of your time.*

If the person accepted answering to the interview, the interviewer thanked and started asking the questions. If the person did not accept, the interviewer politely acknowledged for the person's attention, whished a nice day and went ahead looking for another person.

To gain the cooperation on the field, we used the commonplace sociability technique described by SHAFFIR and STEBBINS (1991), which means the use of friendliness, humor and sharing in relation to the respondents. We attempted to rise points in common between researcher and interviewee to establish the rapport. For instance, some of the interviewed said they live in the same neighborhood, or traveled to the same. It helped to break the resistance of some respondents who finally accepted answering, but did not show a good level of willingness to begin with. In some of the interviews, the acceptance and cooperation rated minimal in the beginning. Nevertheless, the appliance of this technique associated to an efficient self-presentation and sympathy, could change the situation for a good level of rapport. The researchers were instructed to be sympathetic and polite, and never lose patience despite the situation. They were warned not to be shocked by the way some people could treat them at the approaching step or during the interview itself, and that they should avoid showing it, especially in front of the subject.

The easiest part of the beach to access people was Area I, and the most difficult Area III (Figure 1). The majority of the refusals occurred in Areas II and III. It was probably due to differences among beach user's profile in these two parts. In Area I, the beach users have lower income and almost all of them are locals. In opposition, in Area III there is the greatest amount of tourists, as a result of the concentration of hotels, and their income is higher. Due to their foreign origin, maybe they did not have the will to participate in local decision-making.

Another factor that possibly influenced the level of acceptance at Area III is the large size of the sand area, which is smaller. Also, the area presents some social problems as prostitution, begging for money and/or food, infant labor, robbers and informal food and goods sellers.

Because the origin of beach users in these parts is different, the expectations are also different. In Area III, people came from a distant location attracted by the tourist advertisements to fulfill expectations of vacations on a tropical beach, and are now facing a slightly different reality.

The Information Collection

The questionnaires were anonymous. Surely, the preservation of identity allowed the respondents to feel free to answer frank and openly. The minimum age required to participate in the research was 18 years. We believe that persons from this age onwards have a greater probability to be aware of the topics treated in the research. Choosing a minimum or maximum age limit is an important step to bind the sample, as well as to drive the choice of an interviewee. In the case of approaching someone who seemed to have 18 years, but was actually younger, we proceeded with the interview up to Question 11 only, brought the interview to a close, and discarded the questionnaire for the analysis. This procedure was also

adopted in special cases: people who were drunk, too rude, showed second intentions towards the interviewer or were extremely annoyed. Although these impairs, the team was instructed to be firm, without loosing politeness and patience, dosing these characteristics according to the relation established with each respondent. Learning the conduct in field research, including the informal interview, requires both skills and tact. Each researcher adopts a style with which he/she feels comfortable with and that yields results (SHAFFIR, 1991). The interviews flew in the form of a casual conversation. Dealing with public on a beach can be the funniest part of the research. All of the interviewers related cases of respondents who had a deception, for instance, in their relationships, and cried during the interview asking the researchers for councils; many were even invited for dates by the respondents, among other things. The researchers were instructed on how to proceed in different situations and take note in the field 'notes' regarding respondent's behavior, level of attention, willingness and if the questionnaire was to be discarded.

The questions were posed to the interviewees using impartial intonation, which means reading without emphasizing any part of the question content, in order to avoid bias or driving the answer according to the interviewer point of view. ALBUQUERQUE and LUCENA (2004) stressed that the respondent can not feel pressured to respond what he/she believe to be the interviewer's opinion. The responses were noted as close to the speeches as possible. It required from the team ability to write fast. If available, tape recorders can be useful, however, it can be expensive. But in our case, the pilot survey showed that it would not be essential to tape the responses, because the required information could be gathered by handwriting. Moreover, McLELLAN *et al* (2003) stressed the importance of a pattern in the transcription of field notes, mainly in team-based researches. Though the interviewers were asked to write the actual speeches, some did not write down as much as it would be ideal for a deep subject's perception assessment.

As cited before, the full-scale survey questionnaire had three pages. Some studies uses more, but we relied upon the experience of the pilot survey. During the interview, when some respondents saw the pages passing, they asked things like “One more page?” or “All of this?”. So, in order to disguise the size of the questionnaire, before changing the page, we used to ask the first question of the next page. While the respondent was thinking about the answer to give, we changed page. This showed to be very useful to the good flow of the interview. In fact, the training process continued during the fieldwork. Optimized working conditions are essential to the collection of good quality data.

Regarding the time necessary to complete the questionnaire, all the interviewers performed in an expected interviewing time pattern (Figure 2). It can be concluded that the questionnaire can be easily applied by interviewers with the profile of our team. It indicates not only a good level of quality of the data yielded, but also that it could be collected comfortably. These points reinforce the adequacy of the method used. TUDOR and WILLIAMS (2005) took *circa* ten minutes to complete a questionnaire. In Boa Viagem pilot survey, 14 minutes were taken. In the full-scale survey had the time increased to 15 minutes, in average. FODDY (1995) pointed out that the most serious failing of novice interviewers is the tendency to go too fast – give the respondents no time to answer fully. It needs to be avoided. The average interviewing time for each member of the team did not depend on the number of questionnaires applied, which differed between them, but on the researchers’ profile and abilities in conducting the interview.

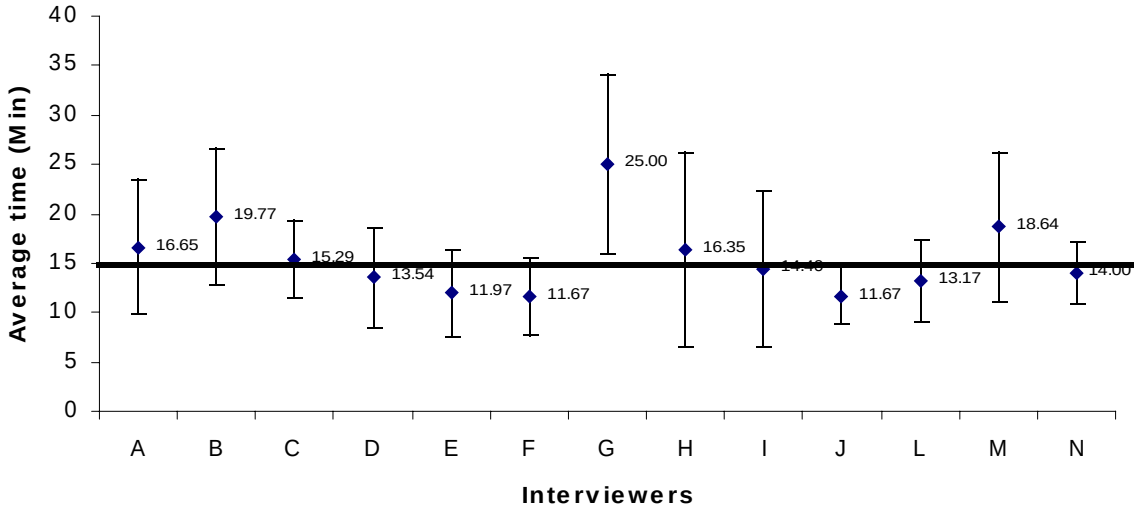

Figure 2: Average time (minutes) taken by each interviewer for applying the full-scale survey questionnaire. The global average time was 15 minutes (—).

As discussed before, it was tried not to overwork the interviewers with an elevated daily target. In general 4, and in some cases 5 interviews, were assigned for 2 hours of sampling. We calculated 15 minutes to complete the questionnaire plus another 10 or 15 to slow interviews, to find another respondent to interview and to any other necessity. Nevertheless, in days with elevated targets, such as Sundays and Wednesdays it was not possible to establish a target due to the limited human resources, so they were asked to do as many interviews as possible. Even tough, in some of the sampling hours in these days, the target could not be reached (Table 3). The distribution of the sampling effort for the beach users fluctuating populations in days and hours is the most adequate manner to cope with the irregular frequency rates. Proportional high and low targets in the more or not so crowded days can lead to eventual very high targets, when the team will need to make concentrated efforts. Under pressure of time and target, the interviewers may became more vulnerable and leave some questions unfilled. In the full-scale survey, most of the 61 questionnaires with had at least one question unfilled or filled wrongly, were done under these circumstances.

However, this rate (14,3%) was much lower than the 47% of the pilot survey. A comparison between the representation in percentage of the number of interviews done by each interviewer, their error rate and its representation in the total sample, showed that the quality of the questionnaires is not correlated to the number done (Table 5). Interviewer F, for instance, did 11,1% of the total questionnaires, but had 2,3% of error. On the other hand, interviewer J did only 0,7%, but had 66,7% of questionnaires with mistakes.

Table 5: Interviewer's error rate.

Interviewer	Interviews / Interviewer	% within the total of questionnaires (n=425)	% error within the total number of wrong questionnaires (n=61)	% error within each ones questionnaires
A	40	9.4	1.4	15.0
B	31	7.2	1.4	19.3
C	24	5.6	1.1	20.8
D	41	9.6	0.0	0.0
E	37	8.7	1.1	13.5
F	47	11.0	2.3	21.2
G	6	1.4	0.0	0.0
H	31	7.2	1.1	16.1
I	98	23.0	2.3	10.2
J	3	0.7	0.4	66.6
L	23	5.4	0.4	8.7
M	22	5.1	2.1	40.9
N	22	5.1	0.2	4.5
TOTAL (%)		**100.0**	**14.3**	**237.1**
TOTAL (n)	**425**	**425**	**61**	**61**

The Staffing Work

According to MILES and HUBERMAN (1994) qualitative studies are chronically called "labor intensive", but the details of staffing and planning are rarely provided. In fact, the staffing work is essential for the proper development of qualitative studies, mainly the fieldwork. There are a great labor to execute behind the research setting, like receiving, proofreading and organizing questionnaires; providing more copies and other materials to the interviewers; giving them further instructions and solving doubts; checking the reaching of the targets; managing the research schedule and human resources according to the demands of

targets and replacements of discarded questionnaires; transcribing the information collected to the computer, among others.

Some of the most important instructions to give the interviewer regards to the correction of the questionnaire filling. It is suitable to schedule the fieldwork leaving a margin in terms of time to replace questionnaires filled incorrectly and to complete the non-reached targets in the regular sampling schedule. We did not have extra time. The last month of summer was February. Luckily, the season was extended until the end of March, when fieldwork was completed.

The number of researchers required to perform all the roles in a qualitative survey depends on its size and complexity. This is in agreement with the vision of McLELLAN *et al* (2003). In small-scale studies, a person can accumulate more than one function. The coordinator was directly responsible for the academic aspects of the research. For the coordinator, good organization, communication and leadership skills are required. Good communication between coordinator and interviewers is essential to overcome non-previewed situations, for instance, the rapid replacement of an interviewer impaired to work for any reason. It is pivotal to make the coordinator able to give the necessary feedback to the team. So, she was naturally inserted in the research schedule of interviews, in order to have the fieldwork experience. But in some sampling days and hours, the coordinator needed to go to the beach to substitute interviewers, or to help reaching high targets. It allowed the coordinator to check the methodology *in situ* and face the unexpected situations the interviewers were exposed to. Then, the coordinator could also perceive details of the interviewees' behavior, attitudes, reactions and perceptions during the interview process.

MILES and HUBERMAN (1994) pointed out the necessity to avoid sharp senior-junior divisions of labor, such as having juniors do the fieldwork and the seniors do the analysis and writing. We share their vision that senior researchers need to be directly involved in data collection in order to have a concrete fell for what the field setting is like. The coordinator

might do some of the interviews, but to a limit not to cause prejudice in the condition of giving support to the research. Furthermore, in the case of developing a qualitative project, it will be better to have different people performing specific roles, but in spite of this, they need to be prepared to embrace the others tasks (Figure 3).

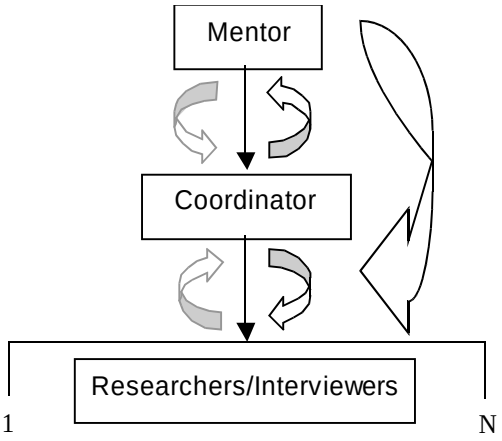

Figure 3: staffing of qualitative researches on beaches.

DATA CODING AND ANALYSING

Preliminary Analysis

MacQUEEN and MILSTEIN (1999) and McLELLAN *et al* (2003), discussed the use of specialized type of QDA softwares and the data management. The third authors emphasized that researchers should have a thorough understanding of the software's requirements about how the data should be structured and also its limitations in relation to resources and analysis. Notwithstanding, general purpose softwares can also be used to manage qualitative data, without prejudice in the quality of data analysis (LA PELLE, 2004).

This step helps the researcher to have a preliminary view of the spreadsheet, as well as the possible results. The data produced during the pilot survey were transcribed to a conventional digital spreadsheet (MILES and HUBERMAN, 1994), where the lines were each

questionnaire and the columns were each question. The columns were named using shorts of the questions contents. As the interviews were anonymous, the questionnaires were numbered in crescent order, followed by the ID information and the rest of the questionnaire in sequence. The major importance of the preliminary analysis is that its handling will prepare the researcher for the data transcription, questionnaire discarding, and analysis of the full-scale survey.

No statistical analysis was up to this moment. However, it is recommended to test the variables available, and cross them in order to enrich the data interpretation. For qualitative data, the Chi Square Test is interesting to check the influence of one variable onto another. For instance, whether beach users' age influences perception regarding environmental problems on the beach. This test, and other types that can be used to analyze qualitative data, are explained in ZAR (1998). In general, depending on the type of data (number, text), importance and necessity to be emphasized for the research, it can be represented in absolute numbers, percentage, average, or other convenient form. Results can be described in the current articles' text or displayed on tables, graphics and matrices (MILES and HUBERMAN, 1994). Once qualitative data generate a wide range of answers, some of them will appear represented by low scores. It makes the tables big, but with three or four representative answers may emerge. If necessary, numerical data can be displayed to help the interpretation of results. Sometimes it is better to let the table big. If not, the most representative categories of answers can be displayed and the others grouped under the category 'others'. It is a decision for the researcher to make. Questions that use "why" serve only to illustrate, or justify, the main reasons for the answers. They will not be put in graphics or tables, except if necessary.

Data analysis after the full-scale survey

Discussing the nature of qualitative data, MILES and HUBERMAN (1994) asserted that such data are, usually, not immediately accessible for analysis, but require some processing. Raw field notes need to be corrected, edited, typed up or transcribed from the recording tapes or questionnaires hard copies.

According to McLELLAN *et al* (2003) the first reduction in the qualitative data is in the transcription onto digital spreadsheets. In fact, right on the moment of the interview, the researchers unavoidably chose the speeches to be written up. In our research interviewers wrote up only comments regarding the answers to the questions. Jokes, and other comments that commonly rise during the interview, and are truly important to the flow of conversation, were not recorded. Non-verbal sounds (e.g. laughs, sighs), slangs, swearwords, grammatical errors were noted. For mispronunciation we used three dots. For long comments we typed the part that showed the main idea, followed by three dots between parenthesis (…) in the middle or the end. In this way we can see the main idea and retrieve the rest of the unwritten information on the questionnaire. Even though the necessity to sharpen the speeches in the transcription to the qualitative data analysis software, it is important to be extremely careful to avoid changing the sense of the ideas and losing its core.

Transcription or typing of qualitative data can not be done in a hurry. In this phase, the first analysis is carried out, i.e., the researcher needs to read everything that is written to understand it and judge what is really important to the analysis. This task takes a lot of time and effort. It is also necessary to reduce a wider variety of answers in as few as possible understandable categories. Some of the answers needed to be fragmented and ideas within them classified in ‘Answer 1, Answer 2’; others partly or totally discarded for having no relevance or sense. The choices on how to type and organize data require calm. In the vision of VIERTLER (2002) time is worthy for the researcher to mature the data. The sense of

organization and synthesis is essential to efficiently store, process, retrieve and analyze qualitative data (McLELLAN *et al,* 2003).

In order to ease the retrieval and association of information, the raw answers and the categories were stored in columns side by side.

The written questionnaires were chronologically organized in folders divided according the four sampling areas on the beach. Colored markers were used on the right margin of the questionnaires to divide the three sampling periods (morning, midday, afternoon).

After proofreading the questionnaires, some that were only partly filled, had two or more blank fields or responses with no sense, were discarded. After this trial, the final number of questionnaires left was 425 for the four areas: 111 in Area 1; 122 in Area 2; 165 in Area 3 and; 27 in Area 4. As it was planed, based on the beach users frequency study of SILVA *et al* (2006), the majority of the interviews were made on weekends, and on the midday sampling period. The beach users were approached mainly on the sand, seated alone. Most of the time the weather was sunny. The tide was not a relevant factor for the survey. So, it was not considered for analysis.

The main source of bias was the tsunami occurred in December 2004 in Southeast Asia. This event was not mentioned in the pilot survey of August 2004, but came up in the full-scale survey of February 2005. As the gender of beach users were balanced (48.2% male and 51.8% female) and the ages showed a flat pattern in the four areas ranging from 18 to 40, we do not consider that there was bias in choosing the respondents. We can not estimate the consequences of bias in choosing foreign people to interview caused by the obstacle of the idiom. Nevertheless we are sure that it naturally existed, and maybe more tourists from other countries could be sampled.

The questions that presented more faults were number 12 to 18, which had more fields to fill in, and more information to collect per space. Although we tried to improve these

questions according to the error rate of the pilot study, by separating double questions, the more complex the fields are, the higher the odds to have mistakes or absent response. Another problem was the misinterpretation of some questions contents. In question 20, some respondents understood that the question was asking whether they continued coming to the beach or not, and answered, “no, my frequency did not change”. In question 26 some respondents interpreted that the question were asking the consequences, and not the causes of beach erosion on Boa Viagem beach. In questions 27 and 28, even though it was emphasized the collective and personal character of them, some respondents changed the sense according to their perspective. As previewed, in questions 25 to 29, regarding the knowledge about beach erosion/sea level rise, many ‘don’t know’ responses were found. In some cases, unexpected responses appeared. However, the researcher needs to consider the importance to respect what comes from the emic perspective, and take it as a result, analyze and interpret as the other ones.

The alternatives of answers to questions 2 and 8, regarding age and income, in categories, demonstrated to be efficient. Putting these delicate topics in categories let the respondents more comfortable to ‘answer without answering’, which means responding without precisely disclosing information they would not like to.

The realignment of question 22 of the pilot questionnaire was a wise decision. People disliked and refused putting the alternatives in a numbered scale. The visual aid was efficiently used after question 33, because it helped to form opinion with a better-balanced list of advantages and disadvantages. It also allowed the respondent to get a perspective on the work planned for the beach they use, and did not influence their real awareness, gathered from questions 32 to 33.

FINAL CONSIDERATIONS

The application of social research methodologies for environmental approaches is essential to build a scientific base to environmental scientists to act upon. Once the study of the relation between humans and environment is a new approach to environmental sciences, it is essential to environmental scientists to be acquainted with the principles largely used by the social ones. The current social research methods can be applied to beach users, respecting the necessary adaptations. The suggestions given in this paper are focused on team-based research with fluctuating populations. However, the principles discussed can be applied for small-scale studies.

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BEACH USERS PROFILE, PREFERENCES AND PRIORITIES ON AN URBAN BEACH.

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Abstract

The data analyzed in this article was collected through 425 interviews of beach users. The using public is composed by females, between 18 and 40 years old. The beach users presented a strong sense of territorialism. For the choice of a beach and beach site they considered mainly the access and proximity and habit/attachment to the environment. The results reveal that the beach users established a relationship with the environment that drives their preferences more than facilities. However, they expect the improvement of the basic facilities by the government, in order to warrant a better quality of the recreational experience.

Keywords: Boa Viagem beach, beach use, interviews, beach user frequency, beach preferences, beach management.

Introduction

The aim of this study is to describe the Boa Viagem beach users profile based in socio-economic, origin, beach visiting frequency, use and occupancy of the sampled population. The results are expected to work as a tool for decision-making on the beach management of the area.

The beaches have been historically used, as some of the most important cities all around the world are placed on coastal areas (Tudor and Williams, 2005). With the rapid growth of population, the coastal vicinities have been more and more occupied and developed (Bird, 1996). Especially in tropical areas like in Brazil, where the climate is very favorable,

and the beaches show exuberant landscapes and features, the occupancy and use remains during all year long.

Following after this are the inherent conflicts of use and coastal problems, such as water quality decrease and beach debris. These problems, among others, are in some cases localized and acute, tending to increase as a result of the growth of population and tourism, beyond the wide range of activities undertaken on the beach (Viles and Spencer, 1995).

Several researches reported that the pollution and a range of other problems were clearly perceived by the beach uses consulted (Breton *et al*, 1996; Williams and Nelson, 1997; Balance *et al*, 2000; Pendleton *et al*, 2001; MacLeod *et al*, 2002; Pereira *et al*, 2003; Peterlin *et al*, 2005). This is a serious issue considering that beaches are important recreational open-air free-charged resources of most of cities (Bird, 1996), mainly for low-income beachgoers (Breton *et al*, 1996). In Pernambuco State, in which Boa Viagem beach is located, going to beaches is the second leisure option for 34% of the population sampled, in a study about what do they think about the environment and sustainable development (SECTMA, 2003).

According to Breton *et al* (1996) defining the social, use and frequency beach users' profile, as well as their perceptions and expectations are essential for the authorities to examine with a view to optimize the social and ecological functions of the beaches. These authors also pointed out that as a natural resource available for leisure beaches require sensitive analysis.

In the vision of Bird (1996) beach management seeks to maintain or improve a beach as a recreational resource and a means of coastal protection, while providing facilities that meet the needs and aspirations of those who use the beach. Successful beach management requires an understanding of the nature and dynamics of a beach system (physical, chemical and biological interactions) as well as the perceptions of the beach users, economic and tourism interests and environmental protection measures.

Many initiatives of coastal management have been implemented in an attempt to provide a community-based approach to the local coastal problems (Price, 1993; Makoloweka and Shurcliff, 1997; Ducrotoy and Pullen, 1999; Polnac and Pomeroy, 2005; Tran *et al*, 2005).

Although the human impacts, beaches are so important environment for both economy and life quality that King (1995) added in his study the argument that it is worthy to place a monetary value on marine resources, which can be incorporated into the public decision making, through an explicit trade-off cost benefit analysis.

In addiction, we share the vision of Morgan (1999) that more detailed investigations of beach user perceptions, preferences and priorities, particularly with regard to those beach aspects which can be directly influenced by management, could provide a valuable resource for general policy decisions in Coastal Zone Management.

The Study Area

Boa Viagem beach is placed in Recife city, Pernambuco State, with 8 km in length (Figure 1). There are four suburbs nearby the beach, from the North to the South: Brasília Teimosa, Pina, Boa Viagem and Setúbal.

The predominant climate is As (Tropical Hot and Wet) according to Köppens classification. Annual temperatures values remain about 25.4º C, $\pm$ 2.8º C. The rain system defines two seasons: dry, from September to February and rainy one, from March to August (Atlas Ambiental da Cidade do Recife, 2000; www.inmet.gov.br).

On Boa Viagem beach there is a diverse landscape with great beauty and value, which offers several options for leisure and sports with low cost, like the sandy area and the natural pools, formed by the reefs in the low tide. The beach attractive features are intensively used by local population, mainly on weekends and holydays. The beach is also considered a gateway, attracting tourists, from Brazil and other countries (Costa and Kahn, 2003). The

maritime edge presents habitations of different social classes, a great number of residential and commercial buildings, hotels, shopping centers, sportive squares, points of formal and informal commerce, some toilets, showers, kiosks, lifeguard post. It is also used for sportive and cultural events.

According to the particularities of the beach, it was divided in four distinct areas by Silva *et al* (2006) from an adaptation of the work of Souza (2004), which studied the environmental health of Boa Viagem beach.

In legal terms Boa Viagem beach is covered in laws in the Federal, State and Municipal scopes to protect the environment, to manage and organize the activities and forms of use by the population. The beaches are also included in the law as a Especial Zone of Environmental protection 2 (ZEPA 2). This classification consists in a sustainable conservation unity, which allows the use, but needs regulation to preserve its natural characteristics.

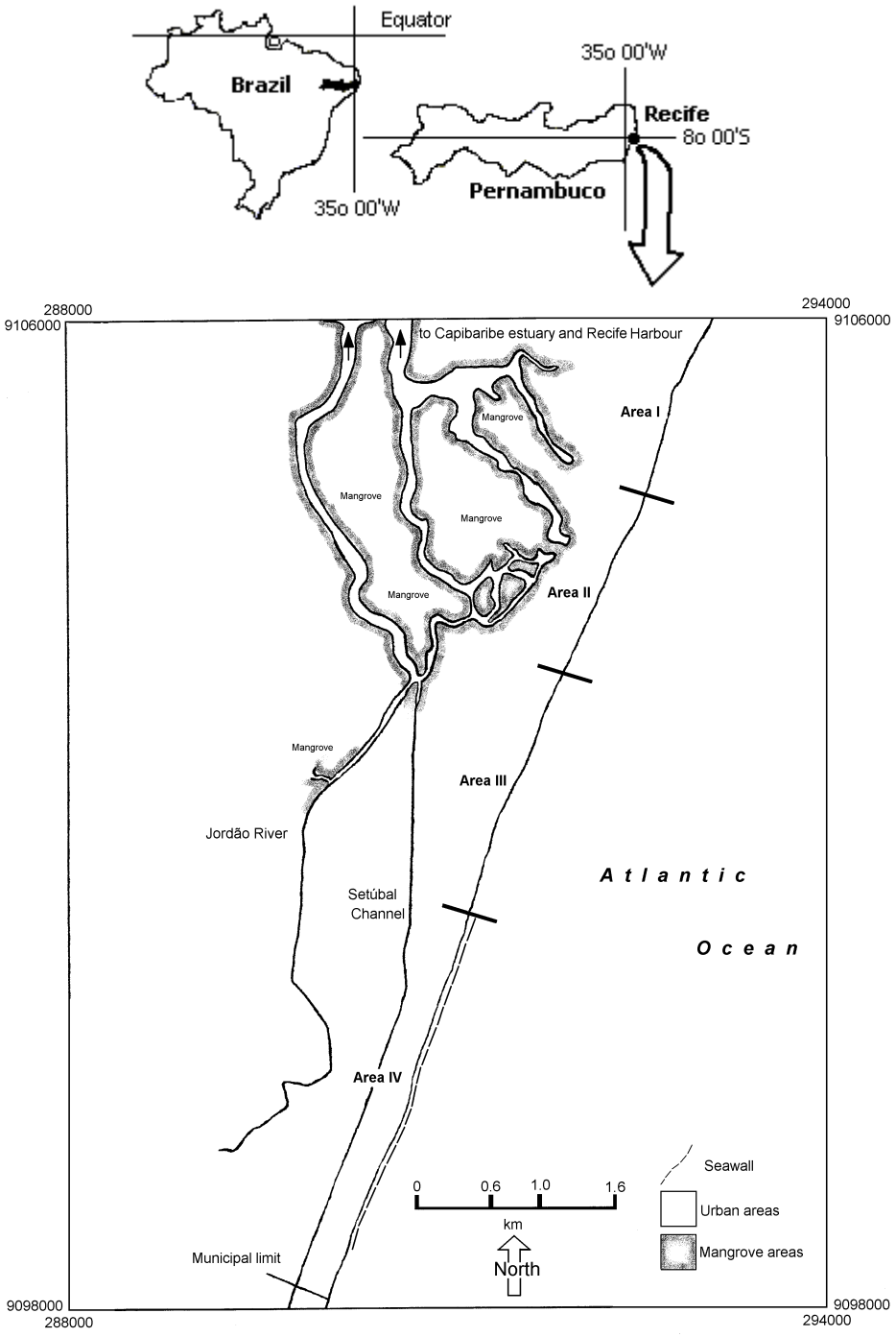

Figure 1: The Boa Viagem beach, Recife City, Pernambuco State, Northeast Brazil and the four Areas (I, II, III and IV) according to Silva *et al.* (2006) along which the sampling was conduced.

Methodology

The survey was carried out in February and March 2005. A team of 12 interviewers was recruited and trained to help in the fieldwork. The data was collected through face-to-face interviews along the four Areas of the beach (Figure 1). For these interviews a semi-structured questionnaire was designed, checked by specialists and piloted. The questionnaire was composed by four parts: an identification (ID) (not numbered) and 34 numbered questions. Only parts 2 and 3 beach user profile (Questions 1 to 8) and frequency and use of the beach (Questions 9 to 22.1) were considered in this paper, and some comparisons with the ID. The questionnaire and detailed methodology are discussed in Vicente-Leal and Costa (2006).

The beach users in general, excepting workers, were approached to be interviewed, both on the sandy area and the seaside pavement, according to five degrees of priorities. These degrees were related to the highest possibility to accept responding and give attention without the interference of a third person, as well as, to avoid stopping people from doing their activities: (i) people seated and alone; (ii) people standing up and alone; (iii) people seated and in group; (iv) people standing up and in group and (v) people walking.

We believe that there was no problem of under representation of any group of beach users, as found in works such as MacLeod *et al* (2002), which had difficulty to sample people involved in water-based activities. The *in situ* observations showed that most of the activities are undertaken on the sandy area.

Based in Silva *et al* (2006), a sample of 411 interviews was planned for the four Areas, with targets proportionally distributed among days of week and hours of the day. Three periods of 2 hours per day were chosen for the application of the questionnaires: 8 to 10 a.m., 11 a.m. to 1 p.m. and 2 to 4 p.m. The teamwork was divided in two groups, concentrated in one Area each week, according to an established research schedule.

Results and Discussion

A number 453 interviews were completed, reducing for 425 after the discarding of those which were poorly completed or had more than 2 questions in blank. From Area I to IV were used for analysis a total of 111, 122, 165 and 27 interviews respectively. These sample numbers were analyzed until question 10. For respondents who declared to be on the beach from 1st to 5th time the rest of the questions were not posed. For questions 11 to 22.1, the number of questionnaires used for analysis was 106, 120, 151 and 25.

The information collected in the questionnaires had been stored in conventional spreadsheets. After that, the textual answers were grouped in categories in accordance with the similarity of their ideas. The results are shown in percentage. The qualitative categories were classified in a decreasing rank of importance according to the percentage of citation. Categories under 1% of citation and/or 12th place were not displayed in the rank, composing the category 'others'. In some questions the sample number regards to the total sample, and in others to the number of answers given to an specific question.

Beach user profile

Considering a small difference, for the four areas, the gender of most of the beach users sampled was female (51.8%). Only on Area IV male were the double in percentage (Table 1-A). This rate is an agreement with Recife population, in which 53.5% of the population is female (IBGE, 2001). In general, the ages followed a pattern among areas, varying from 18 to 40, which demonstrates that the beach users of Boa Viagem beach are predominantly young (Figure 2-A). It is worthy to stress that these age proportions refers to the minimum age of 18 for this study. Surely, if we considered people under this age, the results would present different trends. Notwithstanding, considering the beach social dynamic, adults really compose the majority of the beachgoers. On Area IV, the age category of 31 to 40 years was the most important.

From the total sample, singles represented 50.4 % and married 40.0 % of the interviewed. Joining the singles with widows and divorced, who are 'not engaged' like people, we can find that 59.9 % composed this first category. 57.6% declared to be the head of the family. This superiority in relation to the percentage of married can be taken as normal, since nowadays the families can be composed by a more diverse arrange of relatives and either singles living alone. The Boa Viagem public is composed mainly by local visitors and residents came from inland suburbs of Recife City, or the four coastal suburbs nearby the beach (Figure 2-B). The same trend was found by Morgan (1999), Breton *et al* (1996) and Pereira *et al* (2003) for the neighbor Olinda beach. As Boa Viagem beach has been considered one of the most important tourism destinations since the 1960^{s}, the number of Brazilian and foreign tourists was very low. Probably in the actual scenery of the beach, it continues being exposed in the tourism industry, however, not as a destination properly, but as a gateway for other beaches of the State in ascension, such as Porto de Galinhas (Costa and Kahn, 2003). The Areas where were found the greater percentage of tourists were Areas III and IV (Figure 2-B). On these Areas are concentrated the most important hotels of the beach.

In regard of the level of formal education, the High School was the highlighted category for all Areas (49.4%), followed by the university (25.4%) (Figure 2-C). Areas II and III presented the major quantity of beach users who finished university. The majority of the beach users are economically active (75.3%) and 24.5% are not (Table 1). The first category embraces all the declared actual occupation, despite its nature. In the last category were included housewives, students, unemployed and retired.

The beach users income standed between 1 and 5 Brazilian minimum wages (US$ 120.00, US$1.00=R$2.50) (Figure 2-D). The Area I had the most narrow income distribution, with higher percentages concentrated in the lower categories. In the other Areas, the higher categories of income were a little prominent, mainly in Area IV. These results demonstrate

that the beach users with a higher income are concentrated in Areas II to IV. Nevertheless, the Boa Viagem beach users' income can not be, in general terms, considered high.

Boa Viagem beach was the preferred beach for most of the beach users interviewed (60.9%) (Table 1-D). An interesting point was that the respondents showed preference for beaches located next to their places of origin and livelihood. It explains the prominence of the preference for Boa Viagem beach, once, as cited, most of the interviewed are locals. In the second place came beaches from the South State littoral, in which Porto de Galinhas is the most important, receiving 13.2% of the preference. The reasons for preferring the beaches are ranked on Table 2-A. According to the answer given, in the moment to choose a beach to visit, the beach users interviewed take into account access and proximity, habit and attachment to the place and emptiness and tranquility respectively. Landscape/natural features and 'water and sand cleanness' occupied the 4th and 5th positions.

The category of 11 to 20 and 21 to 30 years coming to the beach were respectively the highest (Figure 2-E). These results coincide with the time where the beach started being occupied, in the 1960^{s}. From this decade onwards, the suburb population and urbanization increased rapidly, and the beach advanced from a seasonal to a permanent occupation.

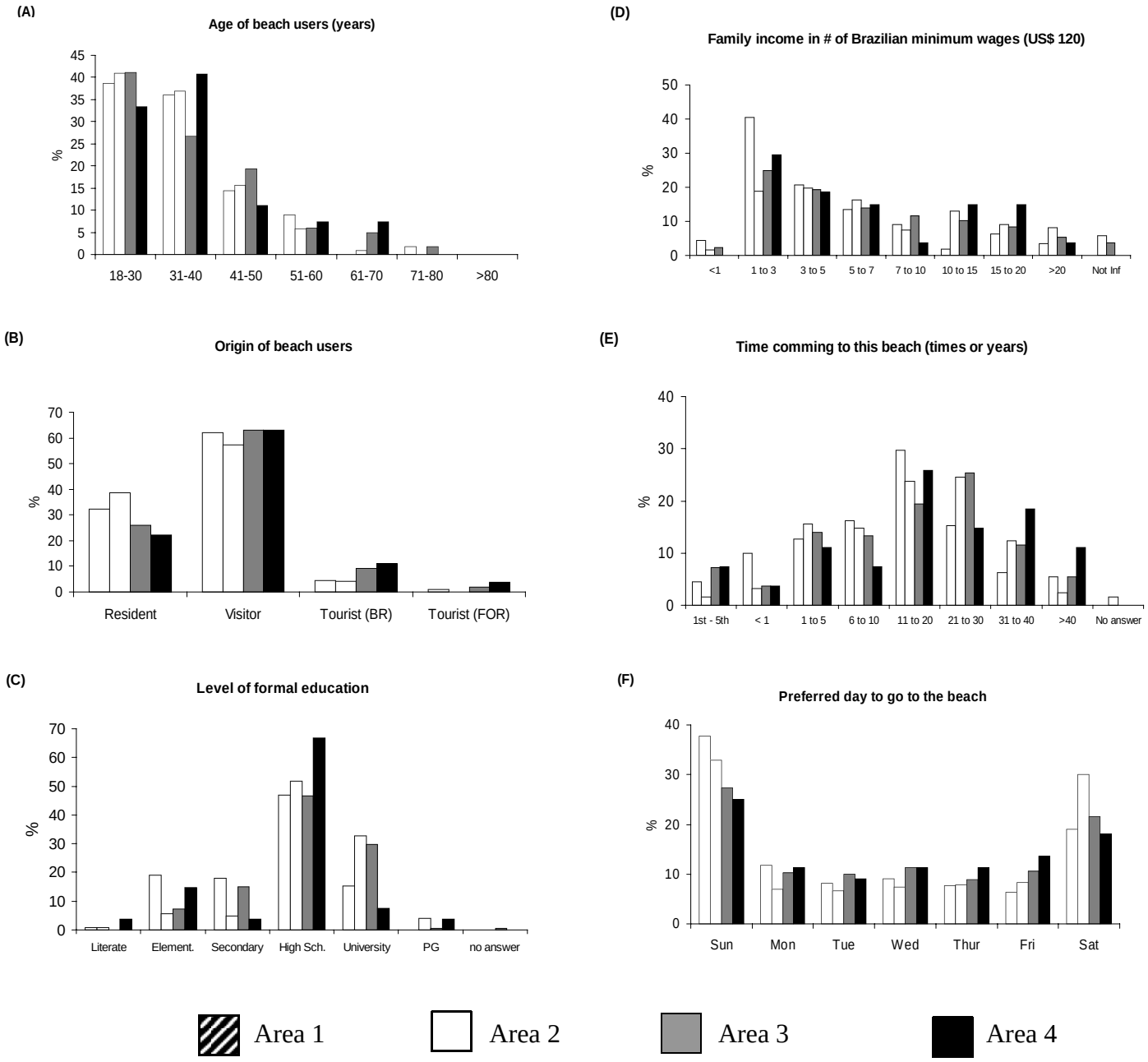

Figure 2: Beach user profile.

Table 1: Beach user profile, preferences and awareness of laws.

Questions	All Areas	Area I	Area II	Area III	Area IV
A) Gender					
Male	48.2	46.8	45.9	47.9	66.7
Female	51.8	53.2	54.1	52.1	33.3
B) Population economically active?					
Yes	75.3	76.6	75.4	73.9	77.8
No	24.5	23.4	24.6	25.5	22.2
No answer	0.2	0.0	0.0	0.6	0.0
C) Head of the family?					
Yes	57.6	58.6	57.4	55.8	66.7
No	42.4	41.4	42.6	44.2	33.3
D) Preferred beach?					
Boa Viagem	60.9	66.7	55.7	64.2	40.7
Other	36.5	32.4	42.6	32.7	48.1
No preference	2.6	0.9	1.6	3.0	11.1
E) Beach better/worse?					
Better	48.0	56.6	45.8	45.7	36.0
Worse	22.9	14.2	24.2	25.8	36.0
Both	6.7	6.6	10.0	4.6	4.0
The same	22.4	22.6	20.0	23.8	24.0
F) Preferred month?					
Vacation	9.7	11.3	4.2	14.6	0.0
Summer	39.8	38.7	46.7	35.8	36.0
No preference	50.2	50.0	49.2	49.7	60.0
No answer	0.2	0.0	0.0	0.0	4.0
G) Preferred area?					
Area 1	25.4	72.0	13.3	7.0	0.0
Area 2	28.3	7.5	78.3	8.9	0.0
Area 3	33.2	5.6	2.5	77.2	20.0
Area 4	5.4	0.9	0.0	3.2	64.0
No preference	7.6	13.1	5.8	3.8	16.0
No answer	0.2	0.9	0.0	0.0	0.0
H) Come alone or in group?					
Alone	25.4	28.3	24.2	22.5	36.0
In group	43.3	51.9	25.0	51.0	48.0
Both	31.3	19.8	50.8	26.5	16.0
I) Who do you come with?					
Family	44.5	45.9	38.3	47.9	55.6
Partner	26.4	28.2	27.3	25.0	22.2
Friends	28.3	22.4	34.4	27.1	22.2
No answer	0.8	3.5	0.0	0.0	0.0
J) Changed behavior because of shark attacks?					
Yes	44.0	39.62	51.7	41.1	44.0
No	56.0	60.38	48.3	58.9	56.0
L) Know laws related to beaches?					
Yes	50.0	48.1	49.2	50.3	60.0
No	50.0	51.9	50.8	49.7	40.0

Beach use and frequency

The beach is considered better since the beginning of the time visiting for 48.0% of the beach users (Table 1-E). These respondents attribute this fact mainly to the water and sand cleanness, among other aspects ranked on Table 2-B. These aspects regards mainly to facilities and public services, like provision of toilets and safety/policemen.

Many of the reasons for the 22.9% who think the beach is worse now in relation to the past are the opposite of the reasons cited by the people who think the beach is better (Table 2-C). The development of the Boa Viagem beach along the years as a beach resort (Morgan, 1999), with the consequent improvement of facilities and services is a fact. Maybe, the sensation that the beach is worse can be explained for the fact that, these improvements were accomplished for a great increase in the population using the beach. This increase surely creates a greater demand for the existent infrastructure, which can become insufficient as the carrying capacity is exceeded and the major ever seem in the literature (Silva *et al*, 2006). However, as it is an urban beach, the users tend to make allowances, being more tolerant to disturbances. It was found in some studies that environmental quality of water and sand really affects beach users' preferences and perceptions (Williams and Nelson, 1997; Pendleton *et al*, 2001; Nordstrom and Mitteager, 2001). But, in the case of Boa Viagem beach this factor influences more the perception of the quality, not the choice.

A point that deserves attention is that if the authorities do not begin to manage the negative aspects of the beach, letting the situation remain for a long time, it can be created a proportionally negative stigma around the image of the beach, compromising seriously the local economy, tourism and enjoyment of the recreational experience. On the other hand, through an adequate beach management the creation of a positive stigma can be established, with correspondent consequences for diverse social sectors. It is important to keep in mind

that this recreational enjoyment is not only a consequence of the real condition of a beach or beach site, but also of perceptions and judgments about it.

The results of the question regarding the preferred beach site on Boa Viagem beach revealed interesting findings. The beach users have a strong sense of territorialism. As it is shown on Table 1-F, more than 70.0% of the beach users in Areas I to III and 64.0% in Area IV prefers to be exactly in the areas where they were interviewed. From the data collected it is possible to interpret that the extension occupied for the beach users interviewed in Area I goes until area III; in Area II the beach users spread to Area I; in Area III the beach users spread until Area I and finally in Area IV the users go only until Area III (Table 1-G). In any way, according to the beach site preference, the beach is generally more crowded from Area I to Area III. The same results were achieved by Silva *et al* (2006). This tendency was found in the survey done by Breton *et al* (1996). According to their vision frequenting the same spot and the same social context on a beach work as a strategy to make the users feel more comfortable and protected in a place unfamiliar to their everyday life and where they feel afraid of the elements.

The main reasons for preferring specific areas on the beach were the proximity to their own or relatives' residences, work or guesthouse and emptiness and tranquility of the site (Table 2-D). For the beach users interviewed the essential characteristics for choosing a beach and a specific area were in general the access and proximity, habit/attachment to the place and the emptiness and tranquility. These factors were more prominent to beach users than landscape or water and sand cleanness. It demonstrates that the majority of the beach

Table 2: Qualitative categories cited as answer for the "Why-questions", ranked according to the percentage of citation.

Rank	a) Preferred beach	b) Better since first time you came	c) Worse since first time you came	d) Reasons for preferring this Area
1st	Access/proximity	Water and sand cleaning	Garbage/pollution on water/sand	Access/proximity
2nd	Habit/ attachment	Beach management	Beach width reduction/coastal engineering	Empty/tranquil
3rd	Empty/tranquil	Presence of policemen	Shark attacks	Habit/ attachment
4th	Landscape/natural features	Toilet availability	Badly planned commerce development	Friend/costumer of a salesperson
5th	Water and sand cleanness	Infrastructure/facilities	Social problems	Bathing/swimming safety
6th	Bathing/swimming safety	High level of urban development	Overcrowded/livened up	Friendship/relationship
7th	Comfort/Well-fare	Leisure, sports, entertainment	Lack of infrastructure/facilities	Overcrowded/livened up
8th	Overcrowded/livened up	Conservation actions	Lack of policemen	Leisure, sports, entertainment
9th	Leisure, sports, entertainment	Bathing/swimming safety	Lack of environmental conservation	Comfort/Well-fare
10th	Presence of policemen	Access/proximity	Lack of beach management	Selected public
11th	Infrastructure/facilities	Users' awareness of beach debris	High level of urban development	Landscape/natural features
12th	Friendship/relationship	Overcrowded/livened up	Tourism decreasing	Presence of policemen
13th	Presence of coastal engineering	Selected public	Lack of maintenance	Water and sand cleanness
14th	Beach management	Landscape/natural features	Lack of leisure, sports, entertainment	Infrastructure/facilities
15th	Low level of urban development	Empty/tranquil		Beach/sandy area width
16th	Selected public	Everything		Beach management
17th	Friend/costumer of a salesperson			Absence of coastal engineering
18th	High level of development			Conservation actions
19th	Conservation actions			
20th	Beach/sandy area width			

users establishes a relationship with the environment immediately close to their livelihoods and begins frequenting it regularly independent of the natural features, quality or existence of some facilities. In the 4th place of the rank for both the choice of beach and beach site were landscape/natural features and friend/costumer of a vendor. In the 5th place were water and sand cleanness and bathing/swimming safety. For the beach site selection cleanness of water/sand occupied the 15th position in the rank. It can be understood that for choosing a beach and a beach site, beach users consider similar factors, but with different levels of importance. Categories related to infrastructure and facilities, such as squares and leisure spaces occupied lower positions in the rank.

The studies of Morgan (1999) and Tudor and Williams (2005) raised the controversy between the ideal and real beach. The first raised the question of why people who state a preference for beaches with basic facilities are to be found at medium/large resort beaches. He suggested that there may be a conflict between the particular preference of the person and their family and/or children needs for facilities. The second asserted that it may be that an 'ideal' beach was envisaged by respondents rather than the imperfect one on which the interviewee was currently situated. Breton *et al* (1996) pointed out that in their study a different minority envisaged beaches as 'exotic' places, lined with coconut palms. In their vision it is related to three factors: tourism consumes image, forged by the mass media and publicity; the idea of escaping from everyday life to a natural environment and social clichés (facilities), representing a curious concept of manipulated 'nature' in which safety and comfort must be provided alongside relaxation.

A very interesting point is that some respondents reported they look for tranquility and others for movement in the same beaches and sites. It is possibly because, even presenting a general vocation depending on the level of commercial development, it can be found differences among areas of a beach end even sites of an area. For instance, if the beach or

beach areas are lively, but the user is looking for tranquility, he/she can find it on a site in the margin of the nearby focus of aggregation. According to our feelings about the answers, we also believe that once on the beach, the users abstract themselves about what activities are being undertaken in the surroundings, or tolerate it in a high level, to concentrate in the satisfaction of their own expectations regarding recreational experience. On Boa Viagem beach it happens even in front of Acaiaca Building, in Area II, the most aggregational. In addiction, the Boa Viagem beach users demonstrate to fit in the classification of beach users of De Ruyck *et al* (1997) in 'gregarious' and 'individualistic', in respect of crowding tolerance and preference for level of commercialization. Nevertheless, for Boa Viagem beach it is not readily apparent if we consider other characteristics than the preference for more or less crowded areas. One can believe that it is not a matter for worrying, as the choice of a beach is made of a complex set of factors (Macleod *et al*, 2002) and there is much variation in beach experience between the two extreme types cited above (De Ruyck *et al*, 1997).

During the fieldwork, especially in the pilot survey it was possible to receive a great feedback regarding the occupational dynamic of the beach among sampling periods (8 to 10 a.m., 11 a.m. to 1 p.m. and 2 to 4 p.m.) and sites (seaside pavement and sand), although the data can not make it clear, as the interviews were concentrated on the sandy area (84.2%). It was observed that in the first and the last sampling periods, when the sun is not so hot and many people use to make physical exercises, the seaside pavement is more and the sandy area less crowded. In the sampling periods of the pilot survey (6 to 8 a.m. and 4 to 6 p.m.) earlier and later than the full-scale survey this characteristic was strongly marked.

The beach going habits in summer was prominently weekly for all areas (46.3%), followed by occasionally (17.4%). In winter 38.1% do not come to the beach and other 26.6% come occasionally (Figure 3-A to C).

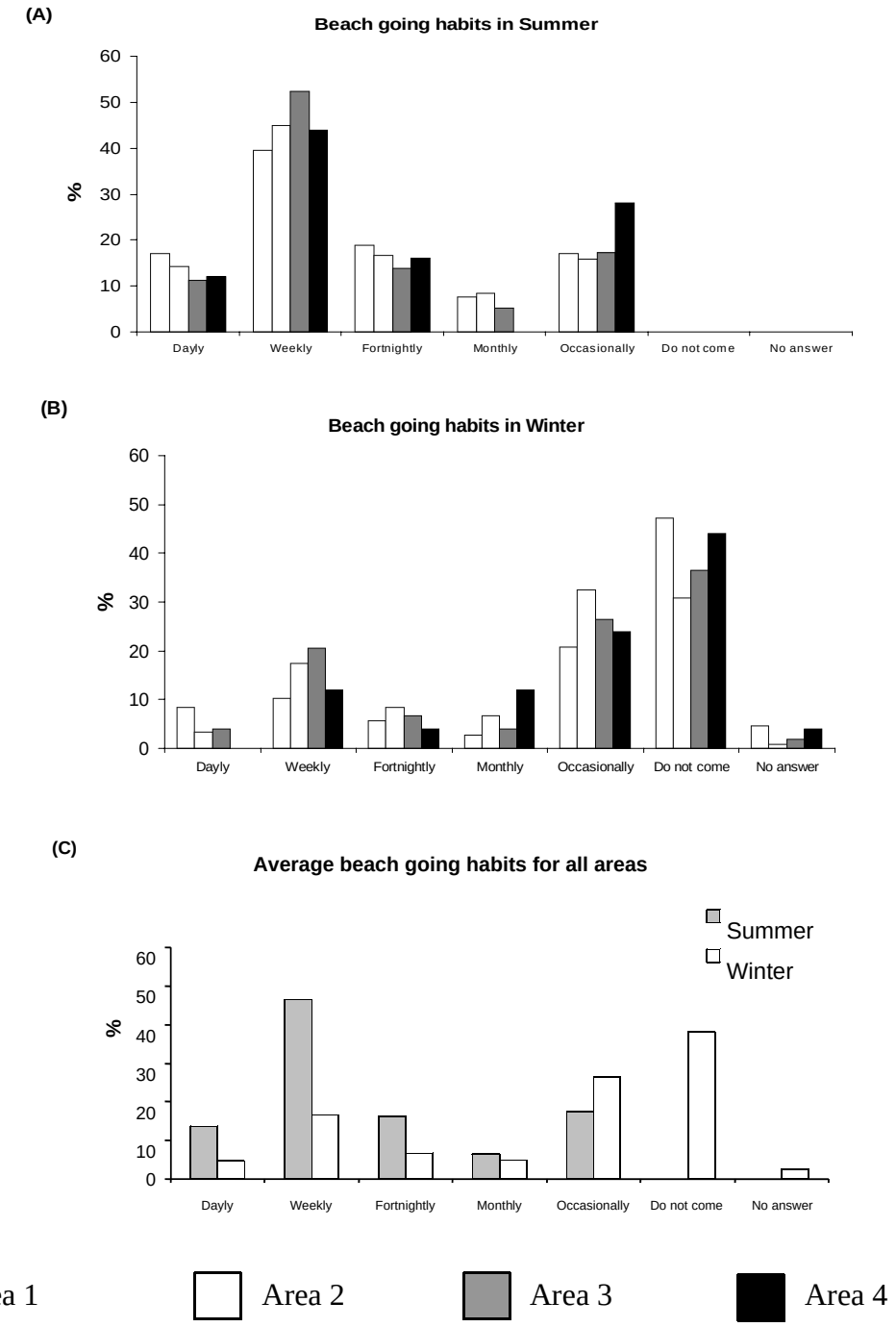

Figure 3: Beach going habits of beach users of Boa Viagem beach. (A) Beach going habits in summer; (B) Beach going habits in winter; (C) Average beach going habits for all areas.

It means that, in relation to the summer, there is a decrease of approximately 1/3 in the frequency in percentage. This is an agreement with the results found by Silva *et al* (2006) for Boa Viagem beach.

On tropical beaches like Boa Viagem, although the alternation of the only two markedly seasons, summer and winter, there is not a severe change in the climate. The difference is the greater rain incidence in winter, and the temperatures, which vary in average

from 31º C in summer to 25º C in winter (www.inmet.gov.br). Based in these results, it is possible to say that the occasional frequency is influenced by the rain system. All year long, the beach users go to the beach when the weather is sunny. However, as the sunny weather is unstable and the sun is weaker in winter, some beach users prefer going only in summer. This tendency is confirmed for the, 50.2% who declared to have no preference for months, visiting the beach all year long, 39.8% only on summer and 9.7% on vacation (Table 1-F). The preferred days for visiting the beach are Sundays and Saturdays respectively (Figure 2-F).

The arrival time stranded between 6 and 7 a.m., reaching the peak between 10 and 11 a.m. The departure time begin to be representative between 9 and 10, reaching the peak between 14 and 15 p.m. (Figure 4-C). This pattern reveals that between 11 and 12 a.m. is the time when the majority of people are on the beach, and it is more crowded. The departure time is in accord to the time when the sunlight falls down. The evening begins at 6 p.m. Silva *et al* (2006) achieved the same pattern through directly counting of users on the beach in similar sampling hours. Added to this, the high seafront buildings that project their shadow over the beach in the afternoon. A few number of beach users arrive and leave the beach before 6 a.m. and 6 p.m. Major departure times are of beach users in Area I and II. In the first it is because of a dancing space and in the second because of the fashionable feature. Other users that stay more on the beach are groups of friends without children. The beach users remain on the beach 4 hours in average in each visit.

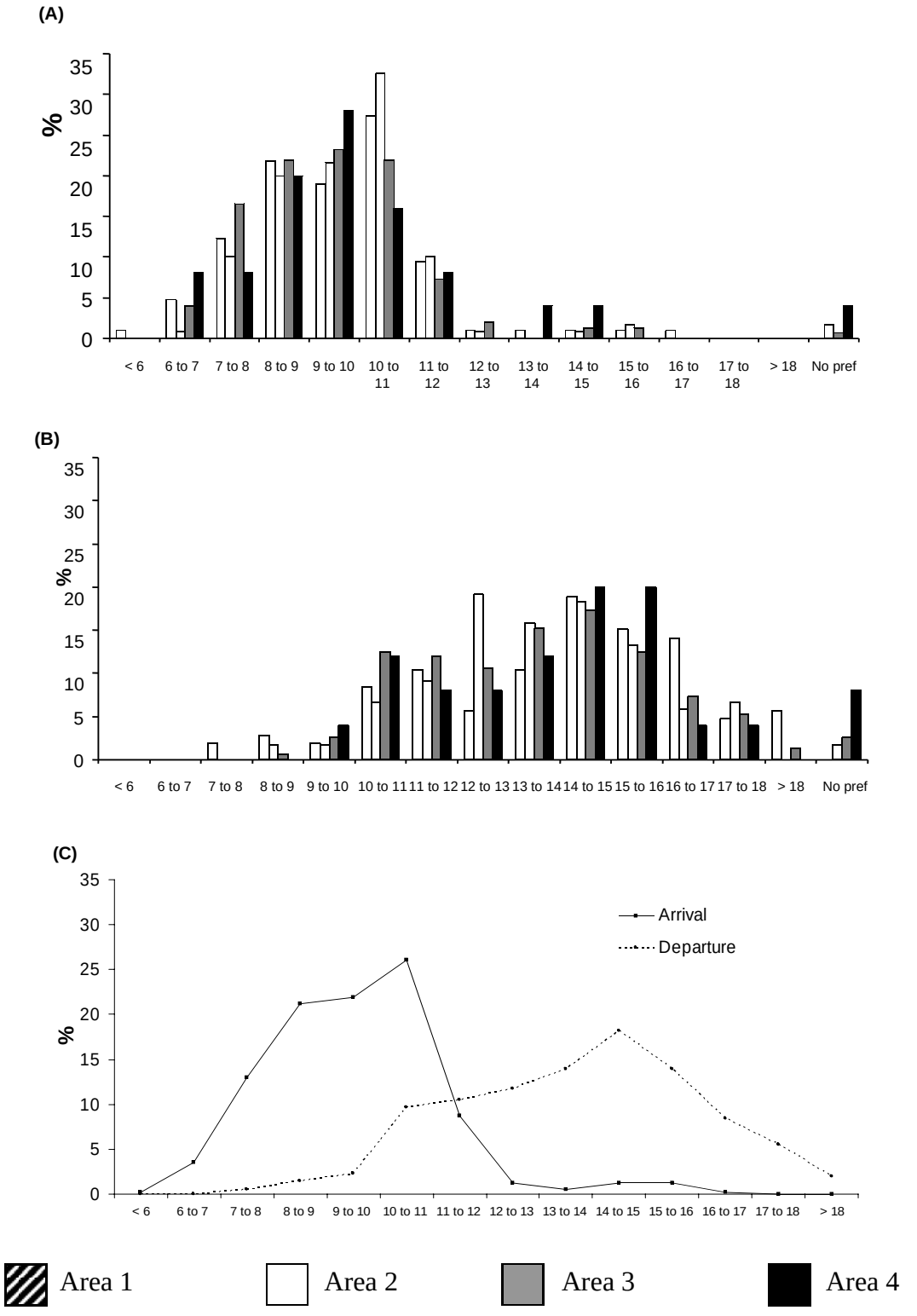

Figure 4: Time of arrival and departure of beach users of Boa Viagem beach. (A) Time of arrival; (B) Time of departure; (C) Average arrival and departure times for all areas.

In each visit, the beach users generally come to the beach in groups (43.3%) (Table 1-H). Only in Area II they use to come both alone and in group. This area is the most fashionable site of the beach (Silva *et al*, 2006), attracting young single users. The groups are basically composed first by relatives (44.5%) and friends (28.3%) (Table 1-I). Both groups have 4 people in average. In Area IV the groups are a little bigger (5 of relatives and 7 of friends). It is because the residents of the sea front buildings use to take chairs, foods and beverages to make meetings and barbecues. These groups are commonly found along the beach.

The amount of money spent by each person per visit on the beach is about US$ 8.00 and 9.00 in average (US$1.00=R$ 2.50). People who come to the beach in groups spend almost a half (41%) more than the users who come alone. Areas I and IV have the highest expenses. It is contradictory considering that in Area I the beach users have lower income in comparison with the others. One can infer that it happens because in Area I going to the beach is probably the principal leisure option, and consequently they spend more, even having a low income. It is not the same for the users of Area IV. Due to their higher income they have both other leisure options and spend more on the beach. Instead of any particularities among areas, the great majority of beach users do not bring their own food and beverage to the beach. Only 28 interviewees declared not to spend any money on the beach, and most of them were residents. Some of them bring a bottle of water and families with children bring snacks, but not enough to satisfy all the needs during the time on the beach, but only to reduce the potential expenses. They depend on the foods and beverages sold by formal and informal vendors (Araújo *et al*, 2006). It makes obvious the necessity of the authorities to manage the commercial services on the beach, in order to improve its quality and adequacy according to the demand.

For the question regarding the usual activities undertaken on the beach, several answers were given. So, in order to summarize this range, we divided the activities in six types according to their main proposal nature:

1. Relaxing and contemplation - these activities primes for resting, relaxation, low physical activities; pleasure in the contact with the environment through the senses. It includes also activities different from the routine, hobbies for instance. Some examples are sunbathing, reading, sleeping, feeling the breezes, feeling the sand under the feet, see the ocean/horizon, etc.
2. Movement - Consist in more intense physical activities, both regarding recreation and physical conditioning (e.g. walking, swimming, playing sports, bathing, playing with sand, running, dancing, etc).
3. Socialization - predominate social observation and interaction (e.g. admiring others' bodies, flirting, dating, making or meeting with friends, talking, etc).
4. Food - the main purpose is to degust foods and beverages typically offered on the beach. These foods and beverages can be tried in other places, however, on the beaches they seem to be especial. This kind of food can be called 'beach food', although the items can present slightly variations among different beaches. Some examples are coconut water, beer, raw oyster, peanuts, eggs, crabs and beans stew.
5. Work - Any activity related to commerce or services of any nature. Ex: vendors, beach cleaners, policemen, lifeguards, etc.
6. Other - Activities that do not fit in the categories cited above.

Workers (Type 5) were not a target for this study. Once on the beach, the users prefer doing first activities of movement, after relax (sunbathing), nature contemplation and food (drinking beer and eating beach food) (Figure 5). Socialization surprisingly came in the fourth place. This category of activity is related to respondents who declared to go to the beach specifically to talk, make friends and/or flirt/date. However, the purpose of having social

contacts/experiences with relatives, friends and even unknown people is underlined in the other categories. As they usually come in groups, they socialize with others while playing sports, swimming, relaxing and eating/drinking.

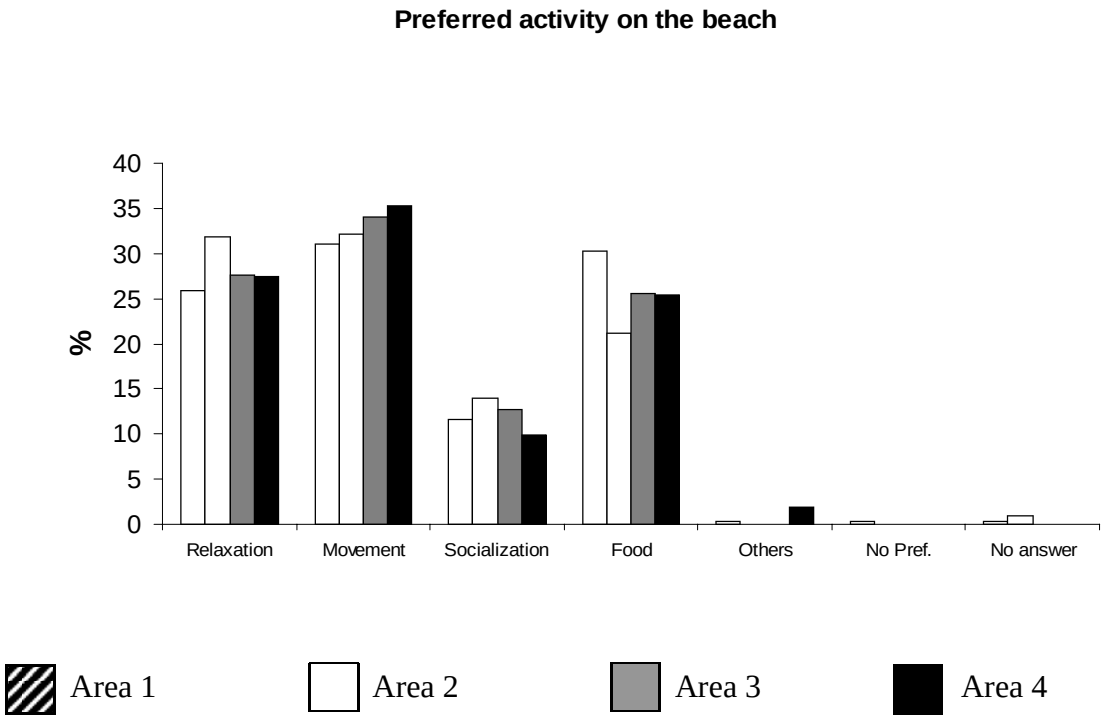

Figure 5: Preferred activities undertaken by the beach users on Boa Viagem beach.

The way users relate to the beach, makes clear that Boa Viagem beach is, in fact, an environmental scenery for social experiences. Normally, people go to the beach to have a kind of leisure time that only the beach scenery/landscape can provide. There users can find the heat of the sun, the seawater for refreshment, the sand to touch, to feel, to play; the wind, and many different people to see and to interact with. They can appreciate facilities and services, and try some typical foods. Beyond all of this, Boa Viagem, like the beaches in general, is a place of body exhibition. Bird (1996) pointed out that surveys of beachgoers often list 'watching other people' as a beach activity. According to this author the beach is an environment where it is more acceptable to take off most (in some places all) of the clothes than in most inland public spaces. In consequence, it is a place where, usually free of charge, one can watch and admire beautiful and healthy people. We can add to this the important hole played for the space available for recreation on the beach in the actual living context, in which

people live in smaller and smaller houses, commonly without any external area. On Boa Viagem suburb, the pavement along the beach is the unique open air space for physical exercises or long walking. These results reinforce the great importance of the beaches as a public leisure space, its impact on the social life and the crucial necessity to maintain its health in a good level.

Another important factor that influences the social dynamic of the Boa Viagem beach is the occurrence of shark attacks. In ten years, from 1992 from 2002 thirty eight non provoked attacks occurred on four metropolitan beaches, 22 only on Boa Viagem beach (Silva, 2002). Alert signs are spread on the beach, but some of their messages are questionable, once do not specify clearly the danger of shark attack, only say what people should not do, without explaining why. The proceedings recommended for safety are to avoid going beyond the reefs, do not dip in a deep higher than the waist, in full and empty moon, early morning and late afternoon, alone, in the mouth of rivers and in turbid waters.

Surprisingly again, 56.0% of the total interviewees did not change their coming habits or behavior as a result of the incidence of shark attacks (Table 1-J). The opposite happened only in Area II. It is likely to be due to the absence of reefs in most of this Area. In Area I they are present. In Area III and IV the reefs form natural pools in the low tide (Souza, 2004). The beach users who changed their habits because of the incidence of shark attacks adopted different strategies, ranked on Table 3-A. Most of these people do not get in the water or do it only in shallow water. Instead of these results, lots of bathers can be found in the water. When a new attack happens, the exposure of the event in the media makes people feel more afraid and cautious. However, as the time passes, the event is forgotten and the bathers get again into the water, ignoring the risk or keeping the false illusion that shark attacks happens only to surfers beyond the reefs. Although the ‘street alert/traffic/tourism guiding signs’ received low importance in the rank of priorities (Table 3-B), we call attention for the importance of them

to prevent future attacks and motivate the adoption of a safe behavior in bathing and water activities.

Beach investing priorities and awareness of beach related laws and policy

The governmental investing priorities for Boa Viagem beach in the vision of respondents regarded to facilities and services, such as policemen, water and sand cleanness, and toilets availability (Table 3-B). In the respondents' opinion the Beach Cleaning Service provided by the Municipality is effective and better that in other times. Nevertheless, they believe that the problem is the great and continuous amount of litter let by the users on the beach, more than the service can collect. The majority of the answers referred to Conservation actions relates to educational campaigns regarding beach litter.

It is interesting to note that even on a beach in this level of development there is always something to improve. The priorities chosen demonstrate that the beach users expect from the government the improvement of aspects of infrastructure and facilities. The resort is still in the consolidation phase (Kay and Alder, 1999). However, through the priorities the beach using public indicates the way they expect for the future of the beach.

Some respondents commented that the actual conditions of the beach do not correspond to its fame both in Brazil and worldwide. It is necessary to consider the opinion that comes from the users, and develop researches like Souza (2004) focused in the infrastructure and environmental health diagnosis, in order to plan carefully in which of the priorities of Table 3-B to invest in each area.

The knowledge of beach related laws were exactly a halfway between 'yes' and 'no' answers. This pattern was found within the Areas, excepting in Area IV. The most important category of laws in the rank was 'Forbidden to run with dogs/animals' (Table 3-C). Dogs are really prominent between the animals. Due to the residential vocation of Boa Viagem beach,

lots of residents use to run along the shore with their pets, even though this practice is forbidden. Whereas the presence of dogs and other animals are common on Boa Viagem and other beaches of Pernambuco State, they are an important source of annoyance for the beachgoers. Three quarters of the beach users interviewed on twenty three Welsh beaches wanted dogs banned from the beach (Morgan, 1999). Some of the answers given really correspond to laws of the Municipal, State and Federal level, which aims to ordinate the use on Pernambuco State beaches, the traffic of animals, bikes, vehicles and disciplines the practice of sports on the sand; present general rules for the practice of nudism, forbids the practice of surf, body boarding and similar water-based activities on the beaches of Recife Metropolitan Region, and establish limits for occupation of coastal areas. Other responses are simply recommendations or rules of behavior, like do not leave remains on the beach and avoid sun exposure between 10 a.m. and 3 p.m. (Table 3-C).

Table 3: Qualitative categories cited as answer for the "Open questions", ranked according to the percentage of citation.

Rank	a) Changes of behavior because of shark attacks	b) Priorities for public budget investment	c) Knowledge of beach-related laws
1st	Do not enter in the sea	Presence of policemen	Forbidden to run with dogs/animals
2nd	Dip in shallow water	Water and sand cleaning	Do not throw garbage away
3rd	Became afraid while in the water	Commerce organization/standardization	Sports are forbidden in certain days and hours
4th	Reduced the bathing frequency	Toilets	Do not dip beyond the reefs
5th	Dip only before reefs	Shark attack control	Surfing prohibited in risk areas
6th	Reduced visits to the beach	Conservation actions	Bikes on the pavement/sand forbidden
7th	Dip only in low tide	Leisure/sports areas	Prohibited cars on the sand
8th	Reduced the bathing time	Lifeguards	Prohibited to open empty chairs
9th	Chose places far from alert plaques	Coastal protection engineering	Prohibited to cook
10th	Use showers to cool off/Take showers	Monitoring	Respect the environment
11th		Pubs/restaurants on the coast	Prohibited nudism/top less
12th		Beach management/revitalization	Do not make unauthorized electric installation
13th		Showers	Handle foods properly
14th		Tourism improvement	Do not practice water sports close to beachgoers
15th		Night life on the coast	Do not urinate/defect
16th		Entertainment events on the coast	Prohibited loud noise/sound
17th		Street lightning	While running with animals, collect the feces
18th		More kiosks	Avoid sun exposure between 10 a.m. and 3 p.m.
19th		Street alert/traffic/tourism guiding signs	Commerce journey until 4 p.m.
20th		Transport/Parking	Do not damage public property
21st		Finish sex tourism/kids begging	Prohibited to serve beverage in glass cups
22nd		Craft fairs	Respect the fishing permitted seasons
23rd			Use protection accessories while running with ferocious animals
24th			Respect the coastal occupation limit

The respondents demonstrated a relative good knowledge about the laws related to beaches. Nevertheless, it does not warrant their fulfillment. The dissemination of the laws for the great population is essential to make them aware of their responsibilities and rights while using this special environment. Moreover, not only this, but a plan for monitoring the uses and activities, in order to assure a satisfactory recreational experience for all the users.

It is extremely important for leisure and tourism managers to be aware of the beach clientele as well as the prime reasons that visitors give for selecting a beach (Tudor and Williams, 2005).

In the vision of Morgan, 1999, input from beach users could therefore be 'fed back' to the beach environment via management decisions, for the direct benefit of the users

themselves; the detailed information about perceptions, preferences and priorities of the set of different beach users can be invaluable for tourism promotion agencies.

At national and regional level, efforts should be made to maintain the diversity of beaches, providing a range of types from the amenity beach with a wide range of facilities to the less intensively used wilderness type (MacLeod *et al*, 2002). Moreover, the development of beaches between these extremes should be dictated by their scientifically defined social and ecological carrying capacity thresholds (De Ruyck, 1997).

Final Considerations

The gender of most of the beach users sampled was female, with ages varying from 18 to 40, which demonstrates that the beach users of Boa Viagem beach are predominantly young. The Boa Viagem public is composed mainly by local visitors and residents came from inland suburbs of Recife City, or the four coastal suburbs nearby the beach. The Areas where were found the greater percentage of tourists were Areas III and IV. However, the number of Brazilian and foreign tourists was very low for a tourist beach.

The beach users had mostly high school, economically active, with income between 1 and 5 Brazilian minimum wages (US$ 120.00-US$ 1.00=R$ 2.50). Beach users with a higher income are concentrated in Areas II to IV. Nevertheless, the Boa Viagem beach users' income can not be, in general terms, considered high. Boa Viagem beach was the preferred beach for most of the beach users interviewed. According to the answer given, in the moment to choose a beach to visit, the beach users interviewed criteria are access and proximity, habit and attachment to the place and emptiness and tranquility respectively. They have prominently 11 to 20 and 21 to 30 years coming to the beach. It coincides with the time where the beach started being occupied, in the 1960^{s}.

The beach is considered better since the beginning of the time visiting for 48.0% of the beach users mainly due to the water and sand cleanness. The aspects raised regarded to facilities and public services. Many of the reasons for people who believe the beach is worse now are the opposite of the first ones. Maybe, the sensation of beach worsening is because the improvements were accomplished for a correspondent increase in the population using the beach. It creates a great demand for the existent infrastructure, which started to be insufficient as the carrying capacity is exceeded. However, as it is an urban beach, the users tend to make allowances, being more tolerant to disturbances. The beach users have a strong sense of territorialism. Most of them prefers to be exactly in the areas where they were interviewed. In any way, according to the beach site preference, the beach is generally more crowded from Area I to Area III. The fact that the beach users' criteria for choosing a beach and a beach site were access and proximity, habit/attachment to the place and the emptiness and tranquility, more than landscape or water and sand cleanness, demonstrates that the majority of the beach users establishes a relationship with the environment immediately close to their livelihoods and begins frequenting it regularly independent of the natural features, quality or existence of some facilities. A very interesting point was that some respondents reported they look for tranquility and others for movement in the same beaches and sites. According to our feelings about the answers, we also believe that once on the beach, the users abstract themselves about what activities are being undertaken in the surroundings, or tolerate it in a high level, to concentrate in the satisfaction of their own expectations regarding recreational experience. The beach going habits in summer was prominently weekly and in winter a great percentage do not come or do it occasionally. It is possible to say that the occasional frequency is influenced by the rain system. According to the time of arrival and departure, the beach is more crowded between 11 and 12 a.m. The beach users remain on the beach 4 hours in average in each visit, and generally come in groups of 4 persons, commonly relatives. On Areas I and IV the beach users declared to spend more money in each visit. It is contradictory

considering that in Area I the beach users have lower income in comparison with the others. One can infer that it happens because in Area I going to the beach is probably the principal leisure option, and consequently they spend more, even having a low income. On Area IV, due to their higher income they have both other leisure options and spend more on the beach. Since on the beach, the users prefer doing primordially activities of movement. Although socialization came in the fourth place, the purpose of having social contacts/experiences with relatives, friends and even unknown people is underlined in the other categories. As they usually come in groups, they socialize with others while playing sports, swimming, relaxing and eating/drinking. The profile of use makes clear that Boa Viagem beach is in fact an environmental scenery for social and natural experiences. The majority of the total interviewees did not change their coming habits or behavior as a result of the incidence of shark attacks. For respondents who declared to have changed the strategies of self defense are do not get in the water or do it only in shallow water. Instead of these results, lots of bathers can be found in the water. When a new attack happens, the exposure of the event in the media makes people feel more afraid and cautious. However, as the time passes, the event is forgotten and the bathers get again into the water, ignoring the risk or keeping the false illusion that shark attacks happens only to surfers beyond the reefs.

The governmental investing priorities for Boa Viagem beach in the vision of respondents regarded to facilities and services. In the respondents' opinion the Beach Cleaning Service provided by the Municipality is effective and better that in other times. They believe that the problem is the great and continuous amount of litter let by the users on the beach, more than the service can collect. The majority of the answers referred to Conservation actions relates to educational campaigns regarding beach litter. Some respondents commented that the actual conditions of the beach do not correspond to its fame both in Brazil and worldwide. It is essential to consider the opinion that comes from the users, and develop researches focused in infrastructure and environmental health diagnosis, in order to plan

carefully in which priorities to invest in each area. The knowledge of beach related laws were exactly a halfway between 'yes' and 'no' answers. The most important category cited was 'Forbidden to run with dogs/animals'. Some of the answers given really correspond to laws of the Municipal, State and Federal level. Other responses are simply recommendations or rules of behavior. The respondents demonstrated a relative good knowledge about the laws related to beaches. However, it do not warrant their fulfillment. The dissemination of the laws for the great population is essential to make beach the great public aware of their responsibilities and rights as users of this special environment. Moreover, not only this, but a plan for monitoring the uses and activities, in order to assure a satisfactory recreational experience for all the users.

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BEACH USER'S PERCEPTION REGARDING COASTAL EROSION ON AN URBAN BEACH.

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ABSTRACT

A number of 304 interviews were analyzed in order to access the perception of beach users regarding coastal erosion on Boa Viagem beach, Northeast Brazil. The results revealed that coastal erosion is not the main environmental problem for the beach user. However, they feel very worried in front of the risk of invasion of the sea and destruction of the beach, as well as loss of public/private property. Only one respondent could give the correct concept of coastal erosion, although they are aware of its causes, consequences and the existence of artificial structures on the beach. Almost all beach users interviewed were not aware of the project proposed by the Municipal government to solve the problem. It is essential to provide information regarding erosion and the project for the general public. It is also worthy to promote open discussion and accurate environmental studies, in order to allow the best decision in relation to the future of this important environment.

KEYWORDS: Coastal erosion, perception assessment, interview, questionnaire, beach management, Boa Viagem beach.

INTRODUCTION

In Brazil, the pleasant climate and high temperatures during almost all the year allows an intensive beach use in different manners, such as recreation, relaxation, sports and even work. These characteristics put the beaches in a privileged place of importance in economic, social and environmental aspects. However, the current patterns of use and occupation have

caused diverse conflicts, with negative consequences to the natural environment and beach users in general. According to KAY and ALDER (1999) due to the complexity and importance of the beaches, it is necessary to elaborate plans to promote its proper use, based on the relationships among these variables.

In fact, the influence of population in beach management processes can not be denied or treated separately, because people are the main transforming agent of the beach landscape (MAKOLOWEKA, and SHURCLIFF, 1997; WELLS and WHITE, 1995). Into this new vision of participative research and management, the community is seen as a source of knowledge and an important tool in the search for solutions for the existing conflicts of use on beaches (ABELEDO, 2003; DE RUYCK *et al*, 1997). According to POLETTE (1997) it includes the necessity of individuals, groups of people and organizations to be informed and participate in the environmental impacts evaluation proceedings, decision-making and conservation measures.

In this context, researches on people's perception became essential to better understand the relation among man and environment. Their expectations, satisfactions, dissatisfactions, judgments and attitudes must be comprehended, in order to find out ways to solve or minimize the current problems. Moreover, studies in this area (of knowledge) may determine the population profile, kinds of use, and from them, to influence all interventions, in political, educative, cultural and commercial fields.

The main purpose of this study is to describe the beach users' perception regarding the beach status, impacts and changes of Boa Viagem beach, with emphasis on coastal erosion and artificial protection structures, both already implemented and planned for the area.

THE STUDY AREA

Boa Viagem beach is placed in the littoral area of Recife city, Pernambuco State, Northeast Brazil (Figure 1) (ATLAS AMBIENTAL DA CIDADE DO RECIFE, 2000). This beach boarders in the coastal plain and is formed by unconsolidated sediments with diverse origins in the Quaternary period (DOMINGUEZ *et al*, 1990). In the first part of the beach (Figure 1, Area I) there are frontal dunes covered by grass. In the rest of the beach they do not occur anymore, mainly in the central portion, as a result of the existence of shoreline protection structures and urban constructions (GREGÓRIO *et al*, 2004).

The predominant climate is As (Tropical Hot and Wet) according to Köppens' classification. Annual temperature values stand around 25.4º, $\pm$ 2.8º C. In accordance with the rain regime there are two definite seasons: dry, from September to February and rainy, from March to August (ATLAS AMBIENTAL DA CIDADE DO RECIFE, 2000, www.inmet.gov.br).

The tide regime is semi diurnal and the wave height varies from a minimum of 0.00-1.26 m (0.36 m in average), and a maximum of 0,15-1,47 m (0.43 m in average). During the low tide, the reef line works as natural shore protection against erosion (GUERRA and MANSO, 2004).

On Boa Viagem beach there is a diverse landscape with great beauty and value, which offers several low cost options for leisure and sports, being intensively frequented by the local population, mainly on weekends and holydays. Beaches like these might be considered as gateways, attracting millions of tourists, either from Brazil or other countries (COSTA and KAHN, 2003). The neighborhood presents habitations of different social classes, a great number of high class residential and commercial buildings, hotels, shopping centers, sports courts, points of formal and informal commerce, and is also used for removable structures for sportive and cultural events.

In legal terms Boa Viagem beach fits in environmental protection laws in the Federal, State and Municipal levels, to manage and organize the activities and forms of use by the population. This beach is also included in the Municipal law as an Especial Zone of Environmental Protection (ZEPA 2). This classification implicates in a sustainable conservation unity, which allows the use by the public, but needs regulation to preserve its natural characteristics.

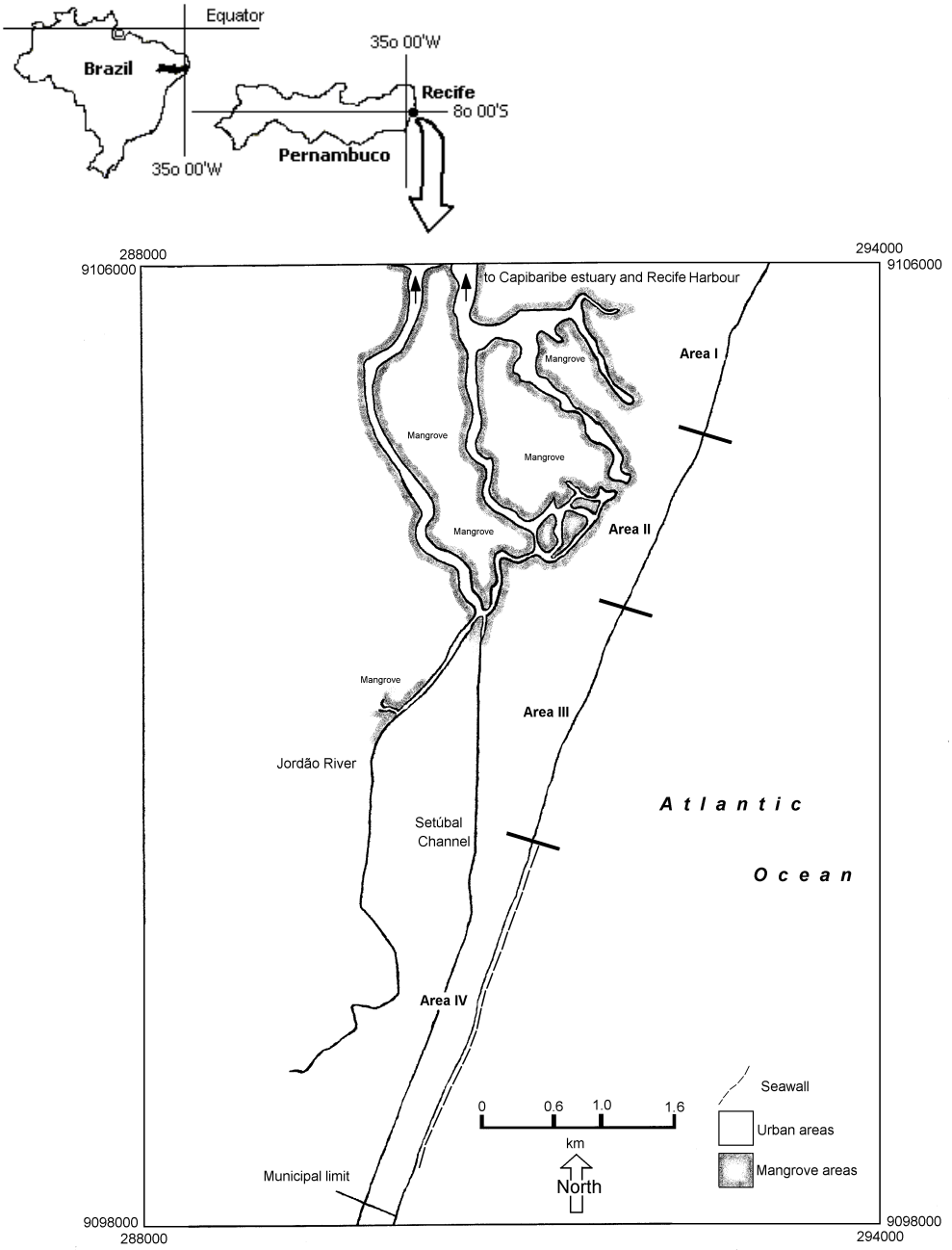

Figure 1: The Boa Viagem beach, Recife City, Pernambuco State, Northeast Brazil and the four Areas (I, II, III and IV) according to Silva *et al* (2006) along which the sampling was conduced.

Coastal erosion is a natural phenomenon, which may be magnified by man-induced activities. It affects rocky and sandy coasts, little or highly urbanized littorals (BIRD, 1996; SOUZA *et al*, 2005). In Brazil, beach erosion affects stretches along almost the entire coast. Some examples referred in the literature are cities in Ceará (PINHEIRO, 2000) and Rio Grande do Norte States (SCUDELARI *et al*, 2003). In Pernambuco State it occurs mainly in Recife (MANSO *et al*, 1995), Olinda (PEREIRA *et al*, 2003) and Paulista, where the local administrations has adopted emergencial and inefficient measures (ESTEVES and SANTOS, 2001).

Immediately north from Area I of the studied beach, the local administration has, as part of an urbanization project, built a wall and an avenue over the beach until the reefs. The families that lived in this area in inadequate housing conditions were relocated to other houses in better situation. However, in environmental terms, this measure hurt the laws, and left the area closed to water activities, because the waves beat strongly against the wall.

On Area IV, there is a seawall (Figure 1). This structure stretches 2 km southwards from the main built area (Area III). Sand bags are also disposed in some specific points with higher risk of erosion. This is not totally efficient in protecting the shore and has also a high cost of maintenance to the public administration. The beach aesthetic, as well as the patterns of public use and frequency, are affected by the presence of the structures themselves and the activity of heavy duty machinery and men working in its maintenance. Beyond all this, the problem of erosion is being little by little transferred to the north area of the beach, forcing the increase of this structure to the north.

The Municipality of Recife City intends to built a shore protection work to substitute the existing one. The project proposes one granite access 250 m seawards. Afterwards, an artificial reef should be built over the natural one using granite boulders, and the beach should

be nourished with sand from the adjacent continental shelf and estuaries (Figure 2). The project cost was estimated in US$ 6 million (R$ 15 million). The area will need to be closed for use for at least 2 years during the construction (COSTA and KAHN, 2003).

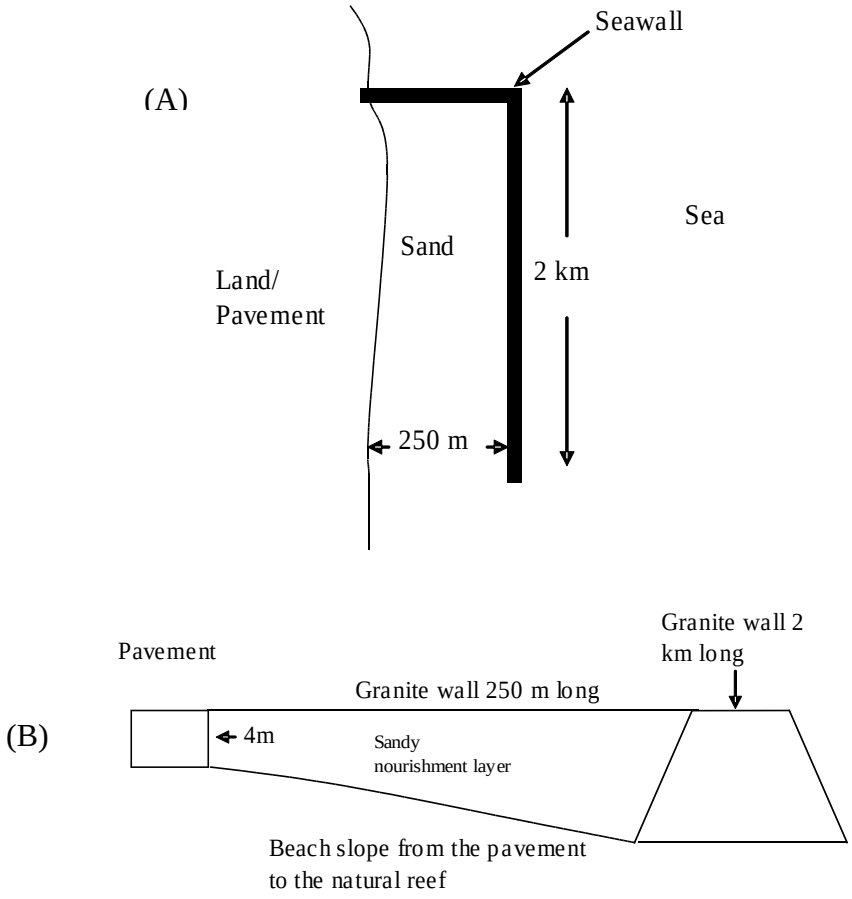

Figure 2: Scheme of the coastal erosion prevention project. (A) top view; (B) side view.

METHODOLOGY

The survey to access the beach users' perception regarding coastal erosion was carried out during February and March 2005. A team of 12 interviewers was recruited and trained to help in the fieldwork (VICENTE-LEAL and COSTA, 2006). The data were collected through face-to-face interviews along the four Areas of the beach. For these interviews a semi-

structured questionnaire was designed. This questionnaire was composed by four parts: an identification-ID (not numbered) followed by 34 numbered questions. The numbered questions boarded the beach user profile (Questions 1 to 8), the frequency and use of the beach (Questions 9 to 22.1) and finally, the perception regarding coastal problems, mainly coastal erosion and beach artificial structures (Questions 23 to 34). Only this last group of questions was considered in this paper, as well as some references to the profile when necessary.

A visual aid was showed before the last question of the questionnaires to provide respondents with the necessary information to form an opinion regarding the artificial structure planned for the beach. It contained a scheme of the structure and a balanced list of several aspects of advantages and disadvantages, based in the description of COSTA and KAHN (2003). After the exposition of the visual aid, the respondents were asked to give his/her opinion regarding the project. The questionnaire and detailed methodology are discussed in VICENTE-LEAL and COSTA (2006).

The beach users in general, excepting workers, were approached to be interviewed, both on the sandy area and on the seaside pavement, according to five degrees of priorities. These degrees were related to the highest possibility to accept responding and give attention, as well as, to avoid stopping people from doing their activities: (i) people seated and alone; (ii) people standing up and alone; (iii) people seated and in group; (iv) people standing up and in group and (v) people walking.

We believe that there was no problem of under representation of any group of beach users, as found in works such as MACLEOD *et al* (2002), which had difficulty to sample people involved in water-based activities. The *in situ* observations showed that most of the activities are undertaken on the sandy area and seaside pavement.

Based in SILVA *et al* (2006), a sample of 411 interviews was planned for the four Areas, with targets proportionally distributed among days of the week and hours of the day.

Three periods of 2 hours per day were chosen for the interviews: 8 to 10 a.m., 11 a.m. to 1 p.m. and 2 to 4 p.m. The teamwork was divided in two groups, concentrated in one Area each week, according to an established research schedule (VICENTE-LEAL and COSTA, 2006).

RESULTS AND DISCUSSION

A number 453 interviews were completed, and was reduced for 425 after the discarding of those that were poorly completed or had more than 2 fields in blank. From Area I to IV were used for analysis a total of 111, 122, 165 and 27 interviews respectively.

These sample numbers were analyzed until question 10. For respondents who declared to be on the beach from 1st to 5th time the rest of the questions were not posed. For question 23 and 32 to 34, the number of questionnaires used for analysis was 106, 120, 151 and 25. In question 24 numbers in brackets indicate the flow of the questions according to the answers given. If the respondent declared to recognize one of the terms asked, it was possible to pose the other questions in sequence. If not, the interviewers were instructed to jump to question 32. Considering this, from question 25 to 31, the amount of interviews analyzed decreased to a sub sample of 62, 96, 123 and 23 for the four areas respectively.

The information collected in the questionnaires was stored in conventional spreadsheets. After that, the textual answers were grouped in categories in accordance with the similarity of their ideas. The results for these groups are shown in percentage. The qualitative categories were classified in a rank of decreasing importance according to the percentage of citation received. Categories less than 1% of citation and/or 12th place were not displayed in the rank, composing the category ‘others’. In some questions the sample number relates to the total sample, and in others to the number of answers given to a specific question.

The beach users were asked first what would be the main environmental problems of the beach in an open question. It was an attempt to access the general importance of coastal erosion as an environmental problem to the public using Boa Viagem beach. As it is

commonly found in several beaches all over the world (BIRD, 1996), the first place in the rank of environmental problems cited (Table 1-A) were garbage and pollution in water and sand. Coastal erosion and the presence of coastal artificial structures came only in 5th place. However, many problems of social and managerial order were cited in the same question, such as lack of infrastructure, facilities, policemen, general beach management, among others. Analyzed separately, environmental and other problems represented 85.2% and 14.8% of the total answers given respectively. Respondents expressed their dislikes, aspects that disturb them more on the beach, not only in environmental perspective, but also in social and managerial ones, depending on their natural or social perception of the same environment. For some respondents, the social and managerial aspects of the beach are more relevant than the environmental ones. Certainly it makes clear their preferences in relation to the level of development, which is normal considering that Boa Viagem is an urban beach.

The expression ‘sea level rise’ was better known (72.9% of ‘yes’) than ‘coastal erosion’ (54.0% of ‘yes’) in the four areas (Figure 3-A, B). The opposite happened in Area II, where 56.7% declared to recognize the expression ‘coastal erosion’. Such can be due to the higher level of formal education of these beach users, which generally finished university (VICENTE-LEAL *et al*, 2006). In Area I, where most of the beach users have secondary education, 65.1% did not recognize this term. Although both terms refer to the same phenomenon, the knowledge and discussions using the first one are restrict to specialists, and the expression ‘sea level rise’ is more exposed in the mass media.

Table 1: Decreasing rank of percentage of answers cited for the open questions.

Rank	A) Environmental problems	B) Concepts of erosion/sea level rise	C) Causes
1st	Garbage/pollution in water/sand	Sea invasion and destruction	Reclaiming/sea front occupation
2nd	Shark attacks	Cited causes	Sea level rise
3rd	No problems/did not observe	Do not know	Do not know
4th	Do not know	Loss of sandy area/leisure	Environmental quality worsening
5th	Erosion/coastal structures	Environmentally destructive phenomena	Building of Suape harbour
6th	Doves/pigeons	Higher tides of August	Natural causes
7th	Dogs/animals	Natural phenomenon	Higher tides of August
8th	Feces/urine	Sea level rise	Garbage/pollution
9th	Algae	The sea searching for its original area	Tsunami
10th	Sound pollution	Tsunami	Erosion/coastal structures
11th	Badly planed urbanization	Reclaiming/sea front occupation	-
12th		Nature reaction to man-induced impacts	-

Rank	D) Consequences for the beach	E) Consequences for you	F) What should be done to solve
1st	Risk of sea invasion and destruction	Loss of sandy area/leisure	Do not know
2nd	Loss of sandy area/leisure	No consequences	Coastal structures in the sand
3rd	Do not know	Risk of sea invasion and destruction	There is nothing to be done
4th	Drive the visitors/tourists away	Do not know	Breakwaters/artificial reefs
5th	Mischaracterization of natural landscape	Bathing insecurity	Accurate technical-scientific researches
6th	Business losses	Cease visiting	Cease reclaiming/sea front occupation
7th	Bathing insecurity	Mischaracterization of natural landscape	Local/global educational campaigns
8th	Loss of property value	Business losses	Diminish emission of pollutant gases
9th	Loss of ecological balance	Loss of ecological balance	Government management
10th	No consequences	-	Respect Nature
11th	Tsunami	-	Place sand bags
12th	Increase of garbage/pollution	-	Renourish the beach

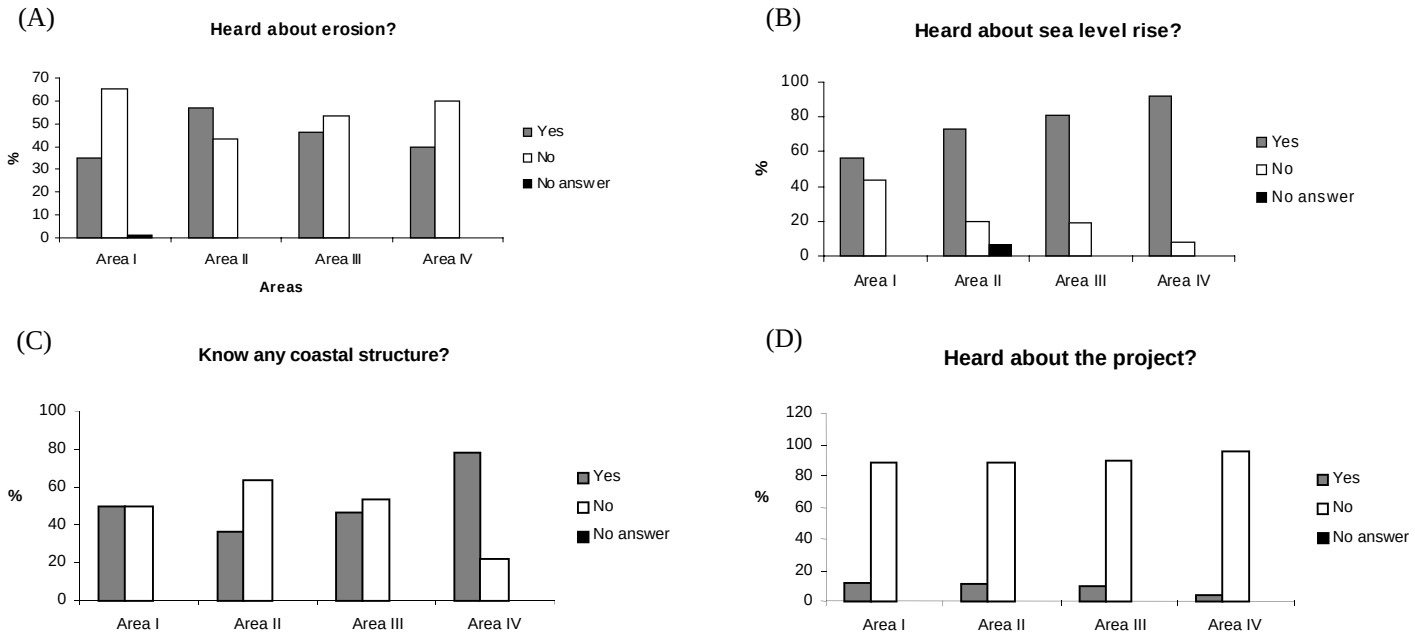

Figure 3: Awareness of beach users of the four areas regarding coastal erosion and coastal artificial structures. The questions where respectively: (A)-heard about erosion?; (B)-heard about sea level rise?; (C)-know any artificial structure?; (D)-heard about the project?

In the question regarding the concept of coastal erosion/sea level rise, many sentences were raised by the respondents (Table 1-B). As most of them know better the expression sea level rise, the concepts given relate mainly to it. It was interesting that they perceived the phenomenon under two main perspectives: the elevation of the seawater level, with the consequent invasion of the sandy and urbanized areas; and the loss of sand, with the correspondent decrease in beach width. It is worthy to stress the fact that 16% did not give a concept, but cited causes of the phenomenon (2nd position in the rank). Some beach users think that coastal erosion/sea level rise is actually a natural phenomenon. Others, not so representative, but still important, believe that the cause are the highest tides (meteorological tides) that occurs prominently in August, when the winds are also stronger. And for some of the interviewed it is a reaction of the sea in front of the man-induced impacts, mainly the occupation of the sea front, which leads to its searching for the past, original, areas. Only one

person in 304 described the real concept of coastal erosion, which is the deficit in sediment balance of a beach, with loss of sand (BRUUN, 1989; BIRD, 1996).

The most important causes of coastal erosion/sea level rise for the respondents were the land reclamation of mangroves areas and the occupation of the coastal area with hard structures and buildings (Table 1-C). In their vision, the urbanization is coming closer and closer to the beach, as the cities are growing and people want to live as close as possible to the sea. Some people reported what their older relatives said about how the beach was the natural environment, absence of urbanization, higher width of the sand and vegetation coverage. A time they could hardly see by themselves, since their age rate varies between 18 and 40 years old (VICENTE-LEAL and COSTA, 2006). In fact, their vision corresponds to the present reality of Boa Viagem and many other beaches in Brazil (AQUINO *et al*, 2003; SCUDELARI *et al*, 2003). MUEHE (2001) proposed an increment of the minimum limit of 33 m from the beach edge for beachfront occupation. This author suggested for the Northeast Brazilian coast a minimum limit of 50 m from the backshore for urbanized beaches, to assure a protection zone against erosion.

On the other hand, the sea level rise driven by the emission of greenhouse gases to the atmosphere, increasing world temperatures and melting of the polar ice caps, came in the 2nd position.

In the perception of the beach users interviewed the beach is suffering pressures from both continental and oceanic sides, getting narrower, squeezed. The sand, carried by the wind, can be found spread over the beachfront pavement until the avenue, more than 100 m distant from the backshore (when present). Anyway, it is possible to observe throughout the answers that, in the perception of the respondents, the majority of the causes of beach erosion/sea level rise are man-induced. The implementation of Suape Harbour (5th position) deserves attention. Even though it is difficult to measure separately the responsibility of this structure, it is listed

as a high impact human activity (PERFIL DOS ESTADOS LITORÂNEOS DO BRASIL, 1995).

PRICE (1993) and ESTEVES and SANTOS (2001) cited the badly planned coastal occupation and resources usage important causes of erosion. BRUUN (1989) and DANIEL (2001) reported the sea level rise as the most important cause of this phenomenon.

In general, the beach users have two main worries: they feel afraid of the possibility of an invasion of the sea over the sandy area, the pavement and buildings, with their destruction; and the consequent loss of the beach as a space for leisure and recreation. These two categories occupied from 1st to 3rd places in the rank for both questions referring to the consequences of coastal erosion/sea level rise for both beach and respondents (Table 1-D and E). These fears probably have existed in their minds since the erosion became noticeable. However, we believe that with its aggravation in the last few years, together with the occurrence of a Tsunami in Southeast Asia in December 2004, made worries increase, even though the possibility of a Tsunami to happen in Brazil is very remote. This category was raised not only as consequence for the beach, but also as concept and as a cause (Table 1-B and C). In fact, although sea level rise is a very long-term process, the risk of flooding is not out of question, since some of Recife city is under sea level (PERFIL DOS ESTADOS LITORÂNEOS DO BRASIL, 1995).

Other reason that influences the perceptions of consequences of erosion is the occurrence of shark attacks, represented in the category ‘bathing insecurity’. This aspect is slightly stronger in the individual perspective (Table 1-E). In ten years, from 1992 from 2002, thirty eight non provoked attacks occurred on four metropolitan beaches, 22 on Boa Viagem beach (SILVA, 2002). A great difference was found in the category ‘no consequences’ (10th position for the beach and 2nd for the individuals). In spite of the similarity of answers according to the perspective of the beach users, in their vision coastal erosion/sea level rise affects the beach directly, but affects them indirectly. The loss of the beach as a space

available for open and free of charge recreation really touches them. Nevertheless, if the condition of the beach evolves to impair a desirable quality in the recreational experience, they can simply cease visiting (6th position), or choose a better coastal destination. It is a dangerous point, taking into account the importance of the beach and its touristic appeal, deserving attention from managers in order to maintain the environment in a minimum proper conditions for use. The ecological and economical perspectives were also clear in the categories of consequences. In the coast of Hermenegildo, South Brazil, ESTEVES and SANTOS (2001) found out that 90% of the residents interviewed asserted that the risk of erosion affects the commercial value of the properties in 50-80%.

Regarding suggestions to control the coastal erosion/sea level rise on Boa Viagem beach, most of the respondents said they do 'not know what should be done' (Table 1-F). These persons argued that this issue is too technical, and they did not have enough knowledge/feel able to give a sound opinion. In general, this answer occupied high positions in the rank for all the questions where it appeared (Table 1-A to D and F). Some suggestions related to the remediation of the consequences, through hard coastal structures on the sand (2nd) and in the sea (4th), sand bags (11th) and beach renourishment (12th). Hard structures such as seawalls, groins and breakwaters are widely used to control coastal erosion, although they are questionable in several aspects (BIRD, 1996). An important impact is the stagnation of seawater and its consequent loss of quality. On Olinda beaches, respondents claimed for the opening of the existent breakwaters in order to renew and oxygenate the water (PEREIRA *et al*, 2003). Despite the low position in the rank, the renourishment have been encouraged by the scientists, and considered feasible and efficient, due to its good cost-benefit relation and low environmental and aesthetic impact (BRUUN, 1989; DANIEL, 2001; NORDSTROM and MITTEAGER, 2001 and MUÑOZ-PEREZ *et al*, 2001). Nevertheless, it is essential to seek adequate sources of sediments and carry out systematic biological monitoring (NELSON, 1993, GIORDANO and ROWLAND, 1999). In the suggestions given to solve the problem of

coastal erosion on Boa Viagem beach, the beach users interviewed aimed to solve the problem, despite the palliative efficacy of the measures adopted. Surely it was easier to make suggestions using as references the already existing, more familiar coastal structures. Others primed to prevent causes through accurate technical and scientific works, a more environment friendly mentality, educational campaigns in local and global levels, the ceasing of the causes and a good management by decision-makers. The 3rd category, in which the respondents declared that 'there is nothing to be done' for solving the coastal erosion/sea level rise on Boa Viagem beach is worth mentioning. For these respondents, as the impacts are already done, it is not possible to revert the situation, as for instance, by removing the hard constructions and buildings along the beach. In the beaches of Metropolitan Region of Barcelona, Spain, this measure was adopted. As part of the Metropolitan Coastal Plan of 1986, industrial buildings were demolished and slums eradicated (BRETON *et al*, 1996). However, this is a drastic measure of invaluable economical and social implications. In this answer is implicit the message that "time is over", and at man can only be a spectator to the reaction of a furious nature. Based in the statements ranked in this question (Table 1-F), as well as in the subtopics C and D of Table 1, in the categories 'natural phenomenon' and 'natural causes', one can make unbelievable findings. Although many others made similar comments along the interview, in the perception of these beach users, the sea, similarly to nature, is a living entity; a force, with power of action and reaction. The sea is a creation of God and only He can control it. Men can try to cope with coastal erosion/sea level rise; however, if the sea resolves to punish them, who is the main responsible for the impacts, nothing can be done to stop the destruction. This sacred vision of nature was also found by the public consultation undertaken by the Secretary of Science, Technology and Environment of Pernambuco State (SECTMA, 2003). In the national consultation on the importance of the sea for Brazilians, it was found that the Northeast Region was distinguished in relation to the rest of the country. For 83% of the respondents, the sea was considered very important, mainly as a source of food source and

recreation opportunities (O BRASIL E O MAR NO SÉCULO XXI, 1998). DANIEL (2001) stressed that it is better to concern about preserving nature than controlling it, because instead of the walls and structures, nature will always prevail.

The awareness of existent coastal artificial structures on Boa Viagem beach was 46.4% yes and 53.6% no for all areas of the beach (Figure 3-C). Nevertheless, in Area IV 78.3% were aware of the presence of a seawall. This result was not expected since the seawall of Boa Viagem beach occupies almost all the extension of this Area (Figure 1). Although the beach users were practically seated on the seawall, they did not perceive it as something strange to the natural scenery of the beach. Maybe it happened because there is more than one decade since the seawall was built, and users tend to incorporate anthropic interventions to their idea of beach landscape.

The seawall was perceived by 90.8% of all the beach users interviewed (all four Areas). However, differences according to the area of the beach were observed. The New Seafront built in Area I was cited by 16.1% of the respondents interviewed in Area I decreasing to zero in Area IV. The seawall was cited by 80.6% of people in Area I increasing to 100.0% in Area IV. One can conclude that the territorialism underpins not only the preferences and priorities, as found by VICENTE-LEAL *et al* (2006), but also their perceptions. The very low percentage of citations of the New Seafront even in Area I where most of people are local residents can be due to its localization next, but out of the recreational sandy area traditionally used. Also, it was all built over the sandy area and part of the reefs, impairing recreational activities and bathing. It was reported in some interviews that people use to lean on the wall to receive the wave impact, an activity named as ‘shock bathing’. In fact it is very dangerous for the adventurers. In any way, with the disappearance of the precarious seafront habitations, which made the area unavailable for recreational purposes for many years, the opinion was unanimous that the New Seafront was good or

excellent, due to the benefit of removing the unfortunate families to better housing conditions in other places and the urbanization of the area.

The opposite happened in relation to the seawall (Figure 4). Analyzing separately the answers related to it, 42.7% agree that the structure is palliative, not enough to overcome the strength of the sea, as discussed before. Others think the seawall is efficient in the contention of the sea erosion(18.5%), important and necessary to protect public and private property (14.5%).

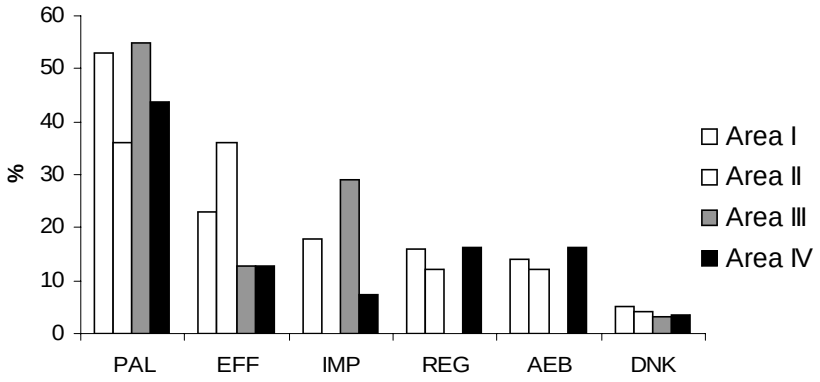

Figure 4: The beach users' opinion regarding the seawall of Boa Viagem beach. PAL-palliative; EFF-efficient; IMP-important/necessary; REG-regular; AEB-aesthetically bad.

For others it is regular, because restricts the area available for recreation and difficult the access to the water, offering risk of falls mainly for children, aged and disabled people (12.9%). Least of all, 11.3% declared that the seawall is a necessary evil, because it compromises the beach aesthetics. Another disadvantage cited was the necessity of maintenance. In fact, the constant impact of waves during the high tide tends to displace the granite boulders. Heavy machinery can be found in the area, putting the rocks back on the top of the seawall and a contingent of workers reorganizing the structure. Beach users were often observed sunbathing close to the tractors. In fact the seawall as it is implemented on Boa Viagem beach is the beginning of a project elaborated in 1989 by the government in cooperation with a technical group. For the complete project were planned, among other

procedures, the nourishment of the beach by the top of the seawall, in order to cover it. Detailed studies were carried out, bearing accurate data in regard of sand grain characteristics, adequate size of granite boulders, its weight and disposal into the structure, among other aspects (MANSO *et al*, 1995).

The project of a coastal structure planed to replace the present seawall is unknown for 89.8% of all beach users approached (Figure 3-D). Surprisingly, the awareness decreased in direction to the south, reaching 11.3% in Area I and 4.0% in Area IV. The information was gathered through comments with friends, TV, newspaper and radio respectively. Notwithstanding, into the 10.2% that declared to have been informed about the project, 65% did not know or remember what are the project general aims. Some of the other 29.3% gave superficial explanations.

The decision to implement a project of this magnitude needs to be discussed beyond academia. The users and the public in general, which will surely suffer the impact of the changes in the environment need to be better informed of the initiative, and their opinions taken into account by decision-makers. According to MYATT *et al* (2003) regarding the perceptions and attitudes towards a realignment scheme in UK, two barriers that suppressed public acceptance were lack of confidence in the Environmental Agency and public understanding. After a short explanation of the project with the use of a visual aid (VICENTE-LEAL and COSTA, 2006) the respondents formed opinions (Figure 5).

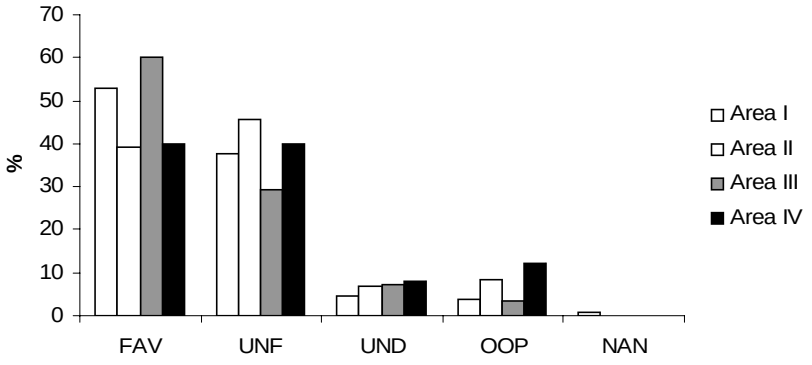

Figure 5: The beach users' opinion regarding the Project planned for Boa Viagem beach. UNF-unfavorable; FAV-favorable; UND-undecided/did not opine; OOP-other opinion; NAN-no answer.

These opinions were prominently unfavorable (50.7%) followed by favorable (37.1%), undecided (6.5%) and other opinion (5.5%). Regarding the proposed project, unfavorable respondents were more concerned about the disadvantages described in the visual aid, whereas the favorable opted for the advantages. The first ones suggested a cheaper measure, with less risk and the same benefits proposed in the project. Moreover, they thought the budget estimated for the project (US$ 6 million) would be better invested in other priority areas, such as education and social assistance. Very similar pros and cons were described in the evaluation of the Economic Performance of the U.S. Army Corps of Engineers Shore Protection Program (HILLYER *et al*, 1997). Respondents who were undecided could not form an opinion. So, they preferred remain unopinionated.

The main comment made by interviewed who had other opinion was that the project is a possibility of solution. However, it is necessary to carry out detailed studies to gather concrete data in relation to pros and cons, as well as what and how to do something, in order to support a mature decision to implement or not the project.

All respondents were also concerned about the future implications of both positive and negative points. We strongly agree with this opinion, because a decision regarding the solution of a problem is based in the previous knowledge about it. As more than a decade

passed since the technical study of the beach environmental variables was made (MANSO *et al*, 1995), we recommend a similar research to be done in order to yield data as accurate as the first study, but able to reveal the present conditions of the beach. The sedimentary variation of the beach has already been studied recently (GREGÓRIO *et al*, 2004), and so was the hydrology and wave transport (ROLLNIC, 2002).

In this study, the opinions formed are somewhat raw. In spite of this, we believe they were well grounded, and are available to be considered by the government managers. It is urgent to give more information to the population, especially beach users, about the issues discussed in this paper. As we are in a participative Municipal government, it is essential to include the project in the agenda of public discussion of priorities for public investments.

FINAL CONSIDERATIONS

It is essential to provide comprehensive and widely available information regarding coastal erosion and the project on Boa Viagem beach for the general population. It is also worthy to promote open discussions and accurate studies, in order to allow the best decision in relation to the future of this important environment.

The decision to implement a project of this magnitude needs to be discussed beyond the academic environment. The public, which will surely suffer the impact of the changes caused in the environment need to be better informed of the initiatives planned for their beach, and their opinions taken into account by the decision-makers.

The main comment made by interviewees who had other opinion was that the project is a possible solution. However, it is still necessary to carry out detailed studies to gather concrete data in relation to pros and cons, to support a sound decision about the project. All respondents were concerned with the future implications of both positive and negative aspects

of the project. The opinions formed in this study are somewhat raw. But, we believe they were well thought, and that people are available to express themselves to government managers.

Although beach users are not specialists in coastal engineering and the‘do not know’ answers were high in the rank, their opinion is essential since they, and not the technical or academic groups, are the beach environment users, the beach public, which have already and might still suffer the impacts of badly planed coastal structures.

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Appendix I

BOA VIAGEM BEACH USERS PERCEPTION RESEARCH – BRIEFING

1 - THE RESEARCH, ITS OBJECTIVES AND IMPORTANCE

Title: Beach users' perception regarding coastal erosion on Boa Viagem beach, Recife, Pernambuco State, Brazil.
Coordinator: Esp. Mônica Márcia Vicente Leal
Mentor: Dr. Monica F. Costa

General Objectives: To access beach users' perception and opinion regarding coastal erosion and the artificial beach structures planned for abating the problem on Boa Viagem Beach.

Especific objectives:
- Describe the socio-economic profile of beach users
- Describe the use and frequency profile of beach users
- Access perception and opinion about environmental issues

Importance: This study can provide important information to the local managers and other stakeholders (government, business, tourism and NGO's) as well as the society as a whole.

2 - CERTIFICATION
UFPE and WASHINGTON & LEE UNIVERSITY

Requirements from the interviewers:

- Avaliability for the 2 sampling weeks
- Minimum workload of 10 hours in the field
- Any particular cases: we can talk in particular
- Important requirement: presence on Saturdays and Sundays (especially between 11a.m. and 1 p.m.)

3 –TRAINING SURVEY - METHODOLOGY

Local: _____, date: _____ (_____) hour: _____
In pairs: One partner does the interview and the other observes the performance

Who to approach to interview:

Priority 1 – people seated and alone
Priority 2 – people standing up and alone
Priority 3 – people seated in group
Priority 4 – people standing up in group
Priority 5 – people walking

- Check in the end of the interview if all the fields of the questionnaire were filled in
- At the end of the interview, ask the respondent about both questionnaire and interview (his or her opinion, whether it was tiring or tedious, too long or difficult to understand or respond)
- Target: 1 to 2 questionnaires per interviewer (2 to 4 per duo) in 2 hours

4 – FULL-SCALE SURVEY – METHODOLOGY

Sampling period: 02/14 to 02/27/2004

Pilot sample areas:
Part 1 – Good environmental health
Part 2 – Intermediate environmental health
Part 3 – Worse environmental health

Frequency study and sampling areas adjustments:

Beach divided in 4 areas and beach users counted:

Area 1 – Good environmental health
Area 2 - Good environmental health
Area 3 - Intermediate environmental health
Area 4 - Worse environmental health

Sample size = 411 questionnaires proportionally distributed according to the amount of beach users in each area

Targets (Show table) and **hours:** 8 to 10 a.m., 11a.m. to 1 p.m. and 4 to 6 p.m.

Avoid missing (it breaks the sampling schedule)
Necessity to miss: call the coordinator as soon as possible to allow replacement

5 - RECOMMENDATIONS:

- Use: sun screen - cap or hat - sandals - White shirt - backpack
- Avoid: short and tight clothes
- Keep water and snacks with you in the bag

6 - THE ART OF INTERVIEWING

Language, posture and attitude –	Avoid slangs and swearwords; keep a good posture when seated or standing up in front of the respondent; Look at the respondent during the interview.
The use of badge –	Never forget to use and show to the respondent. It is essential to state the respondent that the research is important and truthful.
Self-presentation –	Approach politely. Introduce yourself formally to the respondent. Say your first and last name. Say, in a few words, the research general objective. Ask whether the respondent could answer the questionnaire. If positive, aknowledge and start the interview.
How to pose the questions to respondents –	Use impartial intonation while reading, in order to avoid introducing bias in the responses; speak clearly, and project your voice.
How to fill in the questionnaire –	In order, from the beginning to the end. Pay attention to avoid missing to fill any field. You can fill in the ID part before approaching a respondent. Correct the questionnaires at home to complete ideas and speeches, to check the filling, as well as, to correct wrong or unreadable words.
How to note the speeches –	Note everything as pronounced by the respondent, including comments regarding the beach and the research issue. Note as much as possible speeches. You can abbreviate words in order to write faster. It is not necessary to note speeches which do not concern to the questions or the research issue.

Rapport establishment:

How to treat people –	Be always polite and pleasant. Always give thanks at the end of the interview.
How to deal with people –	Be calm and patient, despite the situation or respondent behavior
How to gain cooperation –	Give attention to the respondent, show a real interest in what he/she says; give compliments or stress points in common between you and his/her, like neighborhood or trips, for instance.

7 - WHAT TO DO IF THE RESPONDENT:

Does not understand the question –	Read it again or explain its meaning in an easier way.
Have already been interviewed –	Give thanks, wish a nice day and go ahead.
Is too talkative –	Give attention, but keep silent to discourage them to talk more. Each time he/she pauses, go back to the interview, or if he/she completed the answer, pose a new question.
Refuse participating –	Give thanks, which a nice day and go ahead.
Let the interview incomplete (group) –	Ask one more question to other person in the group and politely resume the interview.
Feel tedious and give no attention while answering –	Write it in the field 'Notes' in the and of the questionnaire.
Has less than 18 years of age –	Proceed with the interview up to Question 11 only, politely resume the interview and write it in the field 'Notes' in the and of the questionnaire.
Shows second intentions –	Proceed with the interview up to Question 11 only, politely resume the interview and write it in the field 'Notes' in the and of the questionnaire.

IMPORTANT NOTES:

It is always a little hard in the beginning, but practice will come soon.
Unexpected situations will always appear. Keep calm.
Never give your personal opinion, be impartial.

Appendix II

QUESTIONNAIREN^{o}_____INTERVIEWER:_____(N.Total_____)

Date: / / **Day:** S M T W T F S **Time:** B: _____ E: _____

Period: Morning (6 to 8 a.m.) ☐ Early afternoon (11 a.m. to 1 p.m.) ☐ Late afternoon (4 p.m. to 6 p.m.) ☐

Weather: Sunny ☐ Partially overcast ☐ Overcast ☐ Rainy ☐

Part: 1-Good ☐ 2-Intermediate ☐ 3-Worse ☐

Pavement ☐ Sand ☐ **Tide:** _____

1.Sex: M ☐ F ☐ **2.Age:** _____

3.Marital status: Married ☐ Single ☐ Widow ☐ Divorced ☐

4.Origin:

Resident	☐	
Visitor	☐	City: Suburb:
Tourist (Bra)	☐	State:
Tourist (ext)	☐	Country:

5. Level of education: None ☐ Elementary ☐ Secondary ☐ High school ☐ College ☐ Pos Graduation ☐

6. What is your profession? _____

7. How much is the family's monthly income (R$ 1, 00=US $ 2, 50)? Are you the head of the family? _____

Less than 104	☐	US $ 520/728	☐	US $ 1.560/2.080	☐
US $ 104/312	☐	US $ 728/1.040	☐	More than US $ 2.080	☐
US $ 312/520	☐	US $1.040/1.560	☐	Non-informed	☐

8. Which beach do you prefer in Brazil? Boa Viagem ☐ Another ☐ Which? _____

8.1. Why? _____

9. How often do you come to Boa Viagem beach?

Summer	Daily	☐	Weekly	☐	Monthly	☐	Occasionally	☐
Winter	Daily	☐	Weekly	☐	Monthly	☐	Occasionally	☐

10. In which days and hours do you prefer being on the beach? Why?

11. Do you use to come to the beach alone or with someone? If you come with someone, who do you come with and how many people are they?

12. In average how much money do you spend each time you visit the beach?

13. In which part of the beach do you stay? Why?

14. Say 3, or more, activities you prefer the most on the beach.

15. How is your frequency now, with the occurrence of shark attacks?

16. Suppose the Municipality or State Government had a budget to invest. What would be the three priority areas in your opinion **(1 – first priority, 2 – second priority, 3 – third priority)**?

Education	☐	Beach protection	☐	Water quality	☐
Crime prevention	☐	Employment	☐	Public health	☐

Other (Specify): _____

17. Suppose the Municipality or State Government received a budget to invest on the beach. What would be the three prioritizing areas in your opinion **(1 – first, 2 – second, 3 – third)**?

Toilet provision	☐	Artificial beach protection structures	☐
Beach cleaning	☐	Construction/maintenance of leisure areas	☐
Inspection	☐	Safety	☐
Construction of more food and drink facilities	☐	Street lighting	☐

Other (Specify): _____

18. Do you know any law regarding what do people and the government are allowed to do, or not, on the beach? Give examples?

19. What is your opinion about the seawall built nearby to the north?

20. What is your opinion about the seawall that exists on the beach nearby to the south?

21. What is your opinion about the project of an artificial beach structure to replace the seawall southwards and increase the sandy area? If you heard about it, in which media was it? (If not, show the visual aid).

22. In relation to the area of the seawall, what is the best solution to the problems caused by the sea level rise in your opinion?

Order the answers: ☐ ☐ ☐ ☐ ☐

1 – Let the beach just as it is now.
2 – Build the artificial beach structure planned, because the benefits are higher than the probable risks.
3 – Do not build the artificial beach structure planned, because the benefits are temporary and it will cause problems in the future.
4 – Build a less expensive structure, with the same benefits and less impacts than the initially planned.
5 – Take away the seawall and put sand in its place.
Other: _____
Notes:

Appendix III

BOA VIAGEM BEACH USERS PERCEPTION RESEARCH
PILOT SURVEY - VISUAL AID

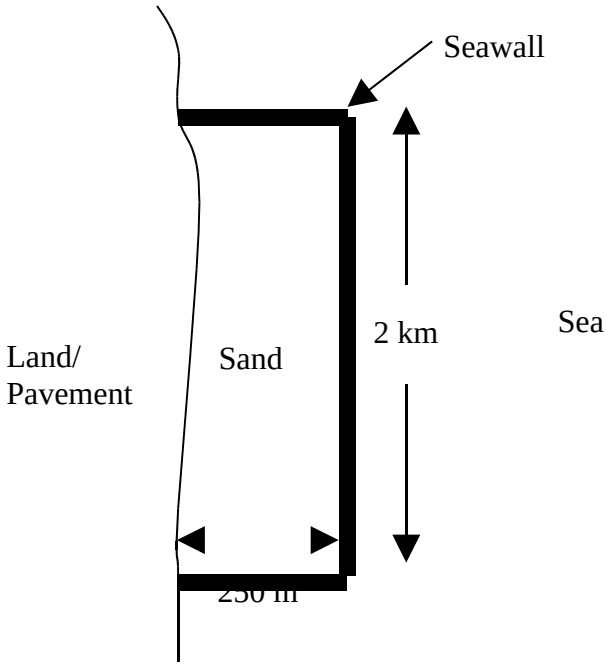

Figure 2: Top view of the project.

ADVANTAGES OF THE PROJECT:

- Protection of the beach, pavement, street and buildings against the sea level rise
- Increase of the sandy area available for recreation
- Increase the tourism, employment and income for local population

DISADVANTAGES OF THE PROJECT:

- Decrease the width of the sandy area north of the Project, impacts on the street and neighboring private properties
- Loss of the bathing area also in low tide
- High cost of construction and maintenance (public money expenditure)
- Impacts on the reefs and the dredged area
- An area of the beach will be closed for at least two years for the construction

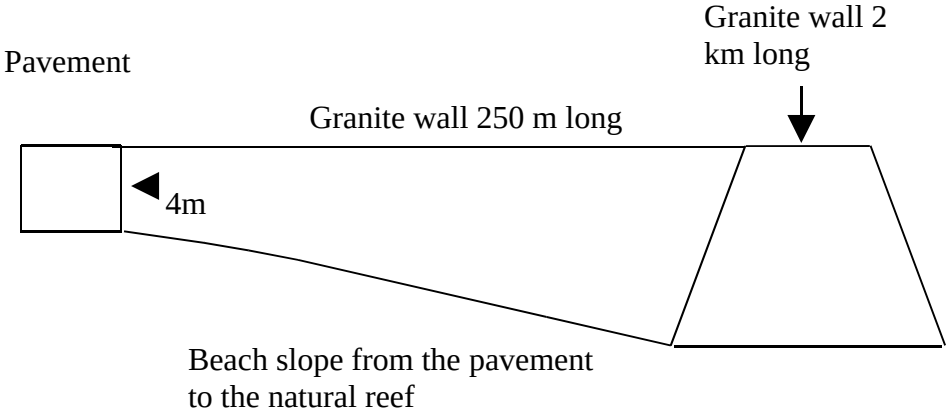

Figure 2: Side view of the project.

Appendix IV

BOA VIAGEM BEACH USERS PERCEPTION RESEARCH

QUESTIONNAIRE N º _____ **INTERVIEWER:**_____**COORD:**_____

Date: ____/____/_____ **Day:** ☐ S ☐ M ☐ T ☐ W ☐ T ☐ F ☐ S

Interviewing time: Beginning (h): _____ End (h): _____

Period: Morning (8 to 10 a.m.) ☐ Midday (11a.m to 1 p.m.) ☐ Afternoon (4 to 6 p.m.) ☐

Weather: Sunny ☐ Partially overcast ☐ Overcast ☐ Rainy ☐

Area: **1-Good**: Area 1 ☐ Area 2 ☐ **2-Intermediate:** Area 3 ☐ **3-Worse:** Area 4 ☐

Beach site: Pavement ☐ Sand ☐ **Tide:** _____

Priorities: Seated alone ☐ Up alone ☐ Seated in group ☐ Up in group ☐ Walking ☐

1. Sex: M ☐ F ☐

2. Age: (SHOW THE CATEGORIES) 18-30 ☐ 31-40 ☐ 41-50 ☐ 51-60 ☐ 61-70 ☐ 71-80 ☐ > 80 ☐

3. Marital status: Married/union ☐ Single ☐ Widow ☐ Divorced ☐

4. Origin: Resident ☐ Pina ☐ Brasília Teimosa ☐ Boa Viagem ☐ Setúbal ☐
Visitor ☐ City: _____
Suburb: _____
Tourist (Bra) ☐ State: _____
Tourist (For) ☐ Country: _____

5. Level of education: _____

6. Present occupation? _____

7. Are you the head of the family? Yes ☐ No ☐

8. How much is the family's monthly income(R$ 1, 00=US $ 2, 50)? (SHOW THE ALTERNATIVES)

Less than 104	☐	US $ 520/728	☐	US $ 1.560/2.080	☐
US $ 104/312	☐	US $ 728/1.040	☐	More than US $ 2.080	☐
US $ 312/520	☐	US $1.040/1.560	☐	Non-informed	☐

9. What is your preferred beach? Boa Viagem ☐ Pina ☐ Other ☐ **Which?** _____

9.1. Why?

10. For how long have you frequented Boa Viagem and Pina beaches?

11. Since them, do you think Boa Viagem and Pina beaches are better, worse or the same?

11.1. Why?

12. How often do you come to Boa Viagem and Pina beaches?

Summer	Daily	☐	Weekly	☐	Twice a month	☐	Monthly	☐	Ocasionally	☐	Do not come	☐
Winter	Daily	☐	Weekly	☐	Twice a month	☐	Monthly	☐	Ocasionally	☐	Do not come	☐

13. In which days do you use to come to the beach? ☐ S ☐ M ☐ T ☐ W ☐ T ☐ F ☐ S All ☐ No pref. ☐

14. In which months do you use to come to the beach? ☐ J ☐ F ☐ M ☐ A ☐ M ☐ J ☐ J ☐ A ☐ S ☐ O ☐ N ☐ D

Obs:

_____

15. In which hours, approximately, do you use to arrive and leave the beach?

	Arrival:	Departure:
Morning	_____	_____
Afternoon	_____	_____
Evening	_____	_____

16. In which part of the beach do you enjoy staying (Reference)? _____

16.1. Why?_____

17. Do you use to come to the beach alone or with someone? Alone **(18)** ☐ With someone **(17.1)** ☐ Both **(17.1)** ☐

17.1. With whom and how many people generally?

Family	☐	Nº of persons	_____
Partner	☐	Nº of persons	_____
Friends	☐	Nº of persons	_____

18.In average how much money do you spend each time you visit the beach?

Alone US $_____ With someone US $_____

19. Say 1 to 3 things you enjoy doing when you come to the beach.

1st.:_____ 2nd.:_____ 3rd.:_____

20. The way you frequent the beach changed or not after the occurrence of shark attacks?

Yes **(20.1)** ☐ No **(21)** ☐

20.1. How did it change?

21. Which investment do you think should be done on Boa Viagem and Pina beaches if the Municipality or State Government received US $ 6 million?

Don't know ☐

1st.:_____ 2nd.:_____ 3rd.:_____

22. Do you know any law related to beaches? Yes (22.1) ☐ No (23) ☐

22.1. Which one?

23. Which are the major environmental problems of Boa Viagem and Pina nowadays in your opinion?

24. Have you heard or not about these terms in relation to Boa Viagem beach:

Erosion	Yes (25)	☐	No (32)	☐
Sea level rise	Yes (25)	☐	No (32)	☐

25. What do you understand as coastal erosion/sea level rise?

26. Which are the causes of coastal erosion/sea level rise on Boa Viagem beach?

27. Which are the consequences of coastal erosion/sea level rise for Boa Viagem beach?

28. Which are the consequences of coastal erosion/sea level rise for you?

29. What should be done to control the coastal erosion/sea level rise on Boa Viagem beach?

30. Do you know any work done by the government to control coastal erosion/sea level rise on Boa Viagem beach? Yes (30.1) ☐ No (32) ☐

30.1. Which one?

31. What is your opinion regarding these works? (JUSTIFY)

32. Have you ever heard about a Project to increase the sandy area on Boa Viagem beach? Yes (32.1) ☐ No (34) ☐

32.1. In which media was it? _____

33. What do you know about this project?

34. (SHOW THE VISUAL AID) According to the project scheme you sow, what is your opinion in relation to the work proposed by Recife Municipality?

NOTES:

Appendix V

BOA VIAGEM BEACH USERS PERCEPTION RESEARCH
FULL-SCALE SURVEY - VISUAL AID

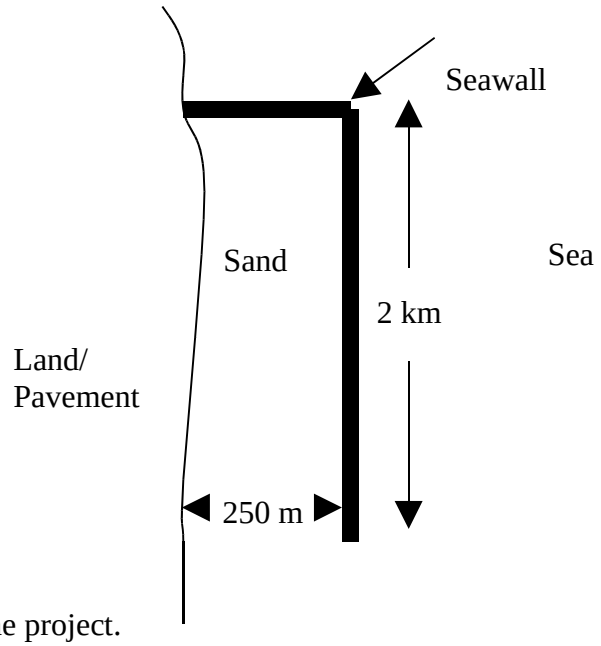

Figure 1: Top view of the project.

ADVANTAGES OF THE PROJECT:

- Protection of the beach, pavement, street and buildings against the sea level rise
- Increase of the sandy area available for recreation
- Increase the tourism, leisure and consume options on the coast
- Employment and income generation for local population
- Improvement of beach infrastructure

DISADVANTAGES OF THE PROJECT:

- Decrease the width of the sandy area north of the Project, impacts on the street and neighboring private properties
- Loss of the bathing area also in low tide
- High cost of construction and maintenance (public money expenditure)
- Impacts on the reefs and the dredged area
- An area of the beach will be closed for at least two years for the construction

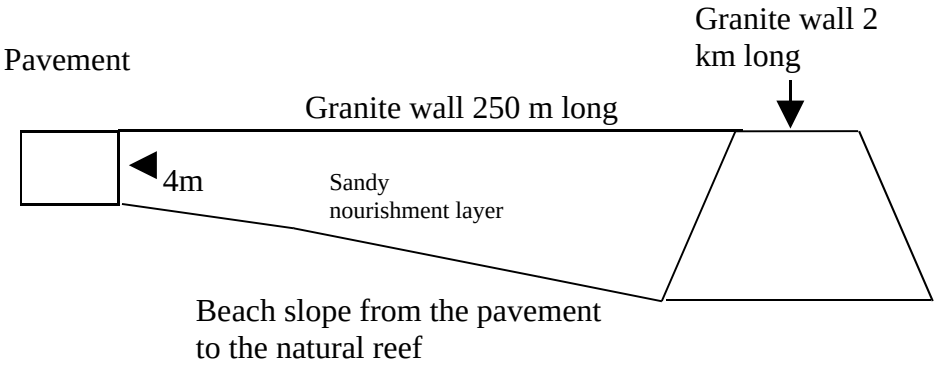

Figure 2: Side view of the project.