DISSERTATION

TOURISM AND ENVIRONMENTAL DECISION MAKING

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TOURISM AND ENVIRONMENTAL DECISION MAKING

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TOURISM AND ENVIRONMENTAL DECISION MAKING

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As environmental resource utilization conflicts escalate globally within and among competing industries, there is a need for careful utilization and conservation of resources. A term that has gained considerable currency with regard to resource allocation is *sustainable development*. Tourism is an industry whose sustainability is dramatically affected by land-based resource competition. While there are diverging opinions regarding the nature, pace and forms of tourism, one must nevertheless acknowledge its profound environmental, economic and social effects upon the landscape. Tourism has come to represent financial security in many developing regions and shows no sign of weakening.

Given that *environmental information* is a building block necessary in the planning of sustainable tourism development, the collection and use of this information at the national level needs evaluation. To this end a survey was sent to 208 governments to determine the extent and use of environmental information. It was discovered that a majority of responding nations do collect and use environmental information to develop plans and create tourism policy.

As governments, host communities and private investors determine that tourism is a preferred method of development for a region, consideration must be given to a specific site's suitability. Tools are needed to facilitate informed site

decisions by community members, government decision makers and project developers. If the forces upon our own diminishing environment from tourism development are to be addressed, an *environmentally-based tourism planning system* must be developed, evaluated, and adopted. Due to its success in agriculture and forestry, both resource-based industries, the *FAO framework for land evaluation* is just such a tool to facilitate stake-holder decisions with regard to site suitability.

Spatial and analytic tools and the FAO framework are then combined to create a *site identification spatial decision support system* for tourism land evaluation. The framework was demonstrated in a case study in northwestern Costa Rica, which identified 4,400 hectares of suitable land for coastal tourism. The success of the proposed framework is demonstrated by the potential for higher economic returns to investors from hotels sited in areas identified as suitable for hotel development by the Strategic Framework.

BIOGRAPHICAL SKETCH

Albert Joerger is currently a Ph.D. candidate for a doctorate degree in the Graduate School of Cornell University. As a graduate research assistant his interests lie in sustainable development of tourism resources and his research seeks to integrate spatial information technologies in environmental planning for travel and tourism.

Mr. Joerger also completed his undergraduate and masters degree at Cornell University. While working on his undergraduate degree, he was a four-year Cornell Tradition Fellow. Having completed his undergraduate studies in Economics at Cornell in December 1988, Mr. Joerger joined the Graduate Field of Landscape Architecture where he earned a Masters of Landscape Architecture in January of 1992.

While completing his masters studies Albert's academic interest took him to Japan to study gardens, to Washington as a Genscht Fellow at the American Forestry Association, and to Pennsylvania as a tourism analyst for the National Parks Service. His most exciting achievement, however, was receiving the William Frederick Dreer Award. As a recipient of the Dreer Award, one of the largest travel fellowships at the University, Mr. Joerger spent one year in Costa Rica studying the management of public and private conservation areas. It was during this time that he developed his current interest in "sustainable development."

Prior to his enrollment in Cornell University, Albert attended high school in Bucks County Pennsylvania were he was a member of the National Honor Society. Additionally, Albert holds a great interest in gardening, sharing this interest at home with his family, and with members of the community.

To my wife Pauline,

whose enthusiasm for me helps me do my best.

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INTRODUCTION

The collection and use of environmental data and information for tourism is not well-documented. Therefore, an assessment of the collection and application of such information is an important step in understanding the relationship between national tourism organizations ("NTO's") and environmental policy and planning. This collection process needs to be understood because environmental information is a building block for achieving greater sustainability in the development and management of the tourism industry. Environmental resource protection can be attained only through the use of environmental information. Use of environmental information is defined as collecting, evaluating, planning or monitoring environmental data. In fact, many in the tourism field agree that "environmental resources provide one of the basic ingredients, a critical production factor, for the production of the tourist product: the natural and/or manmade setting for the tourist to enjoy, live in, and relax" (Briassoulis and van der Straatten 1992:2).

Sustainable Tourism Development

Sustainability has emerged as critically important when assessing and developing viable national tourism plans. Sustainable tourism development, in addition to sustainable development in general, currently receives considerable global attention. The sustainability of contemporary tourism development is a challenge facing the entire travel and tourism industry today. This concern with sustainable tourism development and management is the catalyst for this study of the use of

environmental information in tourism planning and management at a national level globally.

The term "sustainability" has been assigned many divergent definitions throughout the relevant literature, but common themes are persistent among these definitions. One theme is **intergenerational equity**: the concept that present use of resources should not prevent future generations from meeting their needs and that future generations will not experience disproportionate costs from current development. Another theme is **internalized costs**, the notion that current generations will be responsible for all of the expenses from current development. Lastly **careful utilization**, the maintenance of environmental and human resources for long-term economic productivity is essential(Brown and Pheasant 1985; Lee and Snepenger 1985; Foy 1990).

Sustainable Tourism and Environmental Information

Achieving sustainability in development necessitates an awareness and knowledge of the underlying environmental resources upon which the success of the tourism industry's products depend. The natural environment provides any number of amenities, examples of which are view-sheds, recreation areas, and entertainment derived from observing wildlife in their natural habitat. Conserving environmental resources is an objective which is central to sustainable development; one which can only occur through land use planning. Land use planning in turn necessitates collection and use of environmental information by the planning body.

Planning is critical to the conservation of the above-mentioned often fragile resources, which support many sectors of the tourism industry. Land use planning is a process of balancing specific interests within the available resource base (Green and Hunter 1995). Green also adds, "tourism competes along with other sectors for the resources on which it depends. Tourism cannot, therefore, be viewed as a self-

contained set of activities with its own narrow policy agenda; but rather as a part of the wider set of activities which need to be planned ..." (Green and Hunter 1995:95). Dowling (1993) also links environmentally-based planning with tourism development. The link between environmental information and sustainable tourism is planning and implementation of the resulting policy. Environmental information is critical to the process of planning for sustainable development.

Collecting and using environmental information by NTOs plays two critical roles for the tourism industry. First, such information can facilitate planning and management of environmental resources within the tourism industry. Within the tourism industry environmental information can be used not only for resource protection of environmental amenities but also for the protection of investments in tourism superstructure and infrastructure from hazards the environment poses. Examples of environmental amenities that should and can be protected are view-sheds; water and air quality; unique habitats and related wildlife. Flooding, fire, erosion and liquefaction are examples of hazards the natural environment presents. Second, environmental information can be utilized to protect environmental amenities central to the tourism industry from degradation by competing resource-based industries. A classic example of this impact of a competing industry is the logging industry which may, in the process of clear-cutting, destroy view-sheds and hiking areas. Data on water quality and quantity, soils and geology, climate and others can be utilized in the analysis which identifies amenity, hazard or conflict. Identifying these critical relationships between environmental resources can support the NTO's development of plans and policies which promote and conserve the components central to sustainable tourism development.

The current use of environmental information by NTOs needs to be understood so analytical tools can be developed to facilitate better integration of environmental

information into the decision-making process that supports tourism development. Components of sustainability, environmental, social and economic resources, and the interactions of those components must also be considered when planning for environmentally sustainable tourism land uses.

Tourism and the Environment

The relationship between tourism and the environment has received increasing attention since the 1970s. The British Tourist Authority convened a conference as early as 1971 focusing on the relationship between tourism and the environment (British Tourist Authority 1971). During the 1980s and 1990s tourism and the environment have become integral areas of investigation in a number of academic research programs (Briassoulis and van der Straatten 1992). Organizations such as the Organization for Economic Co-operation and Development (OECD),World Tourism Organization (WTO), and United Nations Environment Program (UNEP), have played active roles in promoting the protection of the environment as part of successful regional tourism development programs (OECD 1980; WTO and UNEP 1992). Academic journals, like the Annals of Tourism Research (1987); Tourism and Recreation Research (1993); Tourism and Recreation Research (1995) have also dedicated entire issues to the relationship between tourism and the environment. In fact, the Journal of Sustainable Tourism 1992-1995 is wholly focused upon this interdependency.

At a recent White House Conference on Travel and Tourism, the Environmental Concerns Task Force stated that "an inseparable relationship exists between travel and tourism and the environment" (Wellstead et. al. 1995:3). The Task Force went on to say that the tourism industry cannot ignore the externalities of environmental degradation and that "the environment is integral and indeed central to the economic base of the industry itself" (Wellstead et. al. 1995:5).

In fact, considerable literature has been devoted to the subject, notably: the discussion of the environment/tourism relationship (Farrell and McLellan 1987); the discussion of perceived conflicts (Liu, et. al. 1987); the insight on environmental planning for tourism by Inskeep (1987); a paper on tourism's environmental impact by Farrell and Runyan (1991); observations about ecology by May (1991); commentary on environmental values from Pilgram (1990) and D'Amore (1992); and a report that the environment was an important factor in attracting tourists and that environmental resources should be inventoried and evaluated (Inskeep 1991).

National Tourism Organization and Environmental Information

If one accepts that the use of environmental information is a fundamental building block in planning for sustainable tourism development, there is a need for the collection and use of environmental information at a national level, if sustainability is to be achieved. Given global population growth and the limits on environmental resources, the importance of environmental information to tourism planning and management at a national level can only increase. Due to the limits on natural resources NTOs could be forced into a position of advocacy to protect the resources upon which tourism depends.

Typically, NTOs are often regarded as marketing vehicles and not as planning organizations (Pearce 1992). Recognizing this observation, research was conducted to determine if NTOs collected environmental information in order to plan, monitor, manage, fund and regulate their tourism industry in both developed and emerging economies as well as in agricultural, industrial, and service economies. Because environmental resources are central to the tourism industry, one can assume that NTOs should collect, evaluate, plan, and monitor with environmental information. NTOs need this information to understand the environmental resource base that supports

their industry to formulate effective policies and promote industry awareness in an effort to conserve these resources.

The objective of this first study is to determine the current collection and use of environmental information by NTOs. The need for environmental information in tourism planning is clearly defined in the literature. The author assumes based on the literature that environmental information, while important to planning, is rarely employed in tourism planning and decision making by NTOs. Answers to the following questions were sought: (1) are NTOs using environmental information for national tourism planning and management, and if so, (2) what types of environmental information do they collect and use, and for what purpose? The results of this study serve as the basis for the use of environmental information in the development of a spatial framework for tourism land evaluation.

METHODOLOGY

Since specific examples of the collection and use of environmental information by the NTOs have received little discussion in literature, a survey was developed to identify the types of information, collection procedures, and rationale for collection.

Each survey included a cover letter, with an explanation of the researcher's affiliation and the purpose of the survey. Additionally, a glossary of terms was included. The survey consisted of five multiple choice questions. The respondent could reply to more than one choice within each question and each question allowed the respondent to add additional comments as appropriate. The questions were as follows:

I. Has your organization or ministry ever collected information about any of the following aspects of tourism? The response categories are international tourism arrivals, international tourism revenues, social change as a result of

tourism development, environmental resources, environmental change as a result of tourism development, hotel occupancies, cultural change as a result of tourism development, economic multipliers as a result of tourism revenues, and other.

II. If your organization or ministry collected environmental resource information, what information was collected? The response categories are climate, ecological zones, geology, geomorphology, land use, land cover, soils, topography, vegetation, water quality, water quantity, or other. The respondents were asked to specify the type - primary or secondary information and the source(s) of the secondary information.

III. If your organization or ministry collected environmental information through primary sources, how was the information collected? The response categories are air photos, field census, field sampling, interviews, mapping, reconnaissance survey, satellite images or other.

IV. If your organization or ministry collected environmental information, did your organization or ministry use the information, and if so, how did your organization or ministry use the information? The response categories are tourism project locations, tourism planning, monitoring tourism impact, evaluating tourism impact, establishing tourism policy, funding tourism projects, tourism management, tourism regulation, community involvement, or other.

V. Why did your organization or ministry not collect environmental information? The respondents are directed to reply only if applicable. The response categories are lack of institutional capacity to collect, lack of institutional capacity to interpret, too expensive, no institutional capacity to manage the information, or other.

The NTOs of two hundred and eight countries, commonwealths, territories, principalities, enclaves and protectorates in the world were surveyed to determine what information they collected and how these governing bodies applied environmental information for tourism planning and management.

Burkhead's 1993 Worldwide Travel Information Contact Book was used as an initial locator; the survey was sent by facsimile transmission to the NTO. In cases where no information was available regarding a particular NTO, that country's embassy (and in some cases consulate) was contacted to determine the appropriate tourism planning and management body.

In those cases where the first facsimile transmission was unsuccessful, up to three additional transmissions were attempted to each office. In situations where these transmissions proved unsuccessful, the governmental agency responsible for tourism was contacted via mail. Once in country the survey was often forwarded by the addressee to the individual or agency responsible for the planning, development and management of tourism. Non-respondents of the faxed survey were also mailed a second copy of the survey and a letter encouraging a response. In the interest of time, all respondents were directed, when possible, to reply by fax.

As the surveys including the answers and the name, title/position, organization and address from the respondents were returned, they were tabulated using a spreadsheet application.

RESULTS

Of the two hundred and eight governments that an attempt was made to send the survey, one hundred and forty-eight were successfully sent. These surveys have resulted in a thirty percent usable response rate (45 surveys).

Following the secondary and tertiary attempts to send the survey, including the secondary mailing reminder and the mailing of surveys to the sixty potential

respondents who could not be reached by fax, a total of thirty-seven additional responses were generated. Ten mailed surveys were returned as being undeliverable. In one case this resulted from international mail service being suspended in Somalia. Thus to date, the overall response rate to this survey is forty-two percent.

It should also be noted that there is considerable variation per country with regard to an "NTO", e.g., in some cases the NTO is strictly responsible for distribution of tourist literature. In others, the NTO is a definitive strategic governing body. The research was conducted toward determining the primary governing organization in charge of tourism, despite a variety of titles. Organizations ranged in structure from departments, division, companies, bureaus, authorities, ministries, boards, offices, and institutes. Tourism was linked with government organizations considering the environment, natural heritage, economics, industry, civil aviation, transport, foreign affairs, energy, economy, and construction.

The following is a list of types of organizations which replied to the survey: Ministry of Environment and Tourism; Department of National Heritage, Tourism Division; Tourism and Industrial Development Company; Department of Economic Development and Agriculture; Bureau of Economic Research; Environment, Conservation Section, Project Planning Division of the Tourism Authority; Ministry of Industry and Commerce; Ministry of Culture, Tourism, and Aviation; Tourist Promotion Board; Department of Tourism; Tourism and Transport; Ministry of Foreign Affairs and Tourism, Tourism Co.; Office of Tourism Development Planning; Tourism Promotion Authority; Institute of Tourism; Culture, Sports, and Tourism Division - Tourism Wing; Ministry of Industry and Energy, Industrial Policy Department; Ministry of Commerce; Ministry of Tourism & Civil Aviation; Ministry for Coordination of Environmental Affairs, Department of Tourism; State Tourism Department; National Tourist Office; National Tourism Authority; General Planning

and Economy; Planning Division, Directorate General of Tourism; Tourist Board; Ministry of Tourism; Civil Aviation and Social Development; Ministry of trade and Industry; Ministry of Tourism and Civil Aviation; Tourism Development & Planning; Ministry of the Economy; Tourism Organization; National Tourism Institute, Corporation of National Tourism; Tourism Research and Information Management; Statistical and Research officer; Ministry of Construction and Tourism; Ministry for the Economy.

The majority of NTOs which responded to this survey collect environmental information in some form. Table 1.1 displays the types of data, which respondents collect as a percentage of total responses. The information most NTOs collect are international arrivals and hotel occupancy, at 94% and 91%, respectively. More governments collect economic information (arrivals, occupancy, revenues and multipliers) than environmental information, which 59% of the NTOs collect. Social or cultural information is the least collected type of information.

The distribution of those respondents which collect any environmental information is shown also in Table 1.2 separated into categories of environmental factors. More than half of those respondents that collect environmental information reported that they collected the following information: land use, water quality, vegetation type and distribution, ecological zones, land cover, climate, water quantity, topography and soils. The environmental information collected most often using either primary or secondary collection methods is land use, which 92% of the respondents collected. The column, labeled "Environmental: Primary or Secondary Information," represents those governments which collected primary and or secondary information. The phrase primary collection refers to activities such as original research, field survey, interviews, and questionnaires. Secondary collection includes information from existing reports, maps and other documents. Using only primary

Table 1.1. Tourism Data Collected (% response)

Arrivals	Occupancy	Revenues	Multipliers	Environment	Social	Cultural
94	91	84	63	59	40	33

Table 1.2. Environmental Factors (% response)

Environmental Information Factors	Environmental: Primary Collection	Environmental: Secondary Collection	Environmental: Primary or Secondary Information
Land Use	42	71	92
Water Quality	25	75	85
Vegetation	31	65	77
Ecological Zones	23	58	69
Land Cover	23	58	69
Climate	23	56	69
Water Quantity	21	63	69
Topography	23	54	65
Soils	23	44	54
Geology	13	40	42
Geomorphology	13	35	42
Other	---	---	13

collection methods, land use at 42% of responses is still the most often collected environmental information, but using only secondary collection methods water quality information is more often collected than land use information, at 75% and 71% of responses, respectively. The columns are not cumulative because some respondents collect both primary and secondary information for which they are counted once in the 'primary or secondary' column.

Overall, 59% of the respondents collect environmental information as shown in Table 1.3. And of these, 79% collect environmental information using primary collection techniques. Table 1.3. displays the percentages of respondents who collect environmental information using a series of primary collection techniques. The most frequently used method of primary data collection is interviewing, with 73% of primary data collectors using interviewing. The second most frequently used method of primary data collection is mapping with 64% of respondents using this method. Satellite images are the least frequently used method of primary data collection with only 18% of respondents using primary environmental data.

Of those that reported collecting both primary and secondary environmental information, nearly all reported using the information they collected as illustrated in Table 1.4. Environmental information can be used in a wide range of applications, some of which remain to be determined. The options the respondents are given include establishing tourism policy, tourism planning, evaluating tourism impacts, monitoring tourism impacts, tourism project locations, tourism management, tourism regulations, community involvement, and funding of tourism projects. Among them, the most commonly reported uses were for the purpose of establishing policy, planning, evaluation, monitoring and locations siting, at 92%, 92%, 85%, 85%, and 81%, respectively. While other investigations have found tourism planning was not a central part of the NTO's function (Pearce 1992), the author has found that 54% of the

Table 1.3. Primary Collection of Environmental Information (% response)

Method of Collection	Percent of Primary Collectors
Interviews	73
Mapping	64
Field Census	55
Field Sampling	55
Reconnaissance Survey	48
Air Photos	45
Satellite Images	18

Table 1.4: Use of Environmental Information (% response)

Use of Environmental Information	Respondents
Establishing Tourism Policy	92
Tourism Planning	92
Evaluating Tourism Impacts	85
Monitoring Tourism Impacts	85
Tourism Project Locations	81
Tourism Management	69
Tourism Regulations	69
Community Involvement	65
Funding Tourism Projects	56
Other	6
Did Not Use	4

respondents engage in tourism planning. Furthermore, one of the primary uses reported by collectors of environmental information is tourism planning (92%).

Many NTOs that do not collect environmental information do not regard the use of environmental information as part of their organizational mission, as reported by 32% response by non-collectors with a 'does not apply' response. Table 1.5 displays the primary reasons for governmental non-collection of environmental information. Non-collection of environmental information is most often linked to a lack of institutional capacity to collect such data, with 50% of non-collectors having this reason. Cost of collection of environmental information is also reported as a major reason for non-collection, by 35% of non-collectors.

After studying the nature and reported use of environmental information collected by the entities responsible for national tourism planning, the conclusion was reached that the majority of the respondents collect and use environmental information.

DISCUSSION

Quality of the Survey

The contact information initially taken from the Worldwide Travel Information Contact Book is perceived to be inconsistent and occasionally incorrect, but it presented a good starting point in compiling a complete census of NTOs. There is no standardized format to the contact information, in that not all entries contained all necessary prerequisite country, area codes, and telephone numbers. The variances in contact information account for the need to contact many government's representatives here in the United States directly and the subsequent re-sending of the survey. Judging from the range of replies received, the survey reached a cross section of respondents although the method for choosing the respondent was not random. A respondent was attempted to be contacted in every nation. There is a possibility that

Table 1.5: Government Non-Collection (% response)

Reason for Non-Collection	Respondents
No Institutional Capacity to Collect Information	50
Too Expensive	35
Does Not Apply	32
Other	29
No Institutional Capacity Exists to Manage Information	26
No Institutional Capacity Exists to Interpret Information	26

respondents to the survey would have a propensity towards the collection and use of environmental information because they identified with the survey.

Assurance as to the quality of the responses received is the inclusion of the respondent's name, title, position, address, telephone and fax number on the survey. Respondents to the survey ranged from the Director of Research and Policy, USTTA, to the Director General on the National Tourism Authority, Laos. Other examples of respondents include: Head of Regional Tourism Planning, Ministry of Tourism, Albania; Director, Directorate of Hotels and Tourism, Myanmar; Manager of the Department of Natural Resources, Costa Rican Institute of Tourism; and the Executive Officer, Ministry of Industry and Energy, Industrial Policy Department, Norway. These examples demonstrate that respondents to the surveys were governmental professionals in a wide range of roles and responsibilities.

Many of the respondents included in their facsimile reply a cover letter expressing their interest in the results of the survey and details about their specific organizations. The faxed responses were often followed up by a mailed original copy of their survey responses, cover letter, promotional information and occasionally reports that the respondent's organization developed.

Question one is partly designed to determine if the correct organization was responding to the survey. Over ninety percent of the respondents reported collecting international arrivals and hotel occupancy information. This can be seen as confirmation that the organization replying to the survey was the organization commonly defined as conducting activities typical of an NTO. This question is successful in determining that the survey was completed by the correct organization. Also, the question encourages respondents to reply, which is illustrated by a forty-two percent response rate.

The response rate from surveys directed at organizations are typically low, unofficial estimates of response rates for surveys directed at organizations are between ten and twenty percent (Paxson 1995). Edward Hershey, Director of the Office of Communication Strategies, a communication consulting group at Cornell University, which utilizes surveying, believes the forty-two percent response rate is sensational for the type of survey that was conducted for this research (Hershey personal communication). The high response rate may be due to: 1) the importance of the survey subject mater to the respondents; 2) the recognized sponsorship of the survey within the tourism industry; 3) the follow-up mailing conducted by the author; 4) the incentive offered to share the results of the research; and 5) the personalization of the survey's cover letter with the respondents name. Paxson in his paper "Increasing Survey Response Rates" supports all of these techniques for increasing survey responses (1995).

The response rate is adequate due to the breadth of countries with different economies which replied. Countries replying included those with developed or emerging economies; agricultural, service and or industrial economies; and economies solely dependent or independent of tourism.

Use of Environmental Information

The first question in the survey was also designed to make respondents feel comfortable with the survey instrument. Including economic data in the possible answers to question one was designed to draw the respondents into the survey, since it was assumed that the collection of economic data by NTOs had the highest likelihood. If respondents could successfully answer the first question, they would be more inclined to complete and return the completed survey.

Pearce puts forth in his book "Tourist Organizations" that the role of NTO's is one of promotion. He determines that planning is not a long term function of an NTO

and believes they do not develop plans, since they lack legislative control over the resource base necessary to implement plans. Pearce surveyed six countries in great depth as opposed to the study conducted for this research, which surveyed all countries but with a limited focus predominately on the collection and use of environmental information. The majority of the respondents report that they do collect and use environmental information. While the author did not personally visit the 208 countries in the survey no incentive for the respondents exists to misrepresent their activities. The exciting and potentially unexpected result of this study is that NTOs report planning and usage of environmental information.

The information most collected by government tourism ministries is economic in nature. This is not surprising given the prevalent view that government's role in tourism is marketing and promotion of the tourism product. However, among the survey respondents there is a clear and reported trend toward the collection and use of environmental information as part of a national tourism policy and planning process. Environmental information is collected by an impressive fifty-nine percent of the NTOs who responded to the survey. Of these, ninety-six percent use the information they collect, and the remainder plan to use it in the future. It is clear that although it is not the most collected information, the majority of NTOs collect and use environmental information.

Further findings are that the two most reported types of environmental information collected are **land use** and **water quality**. The interrelationship between land use and water quality has resulted in their collection. Land use impacts water quality through the externalities of use, such as water pollution from urban development and impacts from cattle. Water quality can help determine land use through its potability and its suitability for recreation, such us drinking water sources free of pathogens and bathing areas free of pollutants. Since much of tourism takes

the form of water based recreation and the success or lack of success of destinations often times can be as a result of health conditions resulting from water quality issues, it is not surprising water quality is one of the most collected types of data. Issues such as water quality and land use are part of the environmental information which is most often used for establishing tourism policy and tourism planning.

NTOs that collect environmental information tend to collect the information from secondary sources, the main sources of which are other governmental organizations. Utilizing secondary sources of information can be cost effective and facilitate the access to information the user does not have the capacity to collect themselves. Secondary information use also prevents duplication of effort by recollecting existing information. The advantage of primary information is that the data collected are fit to the collectors information needs, but these advantages may be outweighed by the drawbacks, which are the expense of collection and the expertise necessary to collect the information. Using secondary information demands understanding of the data and its limitations but it reduces the cost and technological prerequisites to gaining access to environmental information, which offers the potential for the increase in use in the tourism planning and management process. A pitfall of using secondary information is that the accuracy of secondary information is often unknown. Field checking data to estimate accuracy of secondary information is one method of ensuring the precision of secondary information used by NTOs.

Of the primary data collection methods that are used, NTOs report the more frequent use of time-intensive methods such as interviews, mapping and field census, and sampling as opposed to less time intensive methods such as air photo and satellite image interpretation. NTOs most likely have a greater familiarity with the former methods of data collection, interviews, mapping, and field census, partly due to the lower technology and training requirements. If environmental data requirements by

NTOs continue to grow, especially considering that eighty-five percent of collectors use the data to monitor tourism impacts, more cost effective methods of collection need to be explored. Remote sensing techniques, such as air photos and satellite images, are recognized as cost effective methods to collect a high volume of environmental resource information.

The majority of the non-collectors already see the need for environmental information as part of their mission. They report lack of an institutional capacity as the major reason for not collecting environmental information. The thirty-two percent of those NTOs not actively collecting environmental information are puzzled why their organization is asked about the use of such information. Apparently these NTOs do not see their mission as requiring the involvement of such information in their decision making processes. Building institutional capacity for the collection and use of environmental information for tourism planning and management is an activity which would demand education, access to technology, information and economic resources. Education is at the center of expanded adoption of environmental information and its analysis by tourism professionals.

The survey identifies an awareness of environmental information and use within national tourism organizations. The survey characterizes the role of environmental information used by NTOs. Most respondents report collection and use of environmental information and the majority of respondents not collecting or using environmental information recognize the importance of environmental information. The primary result obtained from this global survey is a realization that at a national governmental level, with regard to tourism, an awareness of the important role of environmental information in tourism planning exists.

CONCLUSION

NTOs collect environmental information in order to plan, monitor, manage, fund and regulate the tourism industry. Until quite recently, however, many tourism leaders had not viewed environmentalism as an important concern (Gunn 1994). The responses to this survey indicate that the environment, or at least information about and planning and policy based upon the environment, has gained importance to many NTOs. Environmental information and the use of environmental information will only receive greater currency as pressure on limited environmental resources is more widely recognized. Increased awareness within the tourism industry about the role of sustainable development in conserving the resource base that supports the industry will only increase the importance of environmental information and its use.

The importance of inventorying, monitoring and managing environmental resources will increase as resource conflicts with competing industries are clearly understood. Recognizing other sectors impact on tourism resources and the impacts of tourism on other industries will demand that contacts be formed between other agencies, industries and NTOs. NTOs through careful analysis of environmental information need to establish clear and understandable environmental plans and policies to support the tourism industry and to facilitate the mitigation of potential resource conflicts with competing industries.

The role that environmental information should have in tourism planning and management is one of planning, policy and advocacy. The complexity of the task is highlighted by the diversity of organizations that are in fact functioning as NTOs. Many NTOs have different names and different organizational structure and professional associations but the information they utilize and the purposes they determine for environmental information are similar. This survey was the first time that NTOs on a global basis were asked about the collection and use of environmental

information. The current collection and use of environmental information reported by NTOs shows a global adoption of this fundamental building block of sustainable development. Sustainable development depends on the analysis of environmental information to determine plans and policies.

Tourism as an industry needs to illustrate the need for a voice in national environmental resource decision making. Sustainability of tourism development demands "implementation of sound national and regional planning programs" (Williams 1995:112). At the same time, one must remember that there must be a link between planning and action. Action must link planning with monitoring, enforcement, and feedback to the planning process all of which require environmental information.

The positive response about the collection and use of environmental information by NTOs should be encouraging to advocates of the environment and sustainable development. There is the recognition that plans are not always implemented. In 1980 a study by the World Tourism Organization (WTO) found that more than a third of the more than 1600 studies they inventoried were not implemented (Pearce 1992).

Further, monitoring and analysis of land uses for tourism development needs to occur in order to facilitate a better understanding of the role which environmental information plays in tourism land use decision making. And of course, once policy is established through the use of environmental information, there is a need for individuals who continuously monitor the implementation of these policies, as well as the environmental conditions themselves.

Similarly, when policies put forth by competing resource-based industries cause potential deterioration to tourism resources, this too must be addressed. One can

argue that there is a need for more tourism advocacy groups to promote the conservation environmental resources which support the tourism industry.

Finally, research needs to determine the benefits of the integration of environmental information. Benefits such as whether the integration of environmental information results in higher profitability, sustainability and visitor satisfaction. If tourism is to develop in a sustainable fashion, all of the stake-holders need to take a proactive role in the protection of environmental resources. Further research needs to occur to determine the success of the policies and planning reported by the majority of the respondents.

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CHAPTER TWO

A FRAMEWORK FOR TOURISM LAND EVALUATION

INTRODUCTION

As governments, host communities, and private investors determine that tourism is a preferred method of development for a region, consideration of the suitability of specific sites for touristic purposes must be determined. The sustainability of the tourism enterprise, in the context of the host community and the environment, is critical to the success of any proposed development project. Rural communities face resource decisions today that will affect the way they live well into the next century. Spatial analytic tools are needed to enable informed decisions by community members, government decision makers and project developers. The Food and Agriculture Organization's (FAO) framework for land evaluation is just such a tool that will empower these stake-holders to make informed decisions about the suitability of a proposed site for a particular type of development, and assess the impact of existing and proposed development which affects a proposed site (FAO 1976).

The suitability of a site for tourism can be affected by the externalities of other land uses. Tourism as a land use competes for regional resources. Conflicts occur with host communities, logging and agricultural interests, industry and other existing tourism enterprises. Examples of the resource conflicts that exist between host communities displaced by tourism's success, and the conversion of their community to a touristic land use are given by Smith (1992). Some segments of the tourism industry also compete with timber production as well as other segments of the tourism industry for land-based resources. Conflicts between remote back-country lodges and clear-cutting operations occur due to damage to view-sheds, noise from active logging, and

the noise created by the increase of motorized recreational vehicles afforded access by timber harvesting roads. In addition, logging creates an opportunity for all-terrain vehicle tourism that is in direct conflict with back-country tourism enterprises (McKercher 1992). Conflict also exists between agriculture and tourism which may come in the form of soil erosion and subsequent siltation of reefs and associated nutrient loading and pesticide transport which greatly alters reef ecology, degrading their value as touristic attractions.

These examples of conflict can be avoided by integrating the needs of stake-holders into a land evaluation framework. Evaluating changes in land use and sharing the results with the stake-holders is an essential aspect of the decision making process. Governments should make policy, operators should make siting decisions, and host communities should make informed development decisions based on the outcome of such a land evaluation framework as outlined by the FAO.

Sustainability of land and water resources is the primary goal of the FAO framework for land evaluation. The concept of sustainability of resource utilization has gained wide acceptance in the international tourism development and environmental policy arenas. The term "sustainability" has been assigned many divergent definitions throughout the relevant literature, however, a common theme is present among definitions. The common theme is **intergenerational equity:** the concept that present use of resources should not prevent future generations from meeting their needs and that future generations will not experience disproportionate costs from current development. Present generations need to internalize costs, carefully utilize resources, and maintain environmental resources for long-term economic productivity (Brown and Pheasant 1985; Lee and Snepenger 1992; Foy 1990). Most sustainable development literature only emphasizes the temporal dimension of sustainable development and overlooks the spatial dimension (Niu, et al.

1993). A major benefit of the FAO method is the ability to integrate spatial components of environmental and economic resources into the land evaluation process.

Planning models and frameworks can be utilized to integrate the concept of sustainability into the planning process. Many planning models and frameworks have also focused on tourism planning. Past models such as those of Butler (1980) and Mc Elroy (1992) have focused primarily on economic impacts. Other models and frameworks consider social implications, (Smith 1992), and physical impacts, (VanDerZee 1990; Gunn 1994), in addressing sustainability as an integral component of tourism planning.

There is a need for a tourism planning framework that (1) has as an objective the integration of economic, social, and environmental information to meet the goal of sustainable development; (2) can integrate the outcomes of other models and frameworks as powerful components of the planning process; and (3) can be used to compare land uses and consider land-based resources at multiple scales. This paper proposes that the FAO method of land evaluation is the framework to meet these stated objectives. The application of the FAO land evaluation method to a tourism planning process will allow the integration of multiple spatial information resources into an individual tourism decision-making process while also considering issues of sustainability within a spatial context.

TOURISM PLANNING AND SUSTAINABILITY

Tourism planning which integrates social, economic and environmental resource information can increase sustainability if implemented properly. Knowledge exists which, if employed, will create more sustainable tourism land uses. The existing knowledge includes environmental information such as land use, water quality, vegetation, ecological zones, land cover, climate, water quantity, topography,

soils, geology and geomorphology; as well as economic information such as building costs, capital need and availability, labor availability, and market demands; and social information such as attitudes and behavior towards tourism, population diversity and distribution, and cultural and ethnic identities. The author has confirmed the use of economic, environmental and, to a limited extent, social information in national tourism planning (Joerger 1996).

To increase the sustainability of tourism as an industry, national planners, local communities, and project developers need to consider environmental, economic and social resources at multiple scales. The tenuous link between national planning and project development must be strengthened. Determining the suitability of a given area for a specific type of tourism development would be a significant step toward informed government regulation and private sector analysis and participation.

FOOD AND AGRICULTURE ORGANIZATION (FAO) & LAND EVALUATION

The FAO has been active in promoting tools and techniques to facilitate land use planning. The FAO states that "land use planning means the systematic assessment of physical, social and economic factors in such a way as to encourage and assist land users in selecting options that increase their productivity, are sustainable, and meet the needs of society" (FAO 1993).

The FAO method is selected by planners because it is an ecological analysis which considers social, economic and technological information (Davidson 1992). The methodology has been selected for rural development as well as a tool for national planning. There has been broad adoption of the FAO evaluation method world-wide. The FAO techniques are successfully applied in industries dependent on land-based resources, including forestry and agriculture.

Resource limitation often necessitates land evaluation. Demand for land-based resources by alternative land uses such as farming, grazing, wildlife, urban growth and

other tourism development results in resource shortages and conflicting demands. Even if the focus of a planning effort is on tourism, forestry and agriculture must be considered in an integrated, holistic approach during the strategic planning process. Utilizing the FAO method of land evaluation for tourism planning will allow governments, local communities, and project developers to know the needs of tourism and understand the tradeoffs between the development of tourism and other land uses. The FAO method allows users to look at the suitability of land for multiple uses. Utilizing the FAO methodology will also aid in the comparison of tourism to competing land uses (FAO 1986).

Such land evaluation seeks to determine the suitability of an area for a particular land use. The process not only considers environmental characteristics but also considers economic viability, social consequences and environmental impact. The principles fundamental to the FAO land evaluation approach are (FAO 1976):

I) Land suitability is assessed and classified with respect to a specified kind of use;

II) Evaluation is required for the comparison of benefits obtained and the inputs needed on different types of land;

III) A multidisciplinary approach is required;

IV) Evaluation is made relevant to the physical, economic and social context of the area concerned;

V) Suitability of use is considered only on a sustained basis;

VI) Evaluation involves comparison of more than a single kind of use.

There are two approaches that the FAO proposes to meet these fundamental principles: Parallel and Two-stage. The Parallel Approach is thought to produce results in a more timely manner than the Two-stage Approach (FAO 1976). The Parallel Approach also allows synergy and feedback between environmental,

economic and social land evaluation because the analysis of environmental, economic and social resources is occurring simultaneously.

Parallel Approach -simultaneous consideration of environmental, economic, and social resources (Figure 2.1). The Parallel Approach is comprised of four steps:

- initial consultations to establish the context
- basic surveys for collection of environmental, economic, and social information.
- Land suitability classification
  -Description of land utilization types or land uses
  -Environmental, economic, and social analysis
  -Maps, tables and textual matter showing degrees of suitability
- planning decisions

Two-stage Approach -primary consideration of environmental resources and secondary consideration of economic and social resources (Figure 2.1). The Two-stage Approach is comprised of six steps:

- initial consultations to establish the context
- basic surveys for collection of environmental, economic, and social information collection
- qualitative land suitability classification
  -environmental description of land utilization types or land uses
  -environmental maps, tables and textual matter showing degrees of suitability

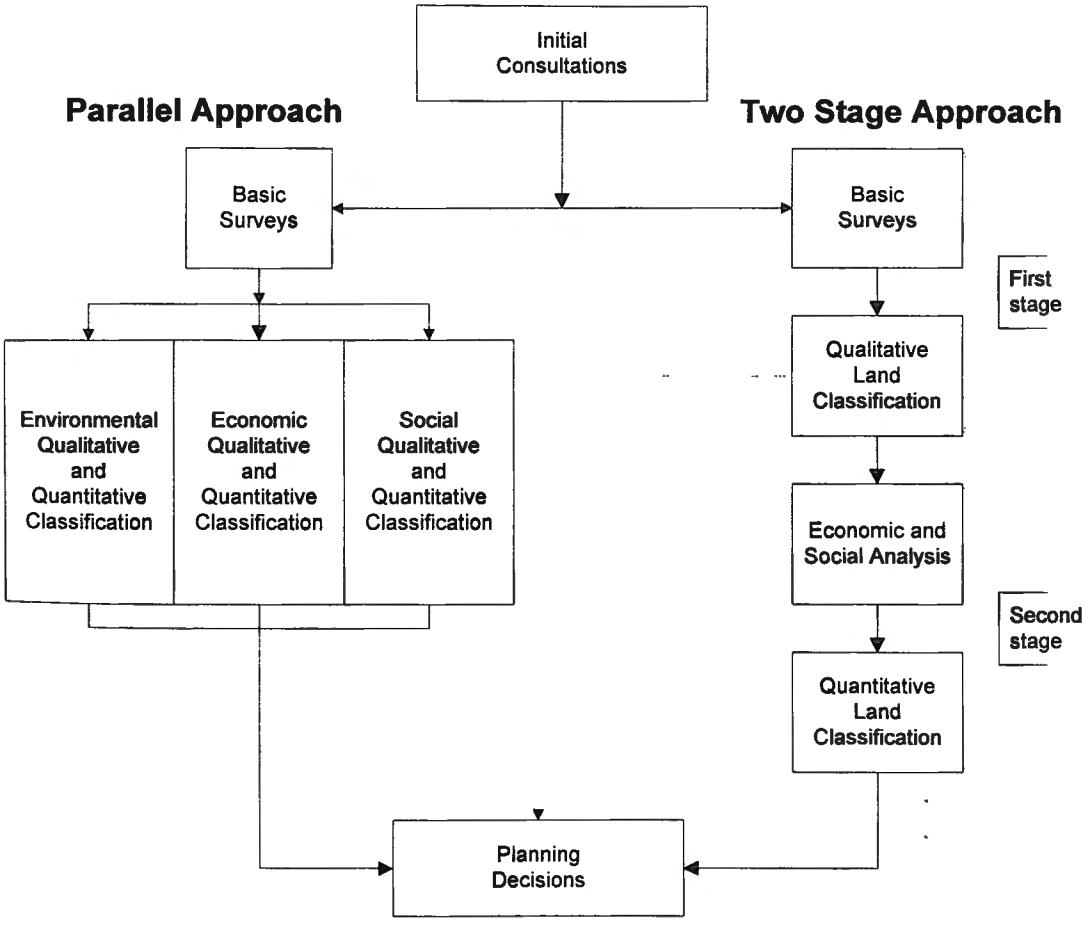

Figure 2.1: Parallel and Two Stage Approaches to Land Evaluation (FAO, 1976)

- economic and social analysis
- quantitative land classification

  -maps, tables and textual matter showing degrees of land suitability
- planning decisions

IMPLEMENTING THE PARALLEL APPROACH

Implementing the FAO land evaluation framework consists of the following components described below and illustrated in Figure 2.2.

1) Establishing the Context

In establishing the context, a specific type of land use is defined for which land suitability will be assessed and classified. The scale of the evaluation needs to be determined at the outset. The context of the evaluation comes from consultations with all of the stake-holders, which determine objectives of the evaluation, as well as the assumptions on which the evaluation is based. Consultations are in the form of surveys, focus groups, discussions and first hand observations.

The FAO method has been utilized at multiple scales: reconnaissance, intermediate, and detailed scale surveys. Reconnaissance surveys are national or regional in focus. They offer an overview of resources and development possibilities. The economic analysis method is not specific and the land evaluation is qualitative. This type of analysis is utilized to develop national plans, selecting development zones and setting development agendas (FAO 1976). Intermediate surveys focus on a specific development agenda, including feasibility studies of development projects. These activities may include property surveys. The economic analysis method is more developed than for reconnaissance surveys. The land evaluation is quantitative. This level of analysis provides information for decisions regarding the selection of projects, a change in the scope of the project, or whether the project should proceed (FAO

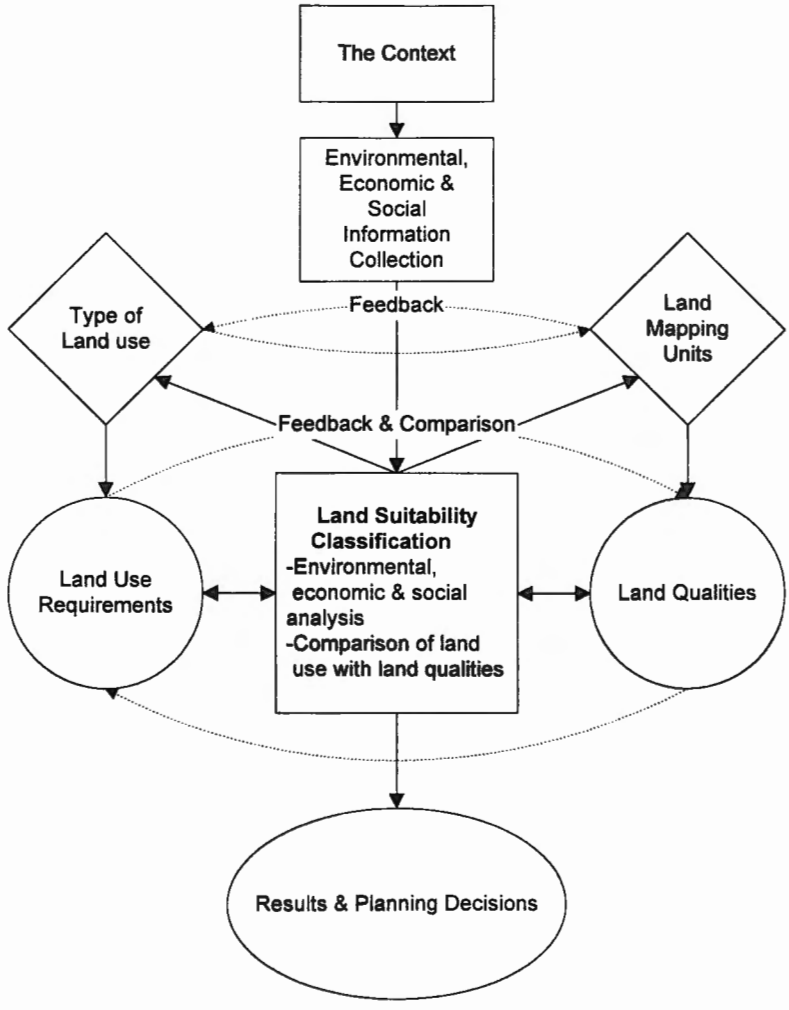

Figure 2.2: The FAO Land Evaluation Method

1976). Detailed surveys are at the property level and are utilized after regional development decisions are made.

2) Environmental, economic, and social information collection

Information can be gathered from primary or secondary sources. Primary sources include air photos, satellite images, reconnaissance survey, field census, field sampling focus groups, computer modelling and, interviews. Secondary sources include maps, books, government reports, cooperative reports and published research. For tourism land evaluation:

- Environmental information collected should include; climate, ecological zones, environmental preferences (next to the beach, away from wetlands, etc.), geology, geomorphology, land cover, land use, soils, topography, vegetation, water quality and quantity.
- Economic information collected should include; supply of the proposed product in the market, projected demand, cost and supply of labor, cost of construction, seasonality, occupancy (in the case of hotel site evaluation), room rates, number of proposed employees, access (in terms of existing infrastructure) and or projected growth in the number of hotel rooms over time.
- Social information collected should include both host and visitor descriptions; demographic information (age, population, average income, education) and cultural values.

3) Land suitability classification

Land Suitability Classification is made up of three components: (1) description of land utilization types or land uses, (2) Land Suitability Classification; and (3) maps, tables and textual matter showing degrees of suitability. Description of land utilization types or land uses is the overall category that the evaluation is being

conducted such as coastal hotel development. Land Suitability Classification defines the degree of suitability and the decision process of the evaluation. Maps, tables and textual matter showing degrees of suitability are the output of the evaluation.

Description of land utilization types or land uses

Description of land utilization types or land uses begins by identifying a major land use. Tourism land uses could include any one of the major land uses within tourism. Within the FAO framework there would be different sub-categories of the major tourism land uses differentiated by environmental, economic, and social characteristics. The sub-categories increase the specificity of the evaluation and are referred to as land utilization types.

The land evaluator would conduct surveys with owner/ operators, government officials and community members to define the tourism land utilization type. The outcome of the survey would define of the major components of the land utilization type including the management objective. The management objective could be, in the case of a hotel, providing room nights to guests, a determined return to the owner operator, or not degrading the environment.

After the general definitions are established, the land utilization types are then defined more specifically by land use requirements and their associated diagnostic land characteristics. Survey responses, exploratory research, and the initial definition of the Land Utilization Type would be utilized to develop more specific Land Use Requirements. Land use requirements are the components that have been determined through "expert" analysis and categorized into diagnostic land characteristics. The knowledge and opinions of rural people, hotel developers, engineers, economic, social and environmental modelers, and hotel guests are those that comprise the community of experts providing the rules by which land characteristics are evaluated and ranked for a given tourism land utilization type.

Land Suitability Classification

After the framework is determined, including land uses, land utilization types, their land use requirements, land qualities , and diagnostic land characteristics, the resource information is evaluated and organized using map-units that have been determined by the scale of the resource inventory and the designation of the diagnostic land characteristics. The map units correspond with the land qualities which are defined by land characteristics. The evaluation compares the land use requirements with land qualities and determines what the suitability of the land is for a given Land Utilization Type based on the most limiting diagnostic land characteristics. Land areas or "map-units" are placed in the following categories depending on the resolution, or scale, of the evaluation. The four levels of resolution are (FAO 1976):

I. Land suitability orders: Either suitable 'S', or not suitable 'N' for the proposed use.

II. Land suitability classes: Levels of suitability within orders, no more than five suitability classes, three is usually optimal. They are denoted with Arabic numbers. They include:

S1-highly suitable. Land without meaningful limitation to sustained use

S2- moderately suitable. Limitation to sustained use, requiring a level of inputs with a marked difference to highly suitable land. Positive attributes outweigh costs.

S3- marginally suitable. Use of this land for the proposed use on a sustained basis offer only marginal returns over costs.

There are two classes of not suitable:

N1- currently not suitable. Land development into the proposed use is not sustainable because of cost or current technology constraints.

N2- permanently not suitable. Sustained use is not possible because of severe physical and/or economic limitations.

III. Land suitability subclasses: Type of limitation , or primary improvement necessary within a class. They are denoted with a lower case letter, S2f, S2a The limitations or improvement they refer to include 'f' flooding hazard, 'a' lack of access etc. There are no subclasses for S1 class. Usually subclasses are minimized and at the most, two subclasses of equal importance are defined.

IV. Land suitability units: Show management differences within a subclass. This designation is used at the property level. Suitability units are designated using a '-'dash and then an Arabic number. S2f-1 is an example of the designation system, the S2 denotes a

moderately suitable site, f denotes a flooding hazard, and -1 denotes a management difference such as that created by a lack of access to waste disposal. The site with a designation of S2f-1 is a moderately suitable site, with flooding hazard and atypical waste disposal needs.

"Conditional suitability" should be avoided if possible but this designation is allowed within the system. The condition is designated by a lowercase 'c' after the order notation. The notation is as follows 'Sc2', 'Sc3'. Organizationally the designation comes after the listing of 'S' classes. Conditional suitablity should be used when: "without the condition(s) satisfied, the land is either not suitable or belongs to the lowest suitable class; suitability with the condition(s) satisfied is significantly more suitable (usually two classes); the expanse of the conditionally suitable land should be very small with respect to the total study area (FAO 1976).

The specificity and measurability of the diagnostic land characteristics and land suitability classification allows the evaluator to make decisions based on predetermined classes with input from the stake-holders and experts. The data collected using models and expert analysis are utilized further to define the land use requirements into measurable categories and are integrated into the Land Suitability Classification. Environmental, economic, and social analyses include the inventory and assessment of a range of resources and are conducted using many different methodologies and technologies.

Environmental analysis includes the inventory and assessment of nature-based resources. Inventory and assessment are dependent on the physical challenges present in the area under consideration. The analysis could include an inventory of flora and

fauna of the study region utilizing field survey and remote sensing. Environmental analysis could also include geologic modeling to predict site stability, tidal or rainfall modelling to predict flooding risk, or behavioral modelling to determine migration patterns of a particular species.

Economic analysis looks at supply and demand for the product offered to determine a return to the operator. Thresholds of return would need to be defined to determine the range of economic suitability. Economic analysis looks to traditional analysis techniques to determine economic suitability. Some techniques are: gross margin, discounted cash-flow, net present value, internal rate of return, and cost to benefit ratio. During the economic analysis consideration is given to different strategic objectives.

Types of social analysis are the result of census, focus groups and interviews to determine the views of community members, government leaders, and local business people. The social analysis is organized into categories and utilized to inform the suitability of a given land use for a given site based on the needs and makeup of the stake-holders.

The proposed land use is compared to the land in the study area. This comparison occurs using land use requirements and land qualities represented by diagnostic land characteristics. "Compare land use requirements of the land utilization type with the land qualities of individual mapping units ... comparison of land use with land ... the requirements of land uses are compared with land conditions in order to estimate or predict land use performance (Davidson 1992:86)". In this component of the FAO technique, the evaluator is comparing the proposed land utilization type with the land qualities as shown in Figure 2.2. The comparison results in a suitability classification (Davidson 1992).

Maps, tables and textual matter showing degrees of suitability

Mapping units are described and land qualities are determined from natural resource inventories, economic analysis and interviews. Map units are the evaluation unit of the survey determined by diagnostic land characteristics. The role of the Map units in the decision process are shown in Figure 2.2. Each map unit is assigned a land quality based on Diagnostic Land Characteristics, using land suitability classification.

Example Model

For the purposes of illustrating the land suitability classification process, a generalized Coastal Hotel Land Utilization Type is defined. Table 2.1 is a check list to define a Coastal Hotel Land Utilization Type. Table 2.1 illustrates the components of a land utilization type; Table 2.2 is the set of land use requirements of the defined land utilization type; and Table 2.3 is the set of defining diagnostic land characteristics of the defined land utilization type. The land characteristics are divided into categories concurrent with the land suitability classification outlined above.

Generalized Definition of a Coastal Hotel Land Utilization Type includes: the product produced, market orientation, capital intensity, labor intensity, power source, technical knowledge, attitudes of the land users, technology employed, infrastructure service requirements, size and configuration of holdings, land tenure, and income levels (FAO 1976). The development of the definition of the land utilization type represents the initial stage in determining the components of the evaluation. The definition of the land utilization type is derived from initial consultations with stake-holders and determines what analysis is conducted to develop the specific land use requirements and their defining land characteristics. As illustrated in Table 2.1, the definition of the land utilization type is the who, what, where, when, why of the land evaluation process.

Table 2.1: Generalized Definition of Coastal Hotel Land Utilization Type.

This is a list of components that would be a part of defining a tourism land utilization type. The land evaluator would need to determine those components that were appropriate to defining a particular land utilization type. Defining the land utilization is a qualitative process.

Land Use Component:	**Description:**
The product produced	-room nights, travel packages?
Market orientation	-psychocentrics, near psychocentrics, mid-centrics, near allocentrics, and allocentrics guests (Plog 1974)?
Capital intensity	-high, medium, and low; owner or bank financing?
Labor availability & intensity	-Time commitment of the owner operator and their employees, number of employees and their origin?
Power source	-grid electric, transported fuel (natural gas), etc.?
Technical knowledge	-training and expertise of managers and labor.
Attitudes of land users	-like or dislike of visitors, social values?
Technology employed	-building techniques, is coastal flooding or seismic activity an issue?
Infrastructure requirements	-roads, water, electricity, airstrip, and boat landing?
Size and configuration of holdings	-size of parcels, is the land near the beach and does it have beach views?
Land tenure	-land can be purchased by foreigners, does land trade freely?
Income levels	- is this enterprise the primary or secondary income of the owner operator, what return is necessary for the project to be developed?

[adapted from (FAO 1976)]

Table 2.2: Land Use Requirements of the Coastal Hotel Land Utilization Type.

Land use requirements focus on the qualitative attributes of the land utilization type.

A. Environmental Land Use Requirement:

Beach	- Walking distance and or adjacency to a beach is highly desirable.
Views	-There should be no view of objectionable sites. Long-distance views from the site of the surrounding landscape are desirable.
Nature	-An area of natural character.
Non degrading	-Resistance to degradation of environmental resources under pressure by tourism.
Flora and Fauna	-Maintain regional biological diversity

B. Economic Land Use Requirement:

Building site	-Site suitable for the development of a inn, and or rental cottages; no need for special foundations which will increase construction costs; free from flooding, capable of on site septic/ waste disposal.
Infrastructure	-Access to roads, electric, potable water, airport and a boat landing, economically unfeasible to develop these amenities as an individual property; access to site for deliveries and employees
Return	-Achieve a competitive return

C. Social Land Use Requirement:

Staff accommodations	-affordable housing within commuting range or existing labor within commuting range
Labor	-labor available to hire at competitive rates

Table 2.3: Diagnostic Land Characteristics of the Generalized Definition Coastal Hotel Land Utilization Type

The land characteristics are the quantitative, measurable, components of a given land use.

A. Environmental:

env1 Environmental factors

S - sites not containing rare or endangered species or habitat.
N2 - sites containing rare or endangered species or habitat.

env2 Views

S1 - Long-distance views of more than 1000 meters from the site of the sounding landscape and or the ocean are highly suitable.
S2 - Land without objectionable views from the site.
N2 - views of objectionable sites within 1000 meters are not suitable.

env3 Beach

S1 -0 - 500 meters from high tide highly suitable
S2 - 500 - 1,000 meters from high tide suitable;
N2-more than 1,000 meters from the high tide is not suitable;

env4 Nature

S1 - adjacent to unique land-form or forest is highly suitable
S2 - unique flora, fauna, or land form within 2000 meters are suitable
N2 - more than 2000 meters to a unique flora, fauna, or land form is not suitable.

B. Economic:

econ1 Return

S1 greater than 20 % return
S2 greater than 10 % but less than 20% return
N1 less than 10 % return

econ2 Flooding

S1 - no flooding hazard
S2 - moderate flooding hazard, once in 75 years
N2- flooding hazard, more than once in 75 years

econ3 Septic systems

S1 - Soils suitable for on site waste disposal
S2 - Soils moderately suitable for on site waste disposal
N1 - Soils not suitable for typical on site septic systems

econ5 Infrastructure

S1- Access to roads, electric, potable water within 200 meters is highly suitable;
S2- access to roads, electric, potable water within 400 meters is suitable;
N1- more than 400 meters to access to roads, electric, potable is unsuitable.

C. Social:

soc3 Attitudes

S1-Positive host community attitudes toward the proposed tourism land use
N1-Negative host community attitudes toward the proposed tourism land use

soc2 Labor

S1-labor available in less than 2 km commuting range
S2 labor available within 2-5 km commuting range
N1- Labor more than 5 km commute

soc1 Housing

S1-affordable housing less than 2 km commuting range for employees
S2-affordable housing within 2-5 km commuting range for employees
N1-affordable housing more than 5 km commute

Decisions are made at this stage on what type of tourism business to engage. Table 2.1 outlines the questions that would need to be addressed to define the land utilization type for a land evaluation using the FAO methodology. In defining land use requirements, as shown in Table 2.2, the land evaluator determines what components of the land utilization type are differentiating for the land area under consideration. The qualitative components of the land utilization type are specified in more detail by the land use requirements. In the case of the Coastal Hotel Land Utilization Type the land use requirements are divided into three categories: environmental, economic, and social land use requirements. Each of the land use requirements must then be defined by measurable diagnostic land characteristics.

Diagnostic land characteristics are the quantitative categories that can be measured or estimated by the land evaluator. In this stage of the evaluation, through expert knowledge and analysis, categories and classes of the evaluation are determined. What specific return gives the proposed project the go-ahead? How close or far to a specific resource is acceptable for successful development? How far, given accessible commuting methods, can labor travel to the job site?

Land suitability classification is determined using the diagnostic land characteristics and land use requirements organized using decision tree logic. The decision trees are separated into three land use requirements: Figure 2.3, Environmental Land Use Requirement Decision Tree; Figure 2.4, Economic Land Use Requirement Decision Tree; Figure 2.5, Social Land Use Requirement Decision Tree and Figure 2.6, Overall Suitability Decision Tree. Figure 2.6 shows the relationship between the environmental, economic and social resource decisions. The decision trees function with the most limiting land characteristic of a map unit (the unit of evaluation) being the classification of the map unit. The outcome of the land

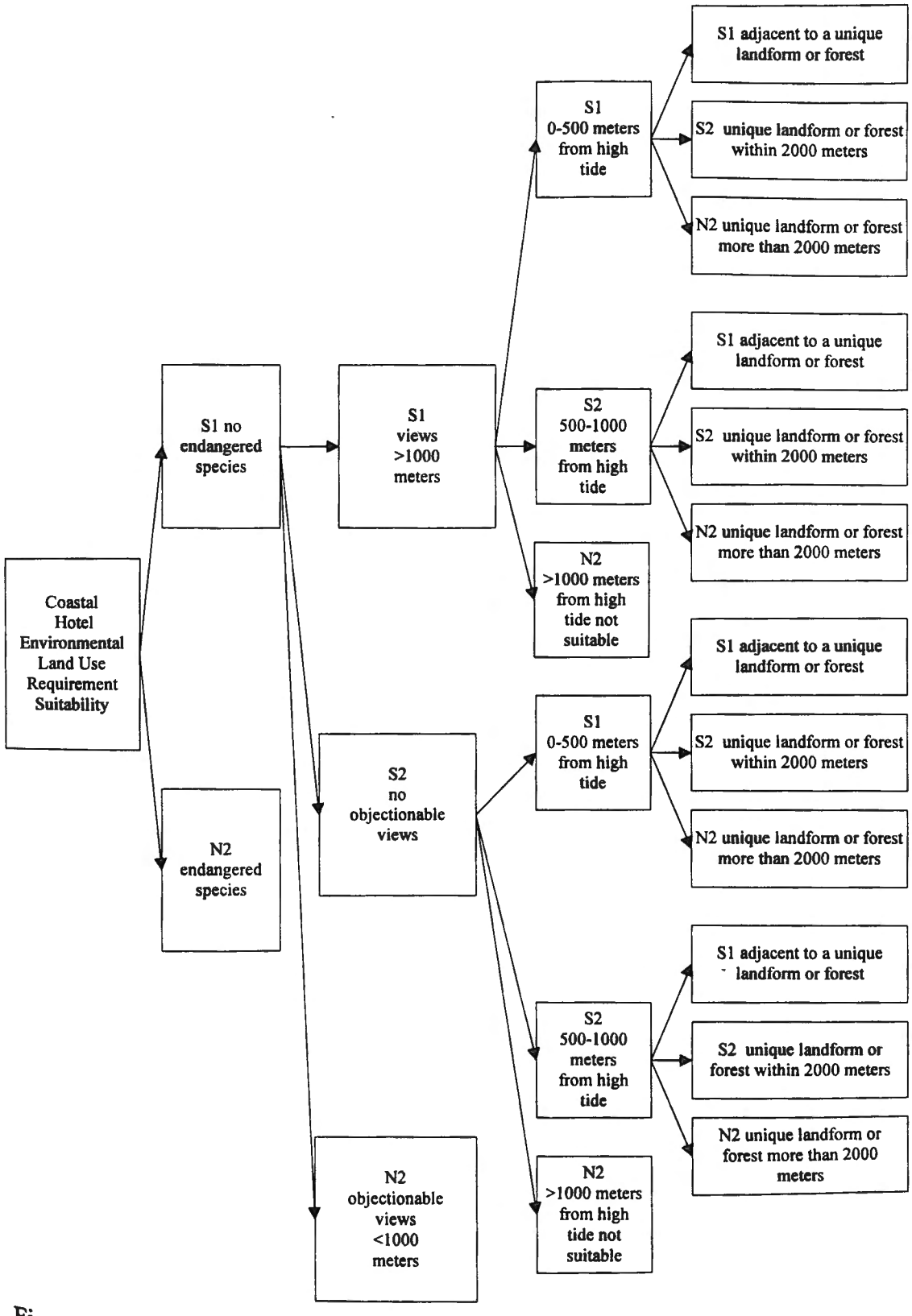

Figure 2.3: Environmental Land Use Requirement Land Characteristics Decision Tree

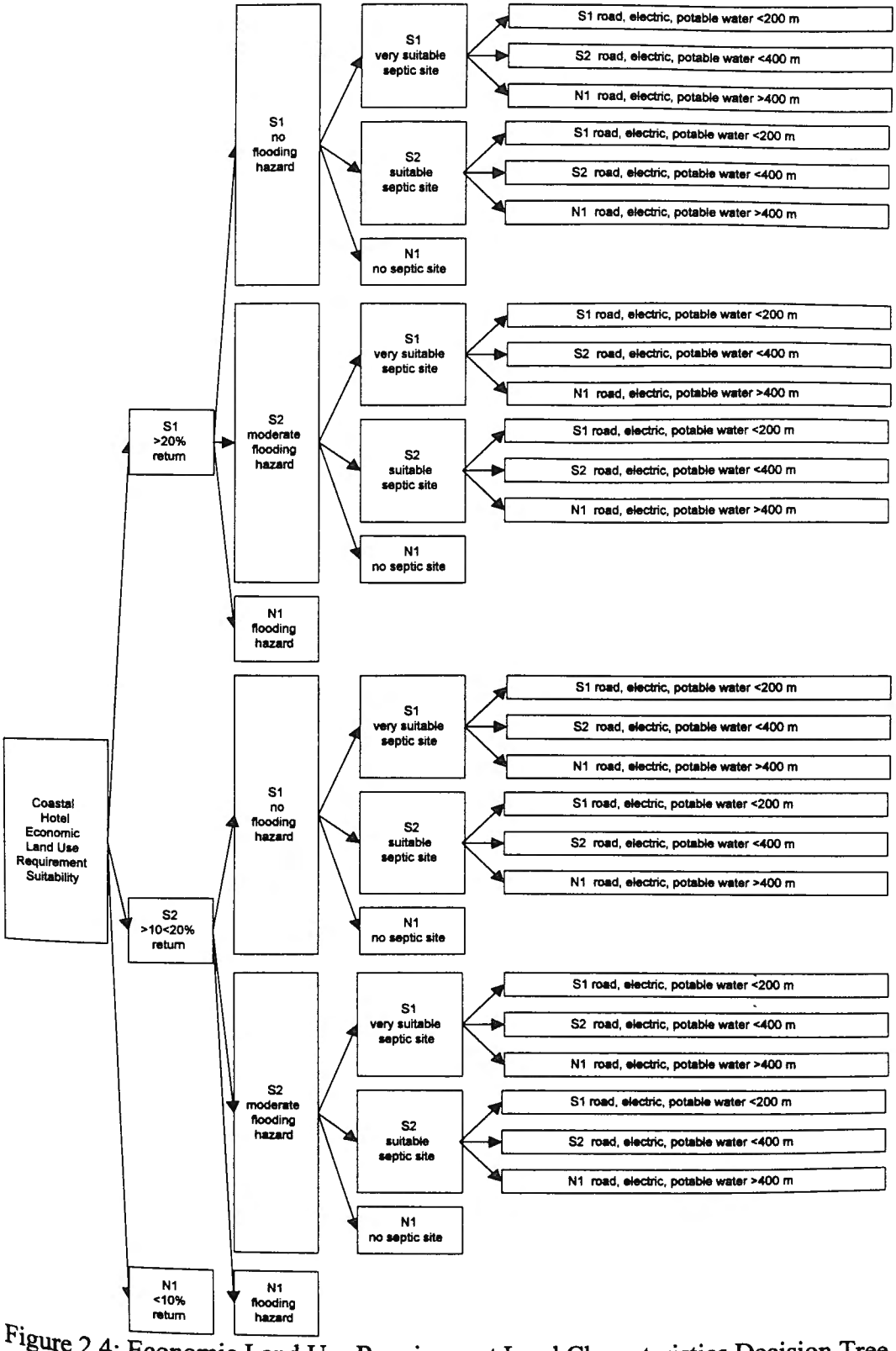

Figure 2.4: Economic Land Use Requirement Land Characteristics Decision Tree

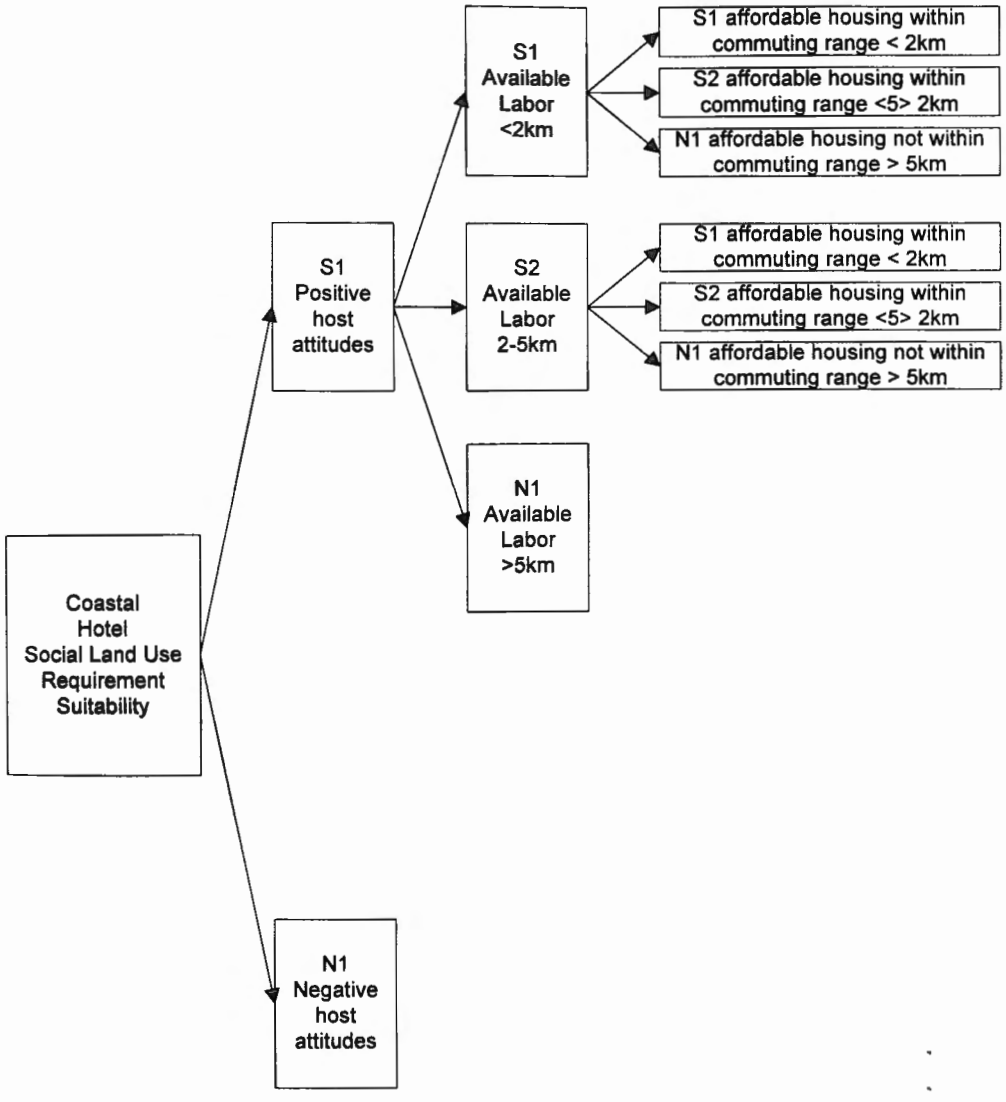

Figure 2.5:Social Land Use Requirement Diagnostic Land Characteristics Decision Tree

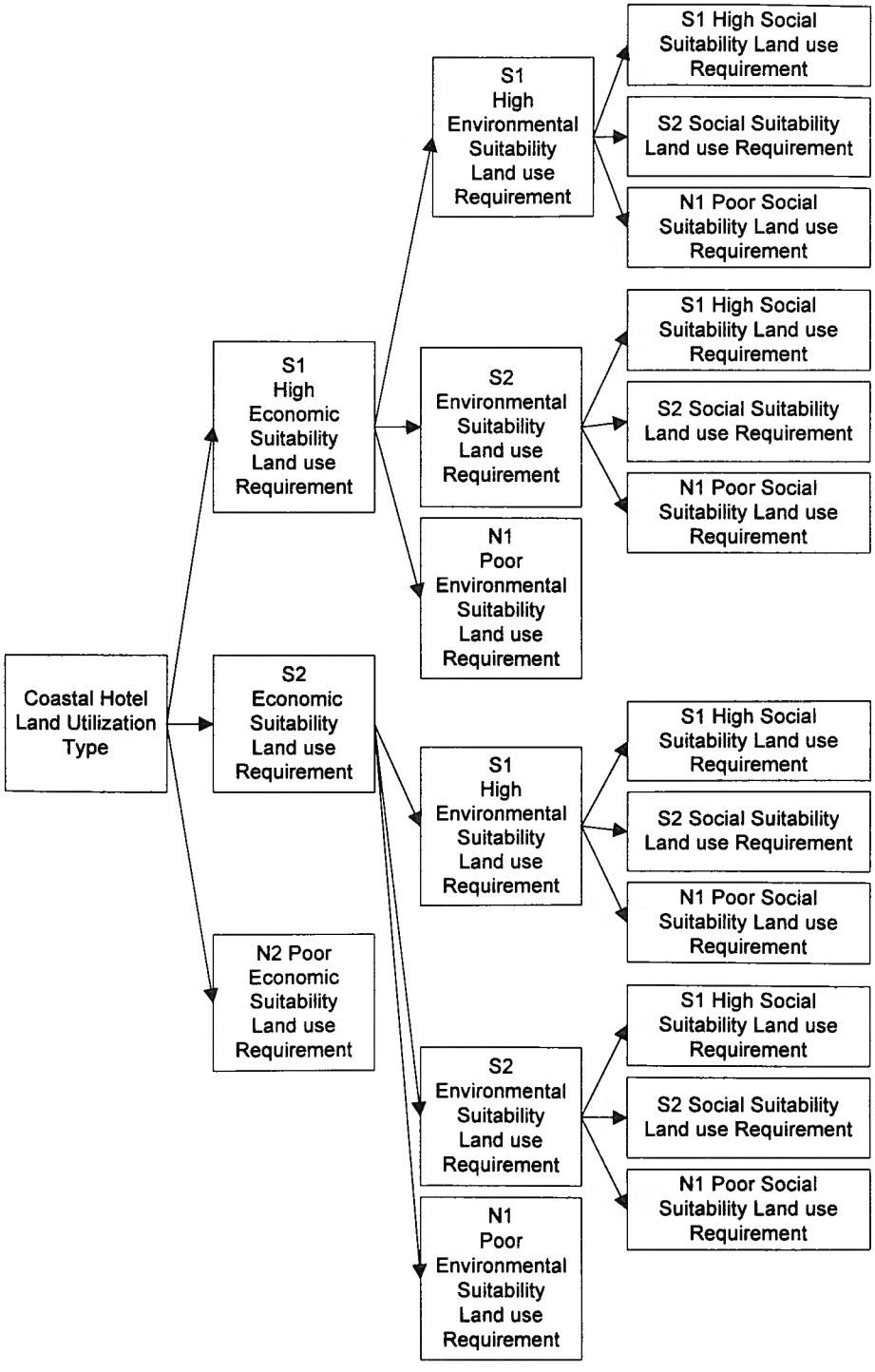

Figure 2.6: Overall Suitability Decision Tree

evaluation is in map and tabular format. Individual map units are evaluated for the proposed Land Utilization Types.

The process of using the decision trees is illustrated in Figure 2.6 Overall Suitability Decision Tree. Three examples are given. The first is a land unit which exhibits high economic suitability (S1), high environmental suitability (S1) and high social suitability (S1). This land unit is given an overall suitability of S1 - highly suitable. The second example exhibits high economic suitability (S1), moderate environmental suitability (S2), and high social suitability (S1). This land unit is given an overall suitability of $S2_e$ - moderately suitable due to an environmental limitation. The third example exhibits high economic suitability (S1), high environmental suitability (S1), and poor social suitability (N1). This land unit is given an overall suitability of $N1_s$ - not suitable due to a social limitation.

4) Results, planning decisions

The final step is the analysis of the outcome of the decision trees, and when subsequent planning decisions are determined. Sensitivity analysis of the assumptions is performed to determine the certainty of the outcome of the evaluation. Sensitivity analysis is performed by systematically changing the values of the respective diagnostic land characteristics and land suitability classification. Sensitivity analysis indicates the relative importance of any one land characteristic. Evaluators can conclude if the accuracy of the underlying information in the evaluation is sufficient based on the impact the information has on the evaluation results.

The FAO framework contains an organizational structure that offers repeatability. Once the land evaluator defines the components of the evaluation, the evaluator can assess multiple land areas for a proposed land use. The repeatability only exists for a land area with similar environmental, economic and social characteristics. The benefit is achieved when a government, local community or a

project developer has multiple sites, or wants to rank multiple sites for a single land use. In establishing the context of the evaluation the foundation for the decision process is determined.

DISCUSSION

The FAO method of land evaluation is suitable for tourism planning because tourism depends on land-based resources. The similarity and conflicts that exist in resource use between tourism, agriculture and forestry suggest the usefulness of the FAO method for tourism land evaluation. The method, which has been used successfully for agriculture and forestry, can be utilized to compare the return on the same resource base by different land uses, if adopted by tourism decision makers. The framework can also be used to determine the foregone or lost income from one land use if a nonrenewable, or precluding resource use is chosen. The success of tourism as a land use depends on an environmental, economic and social complex. The FAO framework accommodates the resources and the decision making needs of tourism development due to the land-based nature of tourism. The FAO framework can facilitate the systematic integration of information into the tourism decision process for rational land use decision making.

The FAO methodology has application in tourism management because the methodology is a framework; it is a method of organizing any land use decision process. The methodology offers a structure for decision-making not the decisions. The FAO method is an organizational framework that seeks to remove the subjectivity from individual tourism land use decisions by applying the user-defined decision process uniformly on individual map units.

The usefulness of the FAO methodology is in its potential as an aid to the identification of conflicts in proposed land uses to stake-holders before they occur. The ability of the framework to facilitate the recognition of non-sustainable, or

inappropriate land use is undeniable. Identifying potential conflicts equips decision makers with information to make rational decisions.

The weakness of the FAO system for evaluating land for tourism comes from the incomplete knowledge of the environmental, economic, and social needs of a particular tourism land utilization type. Research, both primary and secondary, will aid in facilitating the decision process. Much of the primary research that supports the evaluation of land for tourism has been completed in fields such as engineering, soils, geology, landscape architecture, environmental studies, hydrology, economics, sociology, and education. Research which links current knowledge to the tourism land use decision process will be central to the success of the adoption of the FAO methodology in the arena of tourism development. The most critical components to the adoption of the FAO methodology are its automation; and, as a result of automation, access to digital information in a format useful to the tourism land evaluator. While automation of the FAO methodology exists, access to digital information in many regions is unavailable or expensive to develop.

The usefulness of the FAO system is its flexibility and ability to integrate other evaluation techniques. The FAO method is a framework which links the values of the stake-holders with the knowledge and insight of experts. The FAO method offers decision makers repeatable processes, with dynamic potential. The potential comes from the possibility to ask "what if" questions. Decision makers can experiment with different land utilization types to determine an optimal mix of land utilization types based on environmental, economic and social values. This framework allows stake-holders to build consensus on the components of a decision process which results in a planning method that is rational. The FAO method of land evaluation allows individual ideas and knowledge of stake-holders

to be utilized together by multiple decision makers, and the framework allows for broad application of the resulting system of knowledge.

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CHAPTER THREE

SPATIAL ANALYTIC FRAMEWORK FOR IDENTIFYING TOURISM SITES

INTRODUCTION

While there are diverging opinions regarding the nature, pace and forms of tourism, one must nevertheless acknowledge the profound environmental, economic and social impacts of tourism on the landscape. This global tourism phenomenon is showing no sign of weakening as tourism has come to represent financial security in many developing regions. If the ravages of this force upon our own diminishing environment are to be addressed, an *environmentally-based tourism planning system* must be developed, evaluated, and adopted.

With this goal in mind, the nature and benefits of a Spatial Decision Support System (SDSS) are presented. An SDSS is an automated process that supports the analysis and identification of sustainable tourist development sites. Specifically proposed is a new system, the *Strategic Site Identification SDSS Framework* ("The Strategic Framework"). The framework is a process which allows individuals and communities to use existing data to ascertain the most suitable and economically feasible sites for tourism.

The success of the proposed framework is demonstrated by the potential for higher economic returns to investors from hotels sited in areas identified as suitable for hotel development by the Strategic Framework.

Generally speaking, an SDSS is a rational analytical tool with multiple uses in geographic analysis. "An SDSS is focused on a limited problem domain, makes use of a variety of data types, brings analytical and statistical modeling capabilities to bear on problems, relies on graphic displays to convey information to decision makers, is adaptable to the decision maker's style of problem resolving, and can easily be

modified to include new capabilities as they are required" (Armstrong and Densham 1990). As an essential aid in the determination of suitable sites for tourism, the Strategic Framework presented here can accurately facilitate and automate tourism planning at variable spatial scales. Based upon the evidence gathered and the analysis discussed below, this Strategic Framework can be used in any tourism land use situation where environmental, economic and social factors are being considered.

Specifically, the Strategic Framework incorporates the tenets of the FAO's Framework for Land Evaluation developed by the Food and Agriculture Organization (FAO 1976) with modifications for specific tourism applications. Among the many benefits of the proposed Strategic Framework are: (1) the introduction of a fully standardized methodology for data organization and management, (2) specific site planning strategies as a result of the analysis, (3) a unique opportunity for developers and agencies to evaluate environmental as well as social and economic data in their assessment and proposals, (4) an automated framework that will facilitate consensus building between the developers, planning agencies, and local communities, (5) ongoing monitoring apparatus to elicit feedback as conditions change, and (6) a data analysis environment where alternative tourism development scenarios could be explored electronically without creating any environmental damage. In sum, the tourism planner will be able to develop a better understanding of the individual components of sustainability and better clarify those components interactions in the context of land use planning (Joerger 1996a).

The catalyst for this research was the recurring exposure to conflict in resource decision making as observed by the author in Costa Rica between the years 1991 and 1995. A series of land-use conflicts were witnessed, chiefly as a result of poor strategic planning and uninformed decision making with regard to tourism development. An environmentally destructive situation arose between tourism and

other industries (such as agriculture) both of which sought land-based resources. Within the tourism industry, conflicts also occurred between project-level tourism development initiatives and industry-wide sustainable development objectives. After repeated observations of these land capability and land use conflicts during field visits in the coastal zones, the need became clear for a rational method for deciding environmental resource allocations.

Additionally, there is an increased emphasis upon sustainability within the tourism literature and policy arenas. In a recent survey, the author confirmed the collection and use at a national level of environmental information for tourism planning (Joerger 1996b). The collection and use at a national level of environmental information suggests the awareness of one component of sustainability. Consequently, a holistic approach to tourism policies and projects is necessary to meet the objectives of sustainable tourism development. SDSS as a technology can integrate a wide range of information and decision processes which, in the context of interdisciplinary problem solving, offers the opportunity to analyze and organize existing information for a host of wide-ranging tourism applications.

The framework is also scale independent. The framework allows for specific linkages between site, local, regional and national planning efforts. An example of this would be national soil maps which can be utilized to predict general suitability of a region based upon the stability and/or infiltration of the soils. At a site level this same analysis can be used to predict suitability of a particular parcel depending on the content resolution of the soil survey.

The proposed Strategic Framework could lead to the creation of plans and policies to influence the development of an entire region. For example, the framework can be used during the planning process to determine answers to questions such as "Where are appropriate soils for on-site waste disposal?" and "Where do existing roads

allow access to coastal zones and amenities?" Answers to such questions can provide planners with alternatives for achieving goals linked to tourism sustainability. Since tourism is an industry comprised of spatial relationships with dependence on land-based resources, the proposed Strategic Framework can be utilized to understand relationships and inform analysis.

SDSS offers capabilities of analytical and statistical modeling beyond those of map analysis presently available in most commonly used GIS programs (Armstrong and Densham, 1990). Decision support systems provide an automated framework that enable individuals involved in the development and management of tourism resources to make more informed decisions based upon the results of their analysis. In short, the system allows for a multidisciplinary approach to problem solving.

The Strategic Framework can draw upon many sources of data. Information collected for other purposes, from agriculture to cadastral surveys (including but not limited to data collected from timber production, regional, urban and emergency planning), can provide data vital to the tourism planning and development processes. In fact, tourism planners are limited *only* by their own level of imagination and access to information when using the SDSS. Plus, data analysis techniques from other industries, such as agriculture, mining and forestry, also offer valuable insight into sustainable tourism decision making. Using existing data also focuses future data collection, both geographically and in content. It is possible to develop an SDSS with the wide range of data currently available; this process can also help to identify future data collection needs.

The objective of this study is to present and illustrate the application of the Strategic Framework. The Strategic Framework will be derived and demonstrated using a Costa Rican case study. The case study shows the integration of survey data

with existing resource information to identify suitable sites for Small Town Resort Hotels in northwestern Costa Rica.

THE COMPOSITION OF THE STRATEGIC SITE ID SDSS FRAMEWORK

There are three modules that comprise the Strategic Framework for tourism planning(Figure 3.1).

- **MODULE # 1 -- Analysis of Land Utilization Types**
- **MODULE # 2 -- Evaluation of Land Based on Integrated Analysis**
- **MODULE # 3 -- Planning Decisions & Strategies**

Analysis of Land Utilization Type (MODULE #1)

Module #1 is an investigation composed of five steps. **Step one** is the definition of the study area. **Step two** is a survey of stake-holders and an assessment of spatial data and information needs. **Step three** is the determination of relevant land utilization types, achieved through the establishment of environmental, economic and social context of the study area. This context is defined using expert knowledge gained through interviews, surveys, existing data and analysis of spatial data and information. **Step four** is the determination of general land use requirements of each land utilization type. These include environmental, economic, and social conditions necessary for the successful implementation of a land utilization type (Rossiter 1994). This kind of differentiation arises as a result of more in-depth consideration of expert knowledge in the study area. Land utilization type refers not only to the actual land use, but also to components such as market orientation, capital availability, labor intensity, technology employed, infrastructure requirements, size and configuration of land holdings, land tenure and income levels (Davidson 1992). **Step five** is the analysis of the land use requirements to determine measurable components that are diagnostic to the evaluation.

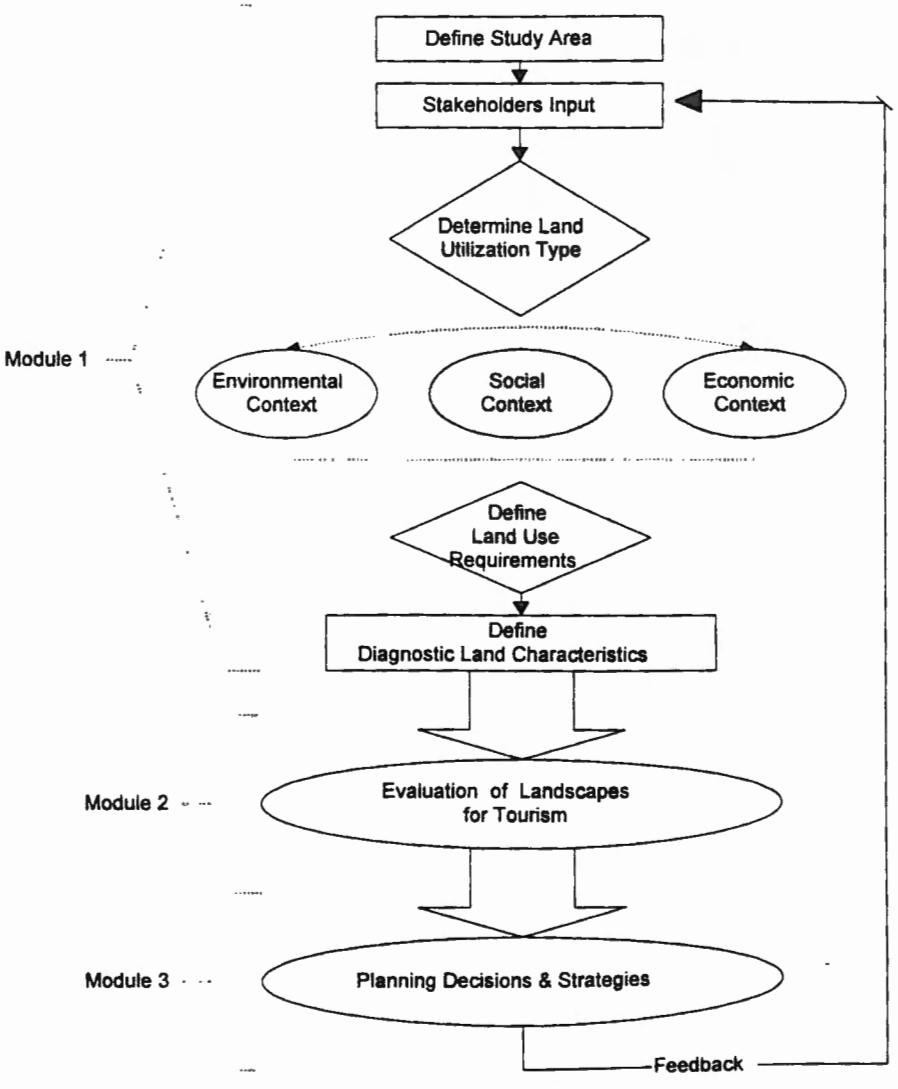

Figure 3.1: Spatial Analytic Framework for Strategic Identification of Tourism Sites

Diagnostic land characteristics are the measurable, or estimated, attributes of the land. Examples of land characteristics include available water, discount rate, distance to services, family size, rainfall, slope gradient, and climate, among others. Land characteristics are often determined from map units of resource inventories and surveys, financial statements, and census data. These components are the diagnostic land characteristics or land qualities (FAO 1976). Diagnostic land characteristics are organized and implemented using a set of decision trees determined from land utilization type analysis. Decision trees are predetermined categories of choices or particular courses of action based upon expert knowledge (FAO 1976).

Evaluation of Land based on Integrated Analysis (MODULE #2)

Module #2 is the process of comparing the needs of the land utilization type with the conditions present in the study site. Land is categorized on a basis of its suitability utilizing the decision trees developed as part of the land utilization type analysis. The data are then subjected to both spatial and non-spatial environmental, economic, and social analyses. The efficiency of this standardized methodology is that once the initial land utilization type is defined, the respective land use requirements and diagnostic land characteristics can then be applied to other sites.

Planning Decisions & Strategy (MODULE #3)

The land utilization type and its components have now been defined, and the land has been evaluated. With output data now available in the form of maps and tabular data, Module #3 uses the information to develop systematic strategies and plans. The three modules are part of a feedback loop that affords the evaluator the opportunity to optimize solutions by manipulating decision tree values developed through stake-holder input.

Geographic Information Systems (GIS) and tabular spread sheets with statistical modeling linked by decision trees are the computational and analytical tools

that drive the framework. This framework, which could promote the sustainability of environmental resources upon which tourism depends, can be used by local, regional, and national decision makers to inventory, evaluate, regulate, and monitor land use change in rural communities. This process is demonstrated in the following case study.

COSTA RICA: A CASE STUDY

Costa Rica was chosen for this case study because the country represents one of the great success stories in neo-tropical conservation and tourism. Costa Rica's conservation efforts along with the national focus on sustainable development are the centerpiece of its tourism industry (Boza 1993). The tourism industry has expanded steadily over the last decade and has become the most important means of earning foreign exchange currency. Given this focus upon tourism in Costa Rica, the suitability of land for this growing industry needs to be assessed using a more quantitative and systematic approach.

This Costa Rican case study was based on expert knowledge that included information from hotel surveys, existing geographic databases, field observations, and the opinions of industry professionals. Primary research was conducted in the form of a survey to determine the economic, social, and environmental considerations of hotel developers and operators in the northwestern zone of Costa Rica. Environmental, social and economic preferences such as necessary return on investment, hiring practices, beach access or wetland proximity were determined from the surveys and the opinions of industry professionals. Economic information was also collected. Further environmental data were collected from the Costa Rican national government, and the Food and Agriculture Organization of the United Nations through the collection and use of their map products.

Module #1 -- Analysis Of Land Utilization Types

Step 1: Selection of Study Area

Northwestern Costa Rica, was selected as an optimal site to test the new Strategic Framework given the focus on tourism development in the region. The northwestern coastal zone is the fastest growing tourist destination in Costa Rica. This region was selected for development of destination tourism resources because of its natural beauty, beaches, sport fishing and land availability. Northwestern Costa Rica is a tourist attraction primarily as a result of its environmental amenities. Within the study area there is a need for planning activities to protect the touristic resource base.

During field work performed in Costa Rica between the years 1991 to 1995, significant land-use conflicts within the rapidly growing tourist economy were documented based on survey research and interaction with researchers in Costa Rica. For example, a banana plantation in the Atlantic lowlands was causing siltation and nutrient loading in bordering reefs, thereby damaging conservation efforts and limiting tourism potential. In another instance, hotels were degrading water quality due to poorly planned on-site waste disposal. Furthermore, a mangrove forest was removed to make room for a marina as part of a hotel development. Reportedly in this same region there is a substantial decline in the water table attributed to excess consumption. Given the developmental pressure within the study area there are many potential negative impacts which could occur to the touristic resources. This region of Costa Rica is typical of areas that would benefit from analysis utilizing the Strategic Framework.

Step 2: Surveys of Stake-holders and Assessment of Data Needs

The stake-holders who were formally surveyed were hotel owner-operators and government officials. Local people and visitors were not formally surveyed. Observations indicate that hotel developers were not taking a proactive role in the

evaluation of the environmental resources which supported their projects. An example of an ignored environmental resource is the declining water quality due to insufficient waste water treatment. As a result of these observations a survey was developed to be directed at hotel owners and managers. The survey was conducted at the project level to determine the type of environmental, economic and social criteria used to site a hotel in the research area. The projects considered here were hotels located in the coastal zone of northwestern Costa Rica.

Nineteen hotel owner-operators on the 'Peninsula De Nicoya' from 'Playa Tambor' on the southern tip of the peninsula to 'Playa Panama' on the northern extreme of the peninsula participated in the survey. The hotels ranged in size from six rooms to over one hundred and thirty-five rooms. The operators included local people, Costa Rican nationals, foreign investors, and on-site representatives from international corporations.

Survey Composition

The survey consisted of questions in seven thematic areas, and included both multiple choice and open-ended questions. Participants were selected based on the location of their hotels in the survey area. The participant was either the owner of the hotel or the manager. The questions were administered in person and the responding participants were given the option of responding in English or Spanish. Each survey was administered orally and took approximately one hour to complete. Additionally, respondents were asked to consider the relationship of the environment to social and economic factors used by operators and owners when siting hotels.

Respondents were asked questions organized to elicit responses related to environmental, social, and economic resource information needs. Information collected also included occupancy, seasonality, average daily rate, number of rooms,

construction costs, siting decisions, community impact, guest characteristics and previous land use:

The survey questions included the following:

1. Why did you locate in this particular area? (attraction, infrastructure, already owned the land, labor availability)
2.. Did you perform a feasibility study before you built or purchased this property? (what information was in the study)
3. What are the most important economic reasons for locating in this location? (cost, occupancy, seasonality, debt)
4. What do you perceive as the impact of this hotel on the community?
5. Did you chose this location because of the community? (labor availability, friendliness of people, lack of people, local culture)
6. What are the most important environmental reasons for locating in this location?
7. What is the nature of your clientele? (country of origin, age of guests)

Survey Findings: Hotel Industry

The 100% response rate of the survey can be explained by two factors. First, the survey was conducted during the low tourist season and respondents had time to participate. Second, the name recognition of Cornell University by individuals in the hotel industry in Costa Rica proved quite valuable. One respondent noted that she had attended the School of Hotel Administration's Professional Development Program.

From the survey it was discovered that **distance to the coast** and a general **positive attitude towards the environment** were the main environmental concerns of the hotel owners. Hotel developers also wanted access to the coast and pleasant scenery or views.

Environmental Resources

Coastal access was a primary focus. Over half, fifty-five percent, of the respondents cited proximity to the coast as a consideration when siting their hotel. Other environmental resources were also considered. Each respondent that reported any of the following categories in their surveys were counted in a composite category "environmental attraction" which yielded a fifty percent response: proximity to nature (30%), water features (25%), wildlife (15%), forest (20%), and national parks (10%).

Social Resources

Social or human resources were not considered by those individuals constructing and operating hotels in the Nicoya Peninsula in northwestern Costa Rica. Hotel owners/developers **disregarded the local community** when choosing their hotel site. Few respondents chose their site based on perceived labor availability (5%), friendliness of host community (15%), local culture (0%) or low population density (5%). The social-cultural considerations had little influence on the siting decision of the respondents. None of the respondents reported considering the character of the local community when siting their hotel property.

Economic Resources

Not surprisingly, economic success was typically the focus of feasibility studies conducted by or for hotel developers. The majority of respondents used resources from their country of origin to finance their hotel project. Debt leverage was reported as being unimportant. The perceived lifestyle and a life change appeared to be a strong motivator. They wanted a financially successful activity to fill their day while they lived in what they thought was one of the most beautiful places in the region. Some of respondents located in specific areas because of the existing infrastructure.

Government Interviews

Additionally, interviews were conducted in the national capital San Jose with many government officials and tourism experts. Governmental and non-governmental agencies interviewed included Emergency Planning, the Cadastral Survey Office, the Ministry of Agriculture and their partner the FAO. The national government of Costa Rica reported collecting and using environmental data for a variety of tourism planning activities: (1) determining tourism project locations, (2) monitoring and evaluating tourism impact, (3) establishing tourism policy, and (4) regulating their tourism industry. At a national level, considerable thought is given to, and the government is quite progressive about, tourism planning with regard to the environment. Nevertheless, local projects utilize little of the information collected for national planning, this became apparent during the interview with the hotel owner-operators.

Digital Data Utilized

Based on the assessment of data needs, digital data used for the spatial analysis included data provided by the FAO and data that were encoded at Cornell University.

FAO data:

- A 1992 Land Use Map at a scale of 1:200,000 prepared by Clemson University and the National University of Costa Rica. The map was prepared using a Landsat TM composite image that was interpreted manually then digitized using ARCINFO GIS software. The data were visually field checked in 1995; the quality of the data is unknown.
- A soils map at a scale of 1:200,000 prepared by ACON (sic) in cooperation with Ministry of Agriculture and Grazing (MAG). This map uses the Costa Rican soil capacity classification system (MAG 1991). Digitizing was performed on ARCINFO according to USA standards for cartographic data.

- A road map at a scale 1:200,000 prepared by an unknown source.
- A political boundaries map at a scale of 1:500,000 delineation were copied from a 1995 Official Political Division by UCR (University of Costa Rica) by hand at the National Geographic Institute (IGN) and digitized using ARCINFO following USA standards for digital cartography.

Other Data Sources

- National conservation areas were digitized from "Los Parques Nacionales y otras areas protegidas de Costa Rica" (the national parks and protected areas of Costa Rica) at a scale of 1:500,000, using ARCINFO.
- Indigenous reserves were digitized from "Los Parques Nacionales y otras areas protegidas de Costa Rica", at a scale of 1:500,000, using ARCINFO.

All maps were geo-referenced using the Costa Rica Lambert North projection. [See Appendix C: Table C.6. for specific geographic projection parameters.]

Step 3: Determination of Appropriate Land Utilization Type

The Strategic Framework for tourism evaluation now requires definition of the land use. This study considered "town resorts", areas that combine the activities of a town community with accommodations and services for tourists. Typically, town resorts focus on an amenity such as the coast (Inskeep 1991). Town resorts were chosen because they are the predominate land use in the coastal regions of Costa Rica. The general concept of town resorts are further characterized and a specific land utilization type is defined. The defined land utilization type used in this example is "Small Town Resort Hotel." Table 3.1 shows the components necessary for the implementation of the land utilization type. These components include (1) Resource Requirements (beach proximity, environmental amenities, labor availability) (2) Management Requirements (suitable building site free from flooding, access to

Table 3.1: Land Use Requirements For The Small Town Resort Hotel

A. Resource Requirements

- Beach within walking distance and or adjacent is highly desirable.
- Nature-an area of natural character.
- Labor- local labor available to hire at competitive rates

B. Management Requirements

- Building site suitable for the development of an inn, and or rental cottages; no need for special foundations which will increase construction costs; free from flooding.
- Infrastructure- including access to roads, electric, potable water; economically unfeasible to develop these amenities as an individual property; access to site for deliveries, employees and guests.
- Labor- available, affordable housing for employees

C. Conservation Requirements

- Flora and fauna in the region present the need to maintain regional biological diversity
- Economic diversity requires the maintenance of mixed regional economies

infrastructure, labor housing availability) and (3) Conservation Requirements (conserving bio-and economic diversity).

Small town resort hotels were selected as a land utilization type for evaluation since this is a typical development style within this region. The individuals constructing hotels in the region are largely non-Costa Rican nationals. The hotel owner-operators come to Costa Rica with their own capital in search of lifestyle and business opportunities. They are drawn to the region by the coast and the scenery. The respondents did not mention government incentives as a motivator, though some government incentives are in place.

Step 4: Definition of Land Use Requirements

Having gathered and analyzed the data from the surveys, interviews, and expert knowledge the results were organized to create land use requirements using the FAO method. The land use requirements are divided into three categories: resource requirements, management requirements, and conservation requirements. The land use requirements outlined in Table 3.1 permit the successful implementation of Small Town Resort Hotel land evaluation.

Step 5: Definition of Diagnostic Land Characteristics

The FAO method is then used to further define diagnostic land characteristics. Figure 3.2 shows the decision tree with its measurable resource requirements. The land evaluator utilizes economic and spatial analysis, which is depicted as decision points to determine a given site's suitability.

Assumptions of this specific evaluation included: capital is coming from outside of the country, capital is uniformly available for owner/operators, and economic diversity is maintained within the region. Due to the location of the study area there are no indigenous reserves present within the boundaries, and affordable

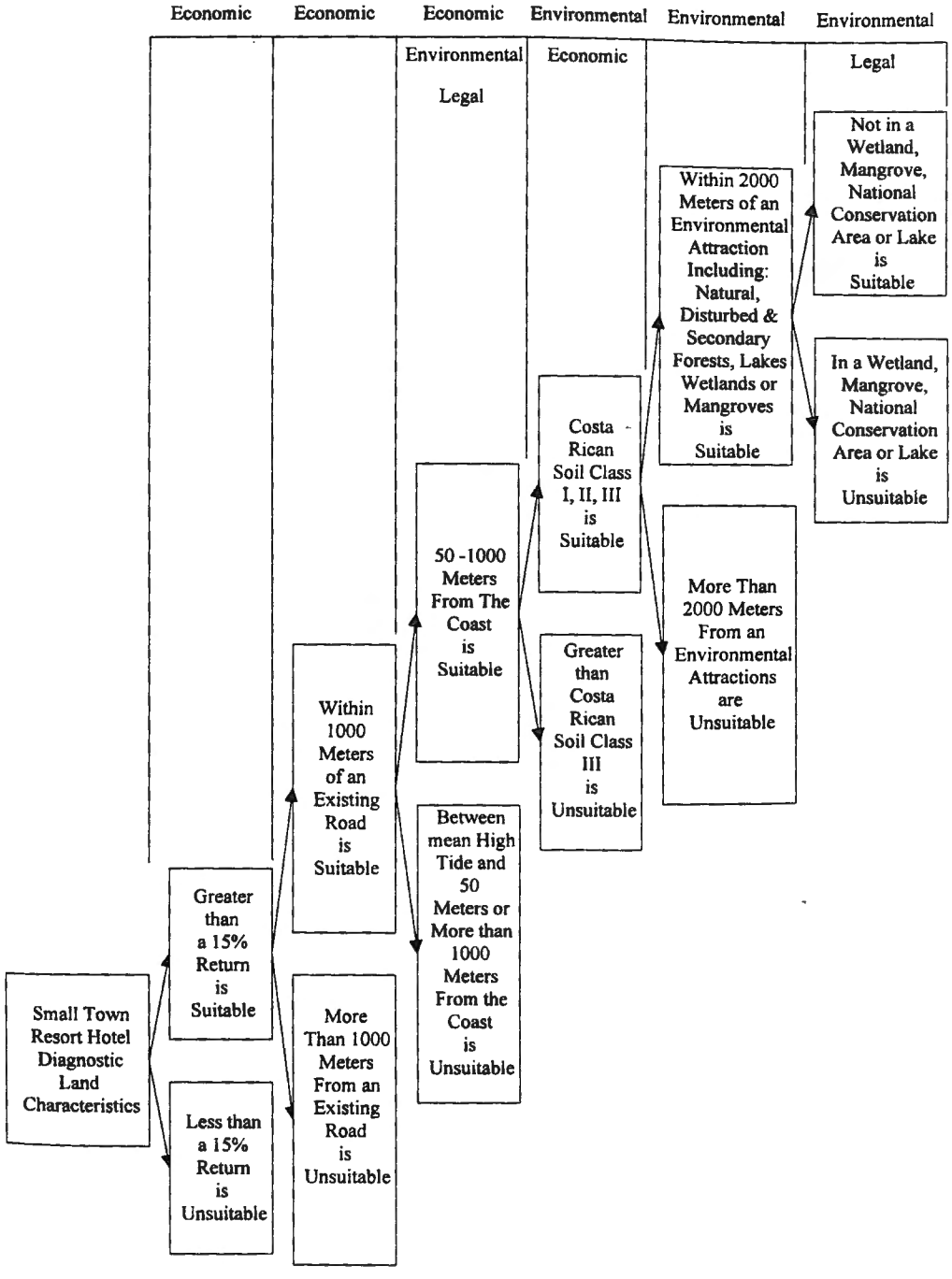

Figure 3.2: Small Town Resort Hotel Diagnostic Land Characteristics Decision Tree

housing and surplus labor is assumed to be uniformly present due to the current lack of development within the region.

The decision tree process is inherently inter-disciplinary in character. It requires feedback within the economic, environmental and social decision making process which support tourism development. While it is difficult to place any one resource's importance over another for the purpose of land evaluation the author charges that evaluators begin with the overall determinator - economics. Projects must be environmentally friendly and socially appropriate but without economic vitality individual projects will not be sustainable.

Economic analysis is located at the apex of the decision tree hierarchy. One would not want to evaluate for a land use which was not economically viable and may require future subsidies. Environmental analysis follows in the hierarchy, which occurs only after a land utilization type has proven to be economically viable. Environmental resources which support tourism are difficult to create; therefore, must be pre-existing in the study area. Social/legal analysis is conducted after the land utilization type has proven to be environmentally viable. Host attitudes and legal constraints can change to meet the needs of economically and environmentally viable tourism; therefore, these resources and constraints are considered the most adaptable in this case study. For example, a flexible legal constraint is the prohibition of alcohol service in the Maldives which was modified to allow for tourism development.

The Costa Rican case study integrates current Costa Rican law and recognizes the positive attitude of the host community for tourism development. Analysis must include all resource components in this interdisciplinary process. The hierarchy recognizes the flexibility of specific resources in this case study. The least flexible and most limiting constraint to an evaluation should be the first component in a decision tree.

The first node of the decision tree in this case study was economic in nature and related to rate of return (greater than a 15% return or less than a 15% return). This decision was determined by considering the rate of return on Costa Rican bonds in dollars and adding 260 basispoints to this prime lending rate for management risk and environmental risk. This decision parameter is appropriate, since an investor would be compensated for the additional risk taken beyond a less risky bond investment.

The second node of the decision tree considers the distance from existing roads. The scale of the small town resort hotel precludes costly investment in excessive access roads and related infrastructure. The distance selected is 1000 meters from pre-existing roads, which allows for buffers from existing development without incurring disproportionate costs for new infrastructure. The distance was selected based on observing the location of existing hotels in relation to existing roads.

Other than the first two decision points, which are economic in nature, the third decision point is influenced by economic, environmental and legal constraints. A viable location would be more than 50 meters but less than 1000 meters from the coast. The economic aspect of this constraints addresses a guest's preference to be proximate to the coast. In order to attract guests, which is a component of economic success, a coastal hotel needs to offer access to the coast. The author assumes that a guest can reasonably walk 1000 meters, but more than 1000 meters is difficult to justify as coastal proximity. The environmental component of this decision point considers proximity to the coast an environmental amenity including related coastal views, flora, fauna and sounds, which are predominant within 1000 meters of the coast. The legal constraint represented is Costa Rican Law, which does not allow development within the first 50 meters from the mean high tide line of the coast.

The fourth decision point considers both economic and environmental components. This decision point selects for suitable soils, which are those soils which

are in Costa Rican soil class I, II, or III. This classification integrates the need for affordable and effective on-site waste disposal, lack of inundation, and minimization of erosion risk and resulting sedimentation. Suitability for on-site waste disposal is determined by analyzing soil texture, drainage, slope gradient and depth. Inundation of a site eliminates it from consideration due to the difficulties of operating a property which suffers flooding. Risk of erosion on construction sites is minimized when there is less than 15% slope gradient (United States Department of Agriculture 1992).

Class I, II, and III soils according to the Costa Rican soil classification system have the appropriate soil qualities for the Small Town Resort Hotels, see Appendix C Table C.5. The environmental and economic components of this decision point are well-illustrated when considering on-site waste disposal. On-site waste disposal with proper soil conditions is less costly than techniques necessary to treat waste water where soil conditions do not allow for septic tanks and infiltration areas, which can become economically prohibitive. Environmentally inappropriate treatment of waste water introduces pathogens into the environment which can be a risk to water quality and results in environmental degradation. The analysis of the soils is primarily an environmental analysis though soil properties have an economic component.

In general, soil properties which are important for the construction of small buildings as well as roads and other amenities used by tourists include slope, inundation, mass movement, depth to bedrock, shrink swell, rock fragments greater than 75 mm, erodibility, subsidence and soil strength. Soil properties may affect the performance of roads, pathways and utilities which come in contact with the soils. Different soils will have different properties with regard to insulation of utilities and corrosion rates. Rate of corrosion of utilities can also be affected by wetness, electrical conductivity, acidity and aeration. Soils also affect the suitability for septic

tank absorption fields where extremely saturated soils and soils with free water at a shallow depth limit their use (United States Department of Agriculture 1993).

In this case study the necessary soil qualities were present in the Costa Rican soil classes I, II and III. This case study exclusively looks at small town resort hotels, which implies small scale development. Larger structures would require more extensive engineering studies and geologic information.

The last two decision points address the need for tourists to have access to environmental amenities. The first of the final decision points places suitable tourist sites within 2000 meters of environmental attractions, which include natural, disturbed, and secondary forest, lakes, wetlands, and mangroves. Proximity to environmental attractions is a motivator for travel in this region. Environmental attractions are buffered at 2000 meters because tourist interested in environmental attractions are thought to be willing to travel further than those only interested in the coast.

The final decision point integrates both environmental and legal components. Small town resort hotels should not be located in sensitive environmental areas, such as wetlands, mangroves, national conservation areas or lakes in order to protect those sensitive areas. Additionally, Costa Rican law does not allow development within national conservation areas.

The previous discussion of the hierarchy within the decision tree illustrates the interdisciplinary process used to define the diagnostic land characteristics. Not only does the decision tree illustrate interdisciplinary analysis via the hierarchical progression beginning with an economic return analysis followed by environmental considerations such as soil classifications and proximity to environmental attractions and finally legal and social considerations such as the exclusion of areas with development restrictions; but the decisions also illustrate that often a decision point

considers more than one of the components simultaneously. Figure 3.2 shows the decision points labeled as to their primary component(s): economic, environmental, or legal.

Module #2 -- Evaluation Of Land Using Integrated Analysis

The analysis of touristic resources consists of economic, social and spatial analysis. Within spatial analysis one considers geographically based economic, environmental and social relationships.

Economic Analysis

A typical ten-year discounted cash flow analysis was performed as a generally accepted methodology in the valuation of income-producing property. The results of the analysis are shown in Table 3.2. The first two pages of Table 3.2 show the results and assumptions for the ten-year discounted cash flow analysis for all hotels surveyed. The third and fourth pages of Table 3.2 show the ten-year discounted cash flow analysis for the five suitably sited hotels according to the spatial analysis of the Strategic Framework. The base year financial statement was projected into the future for ten years using growth rates defined by analysis of the data collected.

The sales price in Year 10, shown in Table 3.2, was calculated based on the income projected for Year 11 and capitalized at a final capitalization rate. These projections are used to determine the expected cash inflows to the investor for the ten years in which the investment is held. Financial and operational data were collected to support the assumptions in this economic analysis and projection. The data were collected (a) from the survey of hotels (b) from the income statement of a typical hotel, and (c) from Political Risk Services (Political Risk Services 1996) and Union Bank of Switzerland (personal communication).

The revenue a hotel can attain is computed based on the analysis of construction costs, operating and growth statistics in the market such as occupancy,

Table 3.2.: Ten Year Discounted Cash Flow Analysis - All Hotels Surveyed

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Revenue												
Rooms Revenue		$ 418,725	$ 434,916	$ 451,732	$ 510,909	$ 577,838	$ 653,535	$ 725,424	$ 805,221	$ 893,795	$ 992,113	$ 1,101,245
Food and Beverage Revenues		104,681	108,729	112,933	127,727	144,460	163,384	181,356	201,305	223,449	248,028	275,311
Other Revenues		20,936	21,746	22,587	25,545	28,892	32,677	36,271	40,261	44,690	49,606	55,062
TOTAL REVENUES		$ 523,406	$ 543,645	$ 564,665	$ 638,637	$ 722,298	$ 816,919	$ 906,780	$ 1,006,526	$ 1,117,244	$ 1,240,141	$ 1,376,556
Departmental Expenses												
Rooms Expenses		104,681	116,196	128,978	143,165	158,913	176,394	195,797	217,335	241,242	267,778	297,234
F & B Expenses		42,919	47,640	52,881	58,698	65,155	72,322	80,277	89,107	98,909	109,789	121,866
Other Dept.		-	-	-	-	-	-	-	-	-	-	-
TOTAL DEPARTMENTAL EXPENSES		$ 147,601	$ 163,837	$ 181,859	$ 201,863	$ 224,068	$ 248,716	$ 276,074	$ 306,442	$ 340,151	$ 377,568	$ 419,100
DEPARTMENTAL INCOME		375,806	379,808	382,807	436,774	498,230	568,204	630,706	700,084	777,093	862,573	957,456
less: Operating Expenses		172,724	191,724	212,813	236,223	262,207	291,050	323,066	358,603	398,049	441,834	490,436
NET OPERATING INCOME		203,082	188,084	169,994	200,551	236,023	277,154	307,640	341,481	379,044	420,739	467,020
less: Fixed Expenses		88,979	98,767	109,631	121,691	135,076	149,935	166,428	184,735	205,056	227,612	252,649
less: FFE		20,936	21,746	22,587	25,545	28,892	32,677	36,271	40,261	44,690	49,606	55,062
OPERATING CASH FLOW		$ 93,166	$ 67,572	$ 37,776	$ 53,315	$ 72,054	$ 94,542	$ 104,942	$ 116,485	$ 129,298	$ 143,521	$ 159,309
CONSTRUCTION	$ (609,000)											
NET REVERSION											$ 1,200,942	

Net Cash Flow	$ (609,000)	$ 93,166	$ 67,572	$ 37,776	$ 53,315	$ 72,054	$ 94,542	$ 104,942	$ 116,485	$ 129,298	$ 1,344,463
Time	0	1	2	3	4	5	6	7	8	9	10
Discounted Cash Flows	(609,000)	81,014	51,094	24,838	30,483	35,824	40,873	39,451	38,079	36,755	332,331
Present Value	101,742										
Discount Rate	15.00%										

Table 3.2 (continued)

Summary of Assumptions - All Hotels Surveyed			
Name	Variable	Source	Comment
High Season	7	from survey	Length of high season in months
Low Season	5	from survey	Length of high season in months
# of rooms	29	from survey	Average number of rooms in sample hotels
Days in Year	365		# of days in year
Available rooms	10,585	calculated	# of rooms * 365
Room night			One room sold for one night
Occupied rooms			Total number of room nights sold
Average occupany			Occupied rooms/available rooms (%) during a specified time period
OCC% high season	83%	from survey	Average Hotel Occuppancy during high season
OCC% low season	30%	from survey	Average Hotel Occuppancy during high season
OCC% WA	61%	calculated	Weighted average OCC% (weighted by seasonality)
Average Daily Rate			Average Daily Room Rate per sold room night
ADR high season	$82.00	from survey	Average Daily Rate during high season
ADR low season	$64.00	from survey	Average Daily during high season
ADR WA	$74.50	calculated	Weighted average ADR (weighted by seasonality)
RevPar			Revenue per Available Room (ADR*OCC%)
RevPar high season	$68.06	from survey	RevPar during high season
RevPar low season	$19.20	from survey	RevPar during low season
RevPar WA	$47.70	calculated	Weighted average RevPar (weighted by seasonality)
Rooms Revenue Year 1	$418,725	calculated	RevPar WA * # of rooms * days in the year
Revenue % of Total		from a typical statement of a Costa Rican hotel	
RoomsRev %	80%		Rooms Revenue as a percentage of total revenues
F & BRev%	20%		Food and Beverage Revenue as a percentage of total revenues
OtherRev%	4%		Other Revenues as a percentage of total
RoomsExp%	25%		Rooms Department Expenses as a percentage of Rooms Revenue
F&BExp%	41%		Food & Beverage Department Expenses as a percentage of Food & Beverage Revenues
Other Exp%	0%		Other Department Expenses as a percentage of Other Revenues
OperCost%	33%		Operating Costs as a percentage of Total Revenues
Fixed Costs%	17%		Fixed Costs as a percentage of Total Revenues
Growth Rates	Expected Value	Information from Political Risk Service	
Inflation	11.0%		Expense Growth Rate *Normal distribution: mean-11%; stddev-1.5%*
Growth (1-3)	3.9%		Short Term Revenue Growth Rate *Histogram: 3% growth 0.4 probability; 4% 0.4 p.;5% 0.2 p.*
Growth (4-6)	13.1%		Medium Term Growth Rate *Histogram: 11% growth 0.1 probability; 12% 0.5 p.;13% 0.1 p.; 14% 0.1 p.;15% 0.1 p.; 16% 0.05 p.;17% 0.05 p.*
Growth(7-10)	11.0%		Long Term Growth is equal to Inflation Rate
Constr/Room	$21,000	from survey	Average Construction Cost per Room
CapRate	13%	Political Risk Service and UBS	Rate utilized to capitalize Year 11 Net Operating Income - as an estimation of Sales Price in year 10

Table 3.2 (continued): Ten Year Discounted Cash Flow Analysis - Suitably Sited Hotels

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Revenue												
Rooms Revenue		$ 687,509	$ 708,270	$ 729,658	$ 819,500	$ 920,404	$ 1,033,733	$ 1,138,139	$ 1,253,090	$ 1,379,651	$ 1,518,995	$ 1,672,412
Food and Beverage Revenues		171,877	177,068	182,414	204,875	230,101	258,433	284,535	313,273	344,913	379,749	418,103
Other Revenues		34,375	35,414	36,483	40,975	46,020	51,687	56,907	62,655	68,983	75,950	83,621
TOTAL REVENUES		$ 859,387	$ 885,338	$ 912,072	$ 1,024,375	$ 1,150,506	$ 1,292,166	$ 1,422,674	$ 1,566,363	$ 1,724,564	$ 1,898,744	$ 2,090,515
Departmental Expenses												
Rooms Expenses		171,877	189,237	208,350	229,393	252,561	278,069	306,154	337,076	371,120	408,603	449,871
F & B Expenses		70,470	77,587	85,423	94,051	103,550	114,008	125,523	138,201	152,159	167,527	184,447
Other Dept.		-	-	-	-	-	-	-	-	-	-	-
TOTAL DEPARTMENTAL EXPENSES		$ 242,347	$ 266,824	$ 293,773	$ 323,444	$ 356,111	$ 392,078	$ 431,677	$ 475,276	$ 523,279	$ 576,130	$ 634,318
DEPARTMENTAL INCOME		617,040	618,514	618,300	700,932	794,394	900,088	990,996	1,091,086	1,201,285	1,322,614	1,456,197
less: Operating Expenses		283,598	312,241	343,777	378,498	416,726	458,815	505,154	556,175	612,348	674,194	742,287
NET OPERATING INCOME		333,442	306,273	274,523	322,434	377,669	441,274	485,842	534,912	588,937	648,420	713,910
less: Fixed Expenses		146,096	160,851	177,097	194,984	214,677	236,359	260,231	286,514	315,452	347,312	382,390
less: FFE		34,375	35,414	36,483	40,975	46,020	51,687	56,907	62,655	68,983	75,950	83,621
OPERATING CASH FLOW		$ 152,971	$ 110,008	$ 60,943	$ 86,475	$ 116,972	$ 153,228	$ 168,704	$ 185,743	$ 204,503	$ 225,158	$ 247,899
CONSTRUCTION	$ (756,000)											
NET REVERSION											$ 1,868,775	

Net Cash Flow	$ (756,000)	$ 153,000	$ 110,000	$ 60,943	$ 86,475	$ 116,972	$ 153,228	$ 168,704	$ 185,743	$ 204,503	$ 2,093,933
Time	0	1	2	3	4	5	6	7	8	9	10
Discounted Cash Flows	(756,000)	133,043	83,176	40,071	49,442	58,156	66,245	63,422	60,720	58,133	517,588
Present Value	373,995										
Discount Rate	15.00%										

Table 3.2 (continued)

Summary of Assumptions - Suitably Sited Hotels			
Name	Variable	Source	Comment
High Season	7	from survey	Length of high season in months
Low Season	5	from survey	Length of high season in months
# of rooms	27	from survey	Average number of rooms in sample hotels
Days in Year	365		# of days in year
Available rooms	9,855	calculated	# of rooms * 365
Room night			One room sold for one night
Occupied rooms			Total number of room nights sold
Average occupany			Occupied rooms/available rooms (%) during a specified time period
OCC% high season	81%	from survey	Average Hotel Occuppancy during high season
OCC% low season	33%	from survey	Average Hotel Occuppancy during high season
OCC% WA	61%	calculated	Weighted average OCC% (weighted by seasonality)
Average Daily Rate			Average Daily Room Rate per sold room night
ADR high season	$120.00	from survey	Average Daily Rate during high season
ADR low season	$95.00	from survey	Average Daily during high season
ADR WA	$109.58	calculated	Weighted average ADR (weighted by seasonality)
RevPar			Revenue per Available Room (ADR*OCC%)
RevPar high season	$97.20	from survey	RevPar during high season
RevPar low season	$31.35	from survey	RevPar during low season
RevPar WA	$69.76	calculated	Weighted average RevPar (weighted by seasonality)
Rooms Revenue Year 1	$687,509	calculated	RevPar WA * # of rooms * days in the year
Revenue % of Total		from a typical statement of a Costa Rican hotel	
RoomsRev %	80%		Rooms Revenue as a percentage of total revenues
F & BRev%	20%		Food and Beverage Revenue as a percentage of total revenues
OtherRev%	4%		Other Revenues as a percentage of total
RoomsExp%	25%		Rooms Department Expenses as a percentage of Rooms Revenue
F&BExp%	41%		Food & Beverage Department Expenses as a percentage of Food & Beverage Revenues
Other Exp%	0%		Other Department Expenses as a percentage of Other Revenues
OperCost%	33%		Operating Costs as a percentage of Total Revenues
Fixed Costs%	17%		Fixed Costs as a percentage of Total Revenues
Growth Rates	Expected Value	Information from Political Risk Service	
Inflation	10.1%		Expense Growth Rate *Normal distribution: mean-11%; stddev-1.5%*
Growth (1-3)	3.0%		Short Term Revenue Growth Rate *Histogram: 3% growth 0.4 probability; 4% 0.4 p.;5% 0.2 p.*
Growth (4-6)	12.3%		Medium Term Growth Rate *Histogram: 11% growth 0.1 probability; 12% 0.5 p.;13% 0.1 p.; 14% 0.1 p.;15% 0.1 p.; 16% 0.05 p.;17% 0.05 p.*
Growth(7-10)	10.1%		Long Term Growth is equal to Inflation Rate
Constr/Room	$28,000	from survey	Average Construction Cost per Room
CapRate	13%	Political Risk Service and UBS	Rate utilized to capitalize Year 11 Net Operating Income - as an estimation of Sales Price in year 10

seasonality, number of rooms, and average daily rate shown in Table 3.2. The revenue calculation is based on the assumption that a hotel can perform at least as well as other competitive hotels in the market in terms of average annual occupancy and average daily room rate.

The base year expenses used in the analysis are developed as a function of revenue. The base year operating performa is modeled according to the operating statement of a typical hotel in the region following a condensed version of the uniform system of accounts format. Some adjustments are made to the typical statement in order to reflect the particular operating requirements of "Small Town Resort Hotels." Using the base year as Year One in the ten-year projection, the growth rates are based on data from a typical hotel in the region using data from Political Risk Services and the Union Bank of Switzerland. The analysis is performed using spreadsheet software, supplemented with the statistical @Risk simulation software program (Palisades Corporation 1994), which allows the assumption of a range of values that follow a variety of statistical distributions, instead of using fixed variables. For Years One through Three, growth is predicted using a histogram distribution between 3% and 5%. The probability of 3% or 4% growth is 0.4, and the probability of 5% growth is 0.2. Growth during Years One through Three is assumed a to be slower growth time period due to operational startup time period. During Years Four through Six, growth is also modeled using a histogram distribution with growth of 11%-17%, 11%,13%-15%, having a 0.1 probability each; a growth of 12% having a 0.5 probability; and 16%-17% having 0.05 probability. An assumption was also made that growth during this period can potentially exceed inflationary levels. Growth for Years Seven through Ten is considered to be equal to inflation. Inflation is expected to follow a normal distribution with a mean of 11% and a standard deviation of 1.5%. The expected value

of a typical hotel parcel is $102,000. Table 3.2 is a projection of cash inflows and outflows over the next ten years for a typical hotel in this land utilization type.

The initial cash outflows include development and land costs. The total cash outflows for the typical 29 room hotel in the study area is $609,000. The future outflows are discounted to their present value using a discount rate of 15%. This rate is established using bond rates in US currency that mature in 2009 which are 12.4%, which adjusts for political and maturity risks, and an additional 260 basis points is added for management and environmental risk, for a total discount rate of 15%.

The difference between the Present Value of the Outflows and the Present Value of the Inflows is the Net Present Value. This difference is the theoretical amount that an investor should be willing to pay for the hotel site and still expect to fully achieve the return objectives and be compensated for the incurred risks.

Social Analysis

The social component of this research occurs through defining the user group of the evaluation. The user group for this evaluation are owner-operators and government policy makers. Social analysis for this framework is limited because of the small number of residents in the study area. The population is currently being defined by the concurrent residential growth in the study area as a result of tourism development. Future analyses will need to consider host population concerns. Existing populations are fishermen, agricultural workers, land speculators, second home owners, hotel staff, and hotel owners. The existing population is small in number and in low population density.

Spatial Analysis

GIS software was utilized to compare the land-based resources with the spatial relationships defined in Module # 1.

Land Suitability Classification

The diagnostic land characteristics defined in Module #1 are now compared to the land-based resources. The land is organized into land qualities, which correlate with the diagnostic land use requirements discussed earlier. Land qualities are compared to diagnostic land use requirements to determine the land suitability classification. Land qualities represent the supply side and diagnostic land use requirements represent the demand side (Rossiter 1994). Land qualities determine the return on the investment of a particular land utilization type and can be displayed on maps illustrating model output.

Small Town Resort Hotel: Land characteristics and land suitability classification

The spatial data within this analysis is classified utilizing the decision trees outlined above. The decision trees function with the most limiting land characteristic determining the suitability of a map unit. The data were evaluated as suitable or not suitable using binary analysis. The land area was either "suitable" or "not suitable" for a given diagnostic land characteristic.

The categories of data classified are:

a. Twenty (20) soil classes based on the Costa Rican soil capacity map were classified suitable or not suitable based on expert analysis.
b. Twelve (12) land use types (wetlands, urban, brush, secondary forest, seasonal crops, permanent crops, pasture, natural forest, mixed crops, mangroves, disturbed natural forests, and burned area) were classified suitable or not suitable based on survey results.
c. Seven (7) national conservation areas were classified as not suitable based on Costa Rican law.
d. Areas less than 1000 meters from roads were classified as suitable based on expert analysis.

e. Areas more than 50 meters but less than 1000 meters from the coast were classified as suitable based on survey results.

These categories are illustrated in Figure 3.2. Small Town Resort Hotel Diagnostic Land Characteristic Decision Tree.

The spatial data analysis is illustrated in Figure 3.3. The political boundaries map at a scale of 1:500,000 was re-selected for coastal regions in the study area and given the coverage name of Coast. The Coast coverage is buffered from 50 to 1000 meters, which became the extent of the study area, Coast Buffer. The soil map at a scale of 1:200,000 was reclassified into suitable and unsuitable soil based on suitability for on-site waste disposal and slopes of 15% or less, which are related to Costa Rican soil classes I, II, and III, as discussed previously. See Appendix C: Table C.4. Soil Key for the specific classification of the soils. Suitable Soils and Coast Buffer were overlaid and the areas common to both coverages resulted in Coast/Soil Composite.

The road map at a scale of 1:200,000 was buffered to 1000 meters, which becomes Road Buffer. Road Buffer is overlaid with Soil/Coast Composite areas common to both coverages resulted in Coast/Soil/Road Composite. This composite defines the coastal areas with suitable soils for development which are accessible via preexisting roads.

The 1992 Land Use Map was re-selected and called Natural Land Uses. Natural, Disturbed Natural and Secondary Forest, Lakes, Mangroves, and Wetlands were defined as Natural Land Uses. Conservation Areas which include National Parks and Protected Areas including indigenous reserves were overlaid with Natural Land Uses and both the area of Natural Land Uses and the area of Conservation Areas, are defined as Environmental Attraction. Environmental Attraction was buffered to 2000 meters and called Environmental Attraction Buffer. The Environmental Attraction

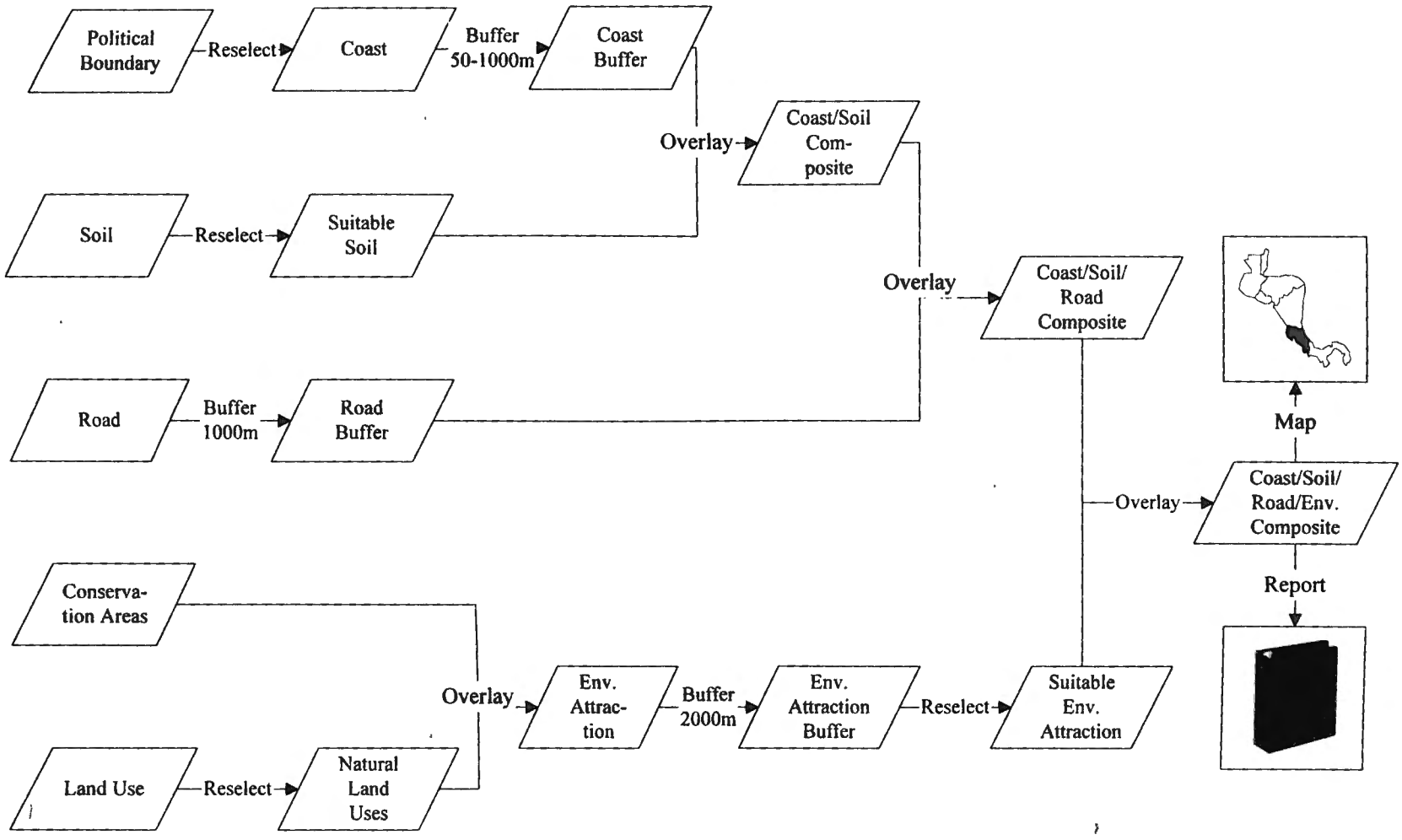

Figure 3.3. Spatial Analysis Process

Buffer was re-selected for suitable environmental attractions, which included all of the Environmental Attraction Buffer except Conservation Areas, Wetlands, Mangroves, and Lakes, the resulting coverage was called Suitable Environmental Attraction.

Suitable Environmental Attraction was overlaid with Coast/Soil/Road Composite. The areas common to both coverages resulted in the coverage Coast/Soil/Road/Environmental Composite. The defined area is an area suitable for coastal tourism due to the proximity to the coast fulfilling the requirements of suitable soils and accessibility. Additionally, the area is proximate to environmental attractions without being located within an environmentally sensitive area.

The output of the physical evaluation for the entire site was as follows:

- The total study area is 39,600 hectares;
- The area of suitable soils is 14,100 hectares;
- 7,300 hectares of suitable soils are accessible by existing roads;
- 4,400 hectares of suitable soils that are accessible by existing roads and are close to natural areas.

Figure 3.4 illustrates the results of the spatial analysis for a subset of the study area. Results of the entire study area are presented in Appendix C Figure C.5. The area displayed in vertical lines is the area of only suitable soils. The area of vertical lines with diagonal cross hatching is the area of suitable soils in proximity to roads. The area of diagonal cross hatching is the area of suitable soils in proximity to roads, and in proximity to environmental attractions. The black circles are existing hotels.

Careful evaluation and planning of economic, environmental, and social resources are necessary to meet the objectives of sustainable development. The linkage between these resources and the success of tourism projects cannot be overstated.

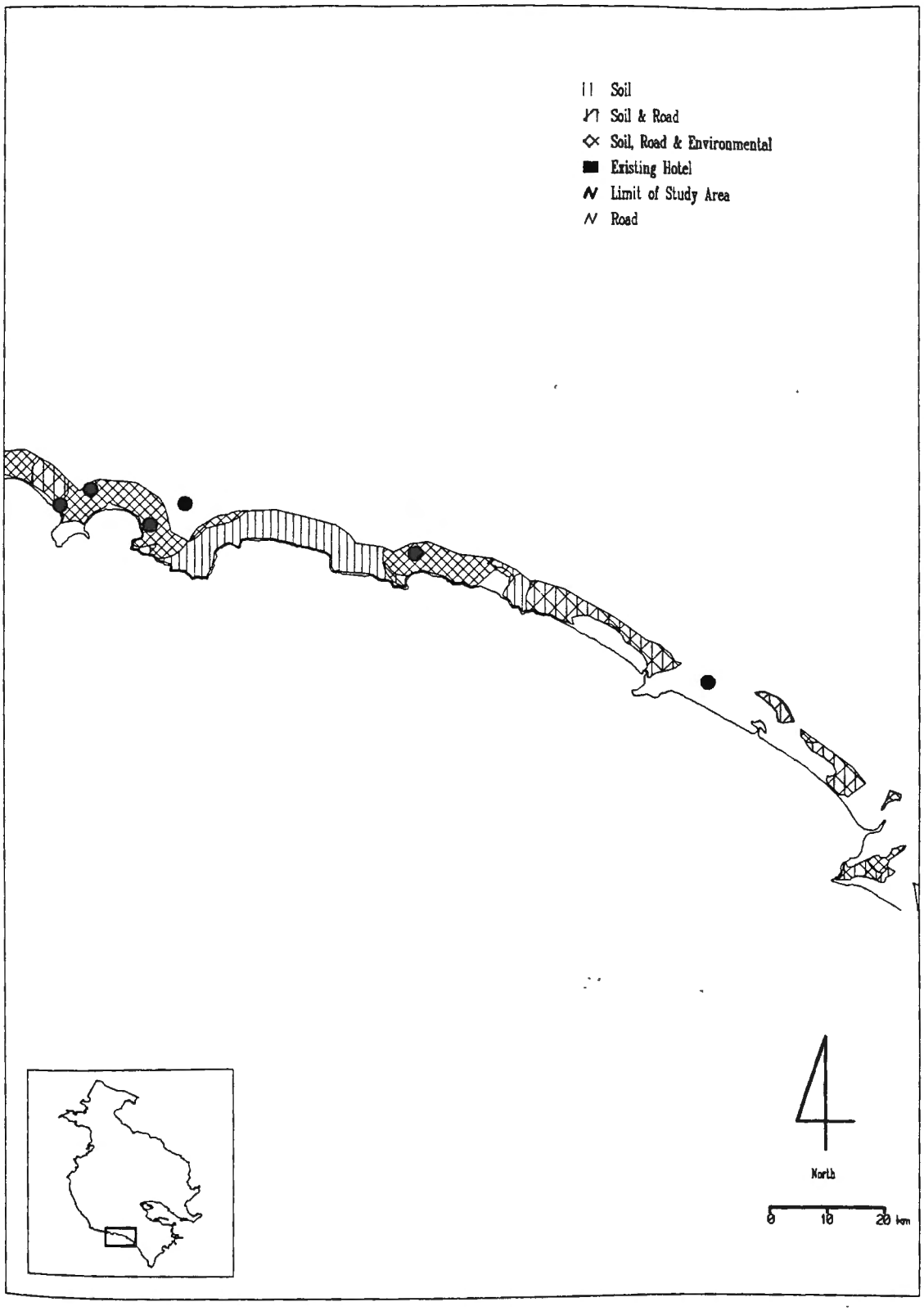

Figure 3.4: Spatial Analysis

Module # 3 -- Planning Decisions & Strategy

The final step of the site selection framework is the analysis of the outcome of the decision trees upon which planning decisions are made. The output of the Strategic Framework identifies suitable development zones. Through policy and investment facilitation, the zones could be encouraged at a national, regional and local level for small hotel development. Based on experience, individuals currently siting these types of properties could benefit from the insight gained through this integrated spatial analysis. Members of the development community have already expressed interest in acquiring the results of this study.

MODEL EVALUATION

Of the nineteen hotels surveyed, five were located in areas identified as suitable by the Strategic Framework, see Appendix C Figure C.5. As illustrated in Table 3.2, those five hotels constructed in areas identified as suitable have higher average daily room rates and average occupancy. This translates into a higher present value of the proposed hotel project. The average present value of five hotel constructed in a suitable area is $374,000, as opposed to the average present value of all hotels surveyed which is $102,000. The present value of all hotels surveyed includes the five hotels suitably sited and 14 hotels sited in areas identified as unsuitable by the Strategic Framework. While the differential in value could be attributed to different management styles and investment levels, the hotels identified in the suitable zones can be considered a cross-section of investment and management styles. In addition, hotels sited in areas identified by the model as suitable will be less prone to flooding, closer to roads, within walking distance to the coast, and will have environmental amenities nearby. These conditions will result in greater visitor satisfaction. Given the uncertainty in developing a coastal hotel, utilizing the output of this analysis help increase the success of individual projects.

The accuracy and success of this tourism evaluation model is underscored by the discovery of recent environmental damage which led to legal action against some hotels identified by the Strategic Framework as located in unsuitable areas (Castilho 1995). This court action brings to light the non-sustainability of hotel projects developed in areas where current land use exceeds maximum capacity.

The framework's chief limitations are the availability and quality of data. In developing nations these limitations can often be difficult to overcome. Information is power, and the stewards of public information can be reluctant to relinquish their control by providing access to their information.

CONCLUSION

Government use of this framework is recommended. There are many advantages to its adoption and use at the national level. First, the framework allows for analysis of resource information at any scale and type. Second, specific analysis concerning the interactions of resources which support tourism development will allow governments to develop implement and monitor tourism policy to support greater sustainability in development. Third, the framework allows government to integrate the values of stake-holders into the policy and management of tourism. Fourth, the framework can be applied at any point in the development cycle, therefore lending insight to existing and proposed tourism development.

This analysis shows that expansion of existing road system for tourism in coastal Costa Rica is unnecessary because there are 4,400 hectares of suitable lands currently accessible by existing roads. This analysis can help government officials to recognize that improving existing roads is a better policy than expanding the road network. All weather access to hotel and properties is an important factor in hotel operation and guest satisfaction.

Education is a key component of the Framework's successful application. Understanding the impact of environmental degradation to long-term tourism profitability and the relationship to land capacity is essential. There must be effective education of tourism developers so that they learn to internalize their own externalities and integrate concepts of sustainability into the hotel siting process.

The Strategic Framework is a tool to help understand the complex relationship between tourism and land-based resources. Instead of many site decisions whose basis seems more impulsive than rational, this integration of different analysis tools will enable stake-holders to make more informed decisions. The Framework offers the ability to understand spatial relationships in areas considered for tourism development.

IMPLICATIONS FOR FUTURE RESEARCH

Environmental degradation has not occurred to an extent that there is a concern over a depleting environmental resource base that supports tourism in northwestern Costa Rica. Concern for environmental resources is inversely related to their perceived availability, and highly correlated to their volatility. Protecting environmental resources demands a national outlook linked to property-specific siting decisions. Developers need to be proactive and government needs to create effective regulation for coastal zone development for these destination resorts to continue exhibiting their desirable environmental characteristics without degrading the environment or the socio-economic fabric of the local communities.

Further research needs to be conducted to show how the Strategic Framework can strengthen local economies and create more sustainable growth while protecting the environment and promoting greater visitor satisfaction. Research needs to occur to determine how current policies for hotel development affect hotel siting and development decisions. The link needs to be understood between progressive environmental ideals at a national level in Costa Rica and the local project

development and decision making process. None of the respondents of the hotel survey, except for the largest properties, stated that current government policies or incentives affected their siting decision.

Research on the optimization of different land uses such as agriculture, forestry, and tourism should and can be explored through the strategic framework. Optimization would allow for a holistic approach to land use planning. Linking existing FAO projects in Costa Rica for agriculture and forestry to tourism land evaluation would allow for further understanding of the costs and benefits of land uses competing for limited land-based resources. Comparison of land uses across industries would allow for optimization within a landscape or planning area.

Finally, research needs to be conducted on the awareness of environmental hazards and degradation which pose a threat to the tourism industry. Research could influence future hotel development while promoting its sustainability.

Meeting the objective of sustainable tourism requires not only informational and analytical tools, but also requires the human will to limit non-sustainable resource development and utilization. Institutional capacity to encourage stake-holders to choose land uses which match land capacity is the challenge of sustainable tourism development as we face the future.

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CHAPTER FOUR

SUMMARY

CONCLUSIONS

Major findings of this research are:

- National Tourism Organizations collect and use environmental information. The primary uses are for tourism planning and policy development.
- The FAO method has considerable application in the evaluation of tourism planning through site suitability analysis.
- When automated spatial and analytic tools are used within the parameters of the FAO framework, the resulting system allows land evaluators to conduct spatial analysis of a broader area. Automation can provide valuable insight to spatial relationships that would otherwise elude the evaluator.

RECOMMENDATIONS

Additional research needs to be conducted to evaluate the effectiveness of NTO's use of environmental information and their effectiveness in planning and implementing tourism development. An evaluation of planning tools must occur and current strategies for national tourism planning must be determined. Innovative interdisciplinary solutions must be sought to increase the effectiveness of national tourism plans. They will empower national tourism planners to make land use decisions informed by the many components that affect the success of sustainable tourism development. Interdisciplinary analysis offers the greatest potential for minimizing the negative impacts of tourism development.

The FAO method of land evaluation demands greater knowledge of specific tourism land utilization types. Research needs to be conducted to understand the specific needs of hotel construction as well as other economic, environmental and

social aspects of the tourism industry. For more accurate land evaluation economic, environmental and social resource needs of distinct land utilization types must be more fully understood. Increasing visitor satisfaction while engaging in sustainable tourism development demands further surveys as to the desires and needs of visitors. Understanding their desires and needs will allow for more precise definitions of parameters and decisions when establishing diagnostic land characteristics.

In the course of this research project the author gained insight into and understanding of the precarious relationship between the environment and the competing industries who vie for land-based resources. Through education and resulting analysis, stake-holders can be shown and understand the tradeoffs between different resource allocations. Further developing this framework to allow for simultaneous evaluation of the site for other resource-dependent industries such as agriculture and forestry will allow for optimization between industries of a region's limited resource base.

Access to information is a critical component of understanding questions regarding resource allocation. Government officials including bureaucrats within government agencies should share data thereby decreasing the cost of data collection for any one land evaluation project. Sharing of existing data sets reduces the power of any one individual, however, sharing data empowers the people of a region to make more informed resource management and allocation decisions. To achieve sustainability, cooperation is needed both within and between the private and public sector.

Government's capability to plan and realize their tourism plans directly affects the potential for sustainable development. In regions where governmental institutional capacity to develop and realize such plans is lacking, the private sector must be proactive in promoting sustainable development. Sustainable development demands

the cooperation and vision of all stake-holders, which include government, industry, visitors and residents, to meet the challenges which face sustainable development and to reap its benefits.

APPENDIX A
GLOBAL SURVEY

Appendix A shows the response summaries of the global survey.

Table A.1: Key to response categories

Table	Category	Category Name
A.2	A	International tourism arrivals
	B	International tourism revenue
	C	Social change as a result of tourism development
	D	Environmental resources
	E	Environmental change as a result of tourism development
	F	Environmental total [calculated]
	G	Hotel occupancy
	H	Cultural change as a result of tourism development
	I	Economic multipliers as a result of tourism revenues
	J	Other
A.3	A	Climate, primary collection - field or lab research
	B	Climate, secondary collection - existing research
	C	Climate, total [calculated]
	D	Ecological zones, primary collection - field or lab research
	E	Ecological zones, secondary collection - existing research
	F	Ecological zones, total [calculated]
	G	Geology, primary collection - field or lab research
	H	Geology, secondary collection - existing research
	I	Geology, total [calculated]
	J	Geomorphology, primary collection - field or lab research
	K	Geomorphology, secondary collection - existing research
	L	Geomorphology, total [calculated]
	M	Land use, primary collection - field or lab research
	N	Land use, secondary collection - existing research
	O	Land use, total [calculated]
	P	Land cover, primary collection - field or lab research
	Q	Land cover, secondary collection - existing research
	R	Land cover, total [calculated]
	S	Soils, primary collection - field or lab research
	T	Soils, secondary collection - existing research
	U	Soils, total [calculated]
	V	Topography, primary collection - field or lab research
	W	Topography, secondary collection - existing research
	X	Topography, total [calculated]

Table A.1: (continued)

Table	Category	Category Name
A.3 (continued)	Y	Vegetation, primary collection - field or lab research
	Z	Vegetation, secondary collection - existing research
	AA	Vegetation, total [calculated]
	AB	Water quality, primary collection - field or lab research
	AC	Water quality, secondary collection - existing research
	AD	Water quality, total [calculated]
	AE	Water quantity, primary collection - field or lab research
	AF	Water quantity, secondary collection - existing research
	AG	Water quantity, total [calculated]
	AH	Other
	AI	Collected environmental information [calculated]
A.4	A	Air photos
	B	Field census
	C	Field sampling
	D	Interviews
	E	Mapping
	F	Reconnaissance survey
	G	Satellite images
	H	Other
	I	Collected primary information [calculated]
A.5	A	Did not use
	B	Tourism project locations
	C	Tourism planning
	D	Monitoring tourism impact
	E	Evaluating tourism impact
	F	Establishing tourism policy
	G	Funding tourism projects
	H	Tourism management
	I	Tourism regulating
	J	Community involvement
	K	Other
	L	Used environmental information [calculated]
A.6	A	Does not apply
	B	No institutional capacity exists to collect the information

Table A.1: (continued)

Table	Category	Category Name
A.6 (continued)	C	No institutional capacity exists to interpret the information
	D	Too expensive
	E	No institutional capacity exists to manage the information
	F	Other

Table A.2: Global Survey -- Has your org. or min. ever collected information about any of the following aspects of tourism?

Country	A	B	C	D	E	F	G	H	I	J
Albania	1	1	0	1	0	1	1	0	0	0
American Samoa	1	0	0	0	0	0	1	1	1	1
Andorra	1	1	1	1	1	1	1	1	1	0
Argentina	1	1	1	0	0	0	1	0	0	0
Austraila	1	1	0	0	0	0	1	0	1	0
Austria	1	1	1	1	1	1	1	1	1	1
Bangladesh	1	1	0	0	0	0	1	0	0	0
Barbados	1	1	1	1	1	1	1	1	0	0
Belize, C.A.	1	1	0	0	0	0	1	1	0	1
Bermuda	1	1	1	0	0	0	1	0	1	0
Brasil	1	1	0	1	0	1	1	0	1	0
Canada	0	0	0	0	0	0	0	0	0	0
Chile	1	1	0	1	1	1	1	0	1	1
Columbia	1	1	0	0	0	0	1	1	0	0
Costa Rica	1	1	0	1	1	1	1	0	1	0
Croatia	1	1	1	1	1	1	1	1	1	0
Cyprus	1	0	1	1	1	1	1	1	0	0
Czech Republic	1	1	0	0	0	0	1	0	0	0
El Salvador	0	0	0	1	1	1	1	0	0	0
Ethiopia	1	1	0	0	0	0	1	1	0	1
Falkland Island	1	1	0	1	1	1	1	0	1	0
Fiji Islands	1	1	1	1	1	1	1	1	1	0
Finland	1	1	1	1	1	1	1	1	1	0
French Polynesia	1	1	0	1	0	1	1	0	1	0
Germany	1	1	0	0	0	0	0	0	0	0
Grenada, W.I.	1	1	0	0	0	0	1	0	1	0
Guam	1	1	1	0	0	0	1	1	1	1
Hugary	1	1	0	0	0	0	1	1	1	0
Iceland	1	1	0	1	0	1	1	0	0	0
Indonesia	0	0	0	0	0	0	1	0	1	1
Israel	1	1	1	1	1	1	0	0	1	0
Italy	1	1	0	0	0	0	1	0	0	0
Laos	1	1	0	0	0	0	1	0	0	0
Liechtenstein	1	0	0	0	0	0	1	0	0	0
Lithunia	1	0	0	1	0	1	1	1	0	0
Luxembourg	0	0	0	0	0	0	0	0	0	0
Macau	1	1	0	1	0	1	1	0	0	0
Malawi	1	1	1	1	1	1	1	1	0	0
Malta	1	1	1	1	0	1	1	0	0	0
Mauritius	1	1	1	0	1	1	1	0	1	0
Mexico	1	1	1	1	1	1	1	1	1	1
Mocambique	0	0	1	1	1	1	0	1	0	0

Table A.2: (continued)

Country	A	B	C	D	E	F	G	H	I	J
Myanmar	1	1	1	1	1	1	1	1	1	0
Namibia	1	1	0	1	0	1	1	0	1	0
Nepal	1	1	0	0	0	0	1	0	1	0
Netherlands	1	1	0	1	1	1	1	0	1	0
New Zealand	1	1	1	1	1	1	1	0	1	0
Norway	1	1	1	1	1	1	1	1	1	0
Nouvelle-Caledonie South Pacific	1	1	0	1	0	1	1	0	1	0
Pakistan	1	1	1	1	1	1	1	1	1	1
Panama	1	1	0	1	1	1	1	0	1	1
Papua New Guinea	1	0	0	0	0	0	0	0	0	0
Paraguay	1	1	0	1	0	1	1	0	1	0
Peru	1	0	0	1	1	1	1	0	0	0
Philippines	1	1	0	1	1	1	1	0	1	0
Portugal	1	1	0	0	0	0	1	0	0	1
Puerto Rico	1	1	0	1	0	1	1	0	1	0
Romania	1	1	1	1	1	1	1	0	1	0
Saint Vincent and the Grenadines	1	1	0	0	0	0	1	0	0	0
San Marino	1	0	0	0	0	0	1	0	0	0
Senegal, West Africa	1	1	0	1	0	1	1	0	1	1
Seychelles	1	1	0	1	0	1	1	0	1	0
Sierra Leone	1	1	0	0	0	0	1	0	1	0
Singapore	1	1	1	0	0	0	1	1	1	0
Solomon Islands	1	1	1	1	1	1	1	1	1	0
South Africa	1	1	1	1	1	1	1	0	0	1
Spain	1	1	0	0	0	0	1	0	1	0
St. Kitts and Nevis, West Indies	1	1	0	0	0	0	1	0	1	0
St. Lucia	1	1	1	1	1	1	1	0	1	0
Sweden	1	0	1	0	1	1	1	0	1	0
Taiwan	1	1	0	0	0	0	1	0	0	0
Thailand	1	1	0	0	0	0	1	0	1	0
The Gambia	1	1	1	1	1	1	1	1	1	0
The Virgin Islands of the United States	1	1	1	0	0	0	1	0	1	0
Trinidad & Tobago West Indies	1	1	0	0	0	0	1	0	1	0
Tunisia	1	1	1	1	1	1	1	1	1	0
Tuvalu	1	1	0	0	0	0	1	0	0	0
United Kingdom	1	1	1	0	1	1	1	0	1	0
United States of America	1	1	0	0	0	0	0	0	1	1
W. Samoa	1	1	1	1	1	1	1	1	1	0
Yugoslavia	1	1	1	1	1	1	1	1	1	0
Zimbabwe	1	1	1	1	1	1	1	1	1	0
Number of Responses	77	69	33	45	35	48	75	27	52	14
Percent of Responses	94%	84%	40%	55%	43%	59%	91%	33%	63%	17%

Table A.3: Global Survey -- If your organization or ministry collected environmental resource information , what did it collect?

Country	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
Albania	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
American Samoa	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1
Andorra	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1
Argentina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austraila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austria	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0
Bangladesh	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Barbados	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	0	0
Belize, C.A.	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	1	1
Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brasil	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Canada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chile	0	1	1	0	1	1	0	0	0	0	1	1	0	1	1	0	1	1	0	0	0
Columbia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Costa Rica	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1
Croatia	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Cyprus	0	1	1	1	0	1	0	1	1	0	1	1	1	0	1	0	1	1	0	1	1
Czech Republic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
El Salvador	1	0	1	1	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
Ethiopia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Falkland Island	1	0	1	0	1	1	0	0	0	0	0	0	1	0	1	0	1	1	0	0	0
Fiji Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Finland	0	1	1	0	1	1	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0
French Polynesia	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Germany	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grenada, W.I.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Guam	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	1	1
Hugary	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Iceland	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	1	0	1
Indonesia	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1
Israel	0	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	0	0	0
Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Laos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Liechtenstein	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lithunia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Luxembourg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macau	0	1	1	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Malawi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malta	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	1	1	0	1	1
Mauritius	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0
Mexico	0	0	0	0	1	0	0	0	0	0	1	1	0	1	1	0	1	1	0	0	0
Mocambique	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	0	1	1	1	1	1

Table A.3: Global Survey -- If your organization or ministry collected environmental resource information , what did it collect?

Country	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
Myanmar	0	1	1	0	1	1	0	1	1	0	0	0	0	1	1	0	1	1	0	1	1
Namibia	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Nepal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Netherlands	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	0	1	1	0	0	0
New Zealand	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Norway	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Nouvelle-Caledonie South Pacific	0	1	1	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
Pakistan	0	1	1	0	1	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
Panama	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1
Papua New Guinea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paraguay	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1
Peru	1	0	1	1	0	1	0	0	0	1	0	1	1	0	1	1	0	1	0	0	0
Philippines	1	0	1	0	0	1	0	0	0	0	0	0	1	0	1	1	0	1	1	0	1
Portugal	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Puerto Rico	0	0	0	1	0	0	0	1	1	0	0	0	0	1	1	0	0	0	0	0	0
Romania	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0
Saint Vincent and the Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Marino	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senegal, West Africa	1	0	1	1	0	1	0	0	0	0	0	0	1	0	1	1	0	1	1	0	1
Seychelles	1	0	1	0	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
Sierra Leone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Singapore	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solomon Islands	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	1	0	1	0	1	1
South Africa	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1
Spain	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
St. Kitts and Nevis, West Indies	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
St. Lucia	0	1	1	0	0	1	0	0	0	0	0	0	0	1	1	0	1	1	0	1	1
Sweden	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taiwan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thailand	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
The Gambia	0	0	0	0	0	0	1	0	1	0	0	0	1	1	1	0	0	0	1	0	1
The Virgin Islands of the United States	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trinidad & Tobago West Indies	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tunisia	0	1	1	0	1	1	1	1	1	1	0	1	0	1	1	0	1	1	1	0	1
Tuvalu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
United States of America	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W. Samoa	1	1	1	0	0	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1
Yugoslavia	0	1	1	0	1	1	0	0	0	0	0	0	0	1	1	0	1	1	0	1	1
Zimbabwe	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	1	1
Number of Responses	11	27	33	11	28	33	6	19	20	6	17	20	20	34	44	11	28	33	11	21	26
Percent of Responses	13%	33%	40%	13%	34%	40%	7%	23%	24%	7%	21%	24%	24%	41%	54%	13%	34%	40%	13%	26%	32%

Table A.3: (continued)

Country	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI
Albania	1	1	1	1	1	1	1	1	1	1	1	1	1	1
American Samoa	0	1	1	0	1	1	0	1	1	0	1	1	0	1
Andorra	0	1	1	0	1	1	0	1	1	0	1	1	0	1
Argentina	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austraila	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austria	0	0	0	0	1	1	0	1	1	0	1	1	0	1
Bangladesh	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Barbados	0	1	1	0	1	1	0	1	1	0	1	1	0	1
Belize, C.A.	0	0	0	1	0	1	0	1	1	0	0	0	0	1
Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Canada	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chile	0	1	1	0	1	1	0	1	1	0	0	0	1	1
Columbia	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Costa Rica	0	1	1	0	1	1	0	1	1	0	1	1	0	1
Croatia	1	1	1	1	1	1	1	1	1	1	1	1	0	1
Cyprus	0	1	1	1	0	1	1	0	1	0	1	1	0	1
Czech Republic	0	0	0	0	0	0	0	0	0	0	0	0	0	0
El Salvador	1	0	1	1	0	1	0	0	0	1	0	1	0	1
Ethiopia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Falkland Island	0	0	0	0	1	1	0	1	1	0	0	0	0	1
Fiji Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Finland	0	0	0	0	1	1	0	1	1	0	0	0	0	1
French Polynesia	1	0	1	0	1	1	1	0	1	1	0	1	0	1
Germany	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grenada, W.I.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Guam	0	0	0	0	0	0	0	1	1	0	1	1	0	1
Hugary	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Iceland	0	0	0	1	0	1	0	0	0	0	0	0	0	1
Indonesia	0	1	1	0	1	1	0	1	1	0	1	1	0	1
Israel	1	1	1	1	1	1	1	1	1	1	1	1	0	1
Italy	0	0	0	0	0	0	0	1	1	0	0	0	1	1
Laos	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Liechtenstein	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lithunia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Luxembourg	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macau	0	0	0	0	0	0	0	1	1	0	1	1	0	1
Malawi	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malta	0	1	1	0	1	1	0	1	1	0	1	1	0	1
Mauritius	0	1	1	0	0	0	0	1	1	0	0	0	0	1
Mexico	0	0	0	0	0	0	0	1	1	0	1	1	1	1
Mocambique	0	1	1	1	1	1	1	1	1	1	1	1	0	1

Table A.3: (continued)

Country	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI
Myanmar	0	0	0	0	1	1	0	1	1	0	1	1	0	1
Namibia	1	1	1	1	1	1	0	1	1	0	1	1	0	1
Nepal	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Netherlands	0	0	0	0	0	0	0	1	1	0	1	1	0	1
New Zealand	0	0	0	0	0	0	0	1	1	0	0	0	0	1
Norway	0	1	1	0	1	1	0	0	0	0	0	0	0	1
Nouvelle-Caledonie South Pacific	0	0	0	0	1	1	0	1	1	0	1	1	0	1
Pakistan	0	1	1	0	1	1	0	1	1	0	1	1	0	1
Panama	0	1	1	0	1	1	0	1	1	0	1	1	0	1
Papua New Guinea	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paraguay	0	1	1	0	1	1	0	1	1	0	1	1	0	1
Peru	0	0	0	1	0	1	1	0	1	0	0	0	0	1
Philippines	1	1	1	1	1	1	1	0	1	0	0	0	0	1
Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Puerto Rico	0	1	1	0	0	0	0	0	0	0	0	0	0	1
Romania	0	1	1	0	0	0	0	0	0	0	0	0	0	1
Saint Vincent and the Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Marino	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senegal, West Africa	1	0	1	1	0	1	1	0	1	1	0	1	0	1
Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Sierra Leone	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Singapore	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solomon Islands	0	1	1	0	1	1	0	1	1	0	1	1	0	1
South Africa	0	1	1	0	1	1	0	1	1	0	1	1	0	1
Spain	0	0	0	0	0	0	0	0	0	0	0	0	0	0
St. Kitts and Nevis, West Indies	0	0	0	0	0	0	0	0	0	0	0	0	0	0
St. Lucia	0	1	1	0	1	1	0	1	1	0	1	1	0	1
Sweden	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taiwan	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thailand	0	0	0	0	0	0	0	0	0	0	0	0	0	0
The Gambia	1	0	1	1	1	1	1	1	1	1	1	1	0	1
The Virgin Islands of the United States	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trinidad & Tobago West Indies	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tunisia	1	0	1	0	1	1	0	1	1	0	1	1	0	1
Tuvalu	0	0	0	0	0	0	0	0	0	0	0	0	0	0
United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0
United States of America	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W. Samoa	1	1	1	1	1	1	1	1	1	1	1	1	0	1
Yugoslavia	0	1	1	0	1	1	0	1	1	0	1	1	1	1
Zimbabwe	0	0	0	1	1	1	1	1	1	1	1	1	0	1
Number of Responses	11	26	31	15	31	37	12	36	41	10	30	33	6	49
Percent of Responses	13%	32%	38%	18%	38%	45%	15%	44%	50%	12%	37%	40%	7%	60%

Table A.4: Global Survey -- If your org. or min. collected environmental info. through primary sources how did you collect it?

Country	A	B	C	D	E	F	G	H	I
Albania	0	1	1	0	1	0	0	0	1
American Samoa	0	0	0	0	0	0	0	0	0
Andorra	1	1	1	1	1	1	0	0	1
Argentina	0	0	0	0	0	0	0	0	0
Austraila	0	0	0	0	0	0	0	0	0
Austria	0	0	0	1	0	0	0	0	1
Bangladesh	0	0	0	0	0	0	0	0	0
Barbados	0	0	0	0	0	0	0	0	0
Belize, C.A.	1	0	1	1	0	0	0	0	1
Bermuda	0	0	0	0	0	0	0	0	0
Brasil	0	0	0	0	0	0	0	0	0
Canada	0	0	0	0	0	0	0	0	0
Chile	0	0	0	1	1	1	0	0	1
Columbia	1	1	1	1	0	1	0	0	1
Costa Rica	0	0	0	0	0	0	0	0	0
Croatia	1	1	1	1	1	1	0	0	1
Cyprus	0	1	1	1	1	1	0	0	1
Czech Republic	0	0	0	0	0	0	0	0	0
El Salvador	1	1	0	1	1	1	1	0	1
Ethiopia	0	0	0	0	0	0	0	0	0
Falkland Island	0	1	0	0	0	0	0	0	1
Fiji Islands	0	0	0	0	0	0	0	0	0
Finland	0	0	0	0	0	0	0	0	0
French Polynesia	1	0	0	0	1	0	1	0	1
Germany	0	0	0	0	0	0	0	0	0
Grenada, W.I.	0	0	0	0	0	0	0	0	0
Guam	0	0	0	0	0	0	0	0	0
Hugary	0	0	0	0	0	0	0	0	0
Iceland	1	1	1	1	1	1	0	0	1
Indonesia	0	0	0	0	0	0	0	0	0
Israel	0	1	0	1	1	1	0	0	1
Italy	0	0	0	0	0	1	0	0	1
Laos	0	0	0	0	0	0	0	0	0
Liechtenstein	0	0	0	0	0	0	0	0	0
Lithunia	0	0	0	0	0	0	0	0	0
Luxembourg	0	0	0	0	0	0	0	0	0
Macau	0	0	0	0	0	0	0	0	0
Malawi	0	1	1	1	1	0	0	0	1
Malta	0	0	0	0	0	0	0	0	0
Mauritius	0	0	0	1	0	0	0	0	1
Mexico	0	0	0	0	0	0	0	0	0
Mocambique	1	1	0	1	1	1	0	0	1

Table A.4: (continued)

Country	A	B	C	D	E	F	G	H	I
Myanmar	0	0	0	0	0	0	0	0	0
Namibia	1	1	1	1	1	1	1	0	1
Nepal	0	0	0	0	0	0	0	0	0
Netherlands	0	0	0	1	0	0	0	0	1
New Zealand	0	0	1	1	0	1	0	0	1
Norway	0	0	0	0	0	0	0	0	0
Nouvelle-Caledonie South Pacific	0	0	1	1	0	0	0	0	1
Pakistan	0	0	1	1	0	0	0	0	1
Panama	0	1	1	0	1	0	0	0	1
Papua New Guinea	0	0	0	0	0	0	0	0	0
Paraguay	0	0	0	0	0	0	0	0	0
Peru	0	0	0	0	0	0	0	0	0
Philippines	1	0	0	0	1	1	0	0	1
Portugal	0	0	0	0	0	0	0	0	0
Puerto Rico	1	1	0	0	1	0	0	0	1
Romania	0	0	0	0	0	0	0	0	0
Saint Vincent and the Grenadines	0	0	0	0	0	0	0	0	0
San Marino	0	0	0	0	0	0	0	0	0
Senegal, West Africa	0	0	1	1	1	1	0	0	1
Seychelles	0	0	0	0	0	0	1	0	1
Sierra Leone	0	0	0	0	0	0	0	0	0
Singapore	0	0	0	0	0	0	0	0	0
Solomon Islands	0	0	0	0	1	1	0	0	1
South Africa	0	0	0	0	0	0	0	0	0
Spain	0	0	0	0	0	0	0	0	0
St. Kitts and Nevis, West Indies	0	0	0	0	0	0	0	0	0
St. Lucia	0	0	0	0	0	0	0	0	0
Sweden	0	0	0	0	0	0	0	0	0
Taiwan	0	0	0	0	0	0	0	0	0
Thailand	0	0	0	0	0	0	0	0	0
The Gambia	1	1	1	1	1	0	0	0	1
The Virgin Islands of the United States	0	0	0	0	0	0	0	0	0
Trinidad & Tobago West Indies	0	0	0	0	0	0	0	0	0
Tunisia	1	1	1	1	1	0	1	0	1
Tuvalu	0	0	0	0	0	0	0	0	0
United Kingdom	0	0	0	1	0	1	0	0	1
United States of America	0	0	0	0	0	0	0	0	0
W. Samoa	1	1	1	1	1	0	0	0	1
Yugoslavia	0	0	0	0	0	0	0	0	0
Zimbabwe	1	1	1	1	1	0	1	0	1
Number of Responses	15	18	18	24	21	16	6	0	33
Percent of Responses	45%	55%	55%	73%	64%	48%	18%	0%	40%

Table A.5: Global Survey -- If your org. or min. collected env. info., did you use it & if so how did your org. or min. use the info.?

Country	A	B	C	D	E	F	G	H	I	J	K	L
Albania	0	1	1	0	0	0	1	0	0	0	0	0
American Samoa	0	1	1	0	1	0	0	1	0	1	0	1
Andorra	0	1	1	1	1	1	1	1	1	1	0	1
Argentina	0	0	0	0	0	0	0	0	0	0	0	0
Austraila	0	0	0	0	0	0	0	0	0	0	0	0
Austria	0	0	1	1	1	0	0	1	0	0	0	1
Bangladesh	0	0	1	0	0	0	0	0	0	0	0	1
Barbados	0	1	0	0	0	0	0	0	0	0	0	1
Belize, C.A.	0	0	1	1	1	1	1	1	0	0	0	1
Bermuda	0	0	0	0	0	0	0	0	0	0	0	0
Brasil	1	0	0	0	0	0	0	0	0	0	0	0
Canada	0	0	0	0	0	0	0	0	0	0	0	0
Chile	0	0	1	1	0	1	0	1	1	0	0	1
Columbia	0	1	1	1	1	0	1	1	1	1	0	1
Costa Rica	0	1	1	1	1	1	0	0	1	0	0	1
Croatia	0	1	1	1	1	1	1	1	1	1	0	1
Cyprus	0	1	1	1	1	1	1	0	1	1	0	1
Czech Republic	0	0	0	0	0	0	0	0	0	0	0	0
El Salvador	0	1	1	1	1	1	1	1	1	1	0	1
Ethiopia	0	0	0	0	0	0	0	0	0	0	0	0
Falkland Island	0	1	1	1	1	1	0	1	1	0	0	1
Fiji Islands	0	0	1	1	1	1	0	0	0	1	0	1
Finland	0	1	1	1	1	1	1	1	0	0	0	1
French Polynesia	0	1	1	1	1	1	1	1	1	1	0	1
Germany	0	0	0	0	0	0	0	0	0	0	0	0
Grenada, W.I.	0	0	0	0	0	0	0	0	0	0	0	0
Guam	0	1	1	1	0	1	1	1	0	1	0	1
Hugary	0	0	0	0	0	0	0	0	0	0	0	0
Iceland	0	0	0	1	1	0	1	0	0	0	0	1
Indonesia	0	1	1	1	1	1	1	1	1	1	1	1
Israel	0	1	1	1	1	1	1	0	1	1	0	1
Italy	0	0	0	0	0	0	0	0	0	0	1	1
Laos	0	0	0	0	0	0	0	0	0	0	0	0
Liechtenstein	0	0	0	0	0	0	0	0	0	0	0	0
Lithunia	0	1	1	1	1	1	1	1	1	1	0	1
Luxembourg	0	0	0	0	0	0	0	0	0	0	0	0
Macau	0	0	0	1	1	1	0	0	0	0	0	1
Malawi	0	1	1	0	0	1	1	0	0	1	0	1
Malta	0	1	1	0	0	1	0	1	0	1	0	1
Mauritius	0	1	1	1	0	1	0	0	0	1	0	1
Mexico	0	1	1	1	1	1	1	1	1	1	0	1
Mocambique	0	1	0	1	1	1	0	0	1	1	0	1

Table A.5: (continued)

Country	A	B	C	D	E	F	G	H	I	J	K	L
Myanmar	0	1	1	1	1	1	0	0	1	0	0	1
Namibia	0	1	1	1	1	1	0	1	1	1	0	1
Nepal	0	0	0	0	0	0	0	0	0	0	0	0
Netherlands	0	0	0	1	0	1	0	1	1	1	0	1
New Zealand	0	0	0	1	1	1	0	0	1	0	0	1
Norway	1	0	0	0	0	0	0	0	0	0	0	0
Nouvelle-Caledonie South Pacific	0	0	1	1	1	0	0	1	0	0	0	1
Pakistan	0	1	1	1	1	1	1	1	1	1	1	1
Panama	0	1	1	1	1	1	1	1	1	1	0	1
Papua New Guinea	0	0	0	0	0	0	0	0	0	0	0	0
Paraguay	0	1	1	0	1	1	1	1	1	1	0	1
Peru	0	1	1	0	1	1	1	0	1	1	0	1
Philippines	0	0	1	1	1	1	0	0	1	1	0	1
Portugal	0	1	1	0	1	1	0	1	1	0	0	1
Puerto Rico	0	1	1	0	0	1	0	0	0	1	0	1
Romania	0	0	1	1	1	1	1	1	0	0	0	1
Saint Vincent and the Grenadines	0	0	0	0	0	0	0	0	0	0	0	0
San Marino	0	0	0	0	0	0	0	0	0	0	0	0
Senegal, West Africa	0	1	1	1	1	1	1	1	1	0	0	1
Seychelles	0	1	0	0	0	1	0	0	0	0	0	1
Sierra Leone	0	0	0	0	0	0	0	0	0	0	0	0
Singapore	0	0	0	0	0	0	0	0	0	0	0	0
Solomon Islands	0	1	1	1	1	1	1	1	1	1	0	1
South Africa	0	1	1	1	1	1	0	1	1	1	0	1
Spain	0	0	0	0	0	0	0	0	0	0	0	0
St. Kitts and Nevis, West Indies	0	0	0	0	0	0	0	0	0	0	0	0
St. Lucia	0	1	1	1	1	1	0	1	1	1	0	1
Sweden	0	0	0	0	0	0	0	0	0	0	0	0
Taiwan	0	0	0	0	0	0	0	0	0	0	0	0
Thailand	0	0	0	0	0	0	0	0	0	0	0	0
The Gambia	0	1	1	1	1	1	1	1	1	0	0	1
The Virgin Islands of the United States	0	0	0	0	0	0	0	0	0	0	0	0
Trinidad & Tobago West Indies	0	0	0	0	0	0	0	0	0	0	0	0
Tunisia	0	1	1	1	1	1	1	1	1	1	0	1
Tuvalu	0	0	0	0	0	0	0	0	0	0	0	0
United Kingdom	0	1	1	1	1	1	1	1	0	0	0	1
United States of America	0	0	0	0	0	0	0	0	0	0	0	0
W. Samoa	0	1	1	1	1	1	1	1	1	1	0	1
Yugoslavia	0	1	1	1	1	1	0	1	1	1	0	1
Zimbabwe	0	0	0	1	1	1	0	0	1	0	0	1
Number of Responses	2	39	44	41	41	44	27	33	33	31	3	52
Percent of Responses	2%	48%	54%	50%	50%	54%	33%	40%	40%	38%	4%	63%

Table A.6: Global Survey -- Ans. the following question only if applicable: Why did your org. or min. not collect env. information?

Country	A	B	C	D	E	F
Albania	0	0	0	0	0	0
American Samoa	0	0	0	0	0	0
Andorra	0	0	0	0	0	0
Argentina	0	1	0	1	1	0
Austraila	0	0	0	0	0	1
Austria	0	0	0	0	0	0
Bangladesh	0	0	0	0	0	0
Barbados	0	0	0	0	0	0
Belize, C.A.	0	0	0	0	0	0
Bermuda	0	0	0	0	0	1
Brasil	0	0	0	0	0	1
Canada	1	0	0	0	0	0
Chile	0	1	0	1	1	0
Columbia	1	1	0	1	1	0
Costa Rica	0	0	0	0	0	0
Croatia	0	0	0	0	0	0
Cyprus	0	0	0	0	0	0
Czech Republic	1	0	0	0	0	0
El Salvador	0	0	0	0	0	0
Ethiopia	1	0	0	0	0	0
Falkland Island	0	0	0	0	0	0
Fiji Islands	0	0	0	0	0	0
Finland	0	0	0	0	0	0
French Polynesia	0	0	0	0	0	0
Germany	1	0	0	0	0	0
Grenada, W.I.	0	1	1	1	0	0
Guam	0	0	0	0	0	1
Hugary	1	0	0	0	0	0
Iceland	0	0	0	0	0	0
Indonesia	0	0	0	0	0	0
Israel	0	0	0	0	0	0
Italy	1	0	0	0	0	0
Laos	0	1	1	1	0	1
Liechtenstein	0	1	1	1	1	0
Lithunia	0	0	0	0	0	0
Luxembourg	0	1	1	0	1	0
Macau	0	0	0	0	0	0
Malawi	0	0	0	0	0	0
Malta	0	0	0	0	0	0
Mauritius	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Mocambique	0	0	0	0	0	0

Table A.6: (continued)

Country	A	B	C	D	E	F
Myanmar	0	1	0	1	0	0
Namibia	0	0	0	0	0	0
Nepal	0	1	0	0	0	0
Netherlands	0	0	0	0	0	0
New Zealand	0	0	0	0	0	0
Norway	0	0	0	0	0	0
Nouvelle-Caledonie South Pacific	0	0	0	0	0	0
Pakistan	0	0	0	1	0	1
Panama	0	0	0	0	1	0
Papua New Guinea	0	1	1	1	1	0
Paraguay	0	0	0	1	0	0
Peru	0	0	0	0	0	0
Philippines	0	0	0	0	0	0
Portugal	0	0	0	0	0	0
Puerto Rico	0	0	0	0	0	0
Romania	0	0	0	0	0	0
Saint Vincent and the Grenadines	0	0	0	0	0	1
San Marino	1	0	0	0	0	0
Senegal, West Africa	0	0	0	0	0	0
Seychelles	0	0	1	1	0	0
Sierra Leone	0	1	1	0	0	0
Singapore	0	0	0	0	0	1
Solomon Islands	0	1	1	1	0	0
South Africa	0	0	0	0	0	0
Spain	0	1	0	0	1	0
St. Kitts and Nevis, West Indies	0	1	0	0	0	0
St. Lucia	0	0	0	0	0	0
Sweden	0	0	0	0	0	1
Taiwan	1	0	0	0	0	0
Thailand	0	1	1	0	1	0
The Gambia	0	0	0	0	0	0
The Virgin Islands of the United States	1	0	0	0	0	0
Trinidad & Tobago West Indies	0	1	0	0	0	0
Tunisia	0	0	0	0	0	0
Tuvalu	0	1	0	0	0	0
United Kingdom	0	0	0	0	0	0
United States of America	1	0	0	0	0	1
W. Samoa	0	0	0	0	0	0
Yugoslavia	0	0	0	0	0	0
Zimbabwe	0	0	0	0	0	0
Number of Responses	11	17	9	12	9	10
Percent of Responses	13%	21%	11%	15%	11%	12%

APPENDIX B
HOTEL SURVEY

Appendix B shows the response summaries of the hotel survey.

Table B.1: Hotel Survey -- Why did you locate in this area?

	1a) Attraction							
Hotel	1a) View	1a) Coast	1a) Mountains	1a) Wildlife	1a) Nature	1a) Forest	1a) National Park	1a) Water Feature
1 A	0	1	0	0	0	0	0	0
2 B	1	1	1	0	1	1	1	1
3 C	1	1	1	0	0	0	0	0
4 D	0	0	0	0	0	0	0	0
5 E	0	0	0	0	0	0	0	0
6 F	1	1	1	1	1	1	0	1
7 G	1	0	1	0	1	0	0	0
8 H	0	0	0	0	1	1	0	0
9 I	1	1	1	0	0	0	0	0
10 J	1	0	1	1	0	0	0	0
11 K	0	1	0	0	0	0	0	1
12 L	1	1	0	0	0	0	0	1
13 M	1	1	1	1	1	1	0	0
14 N	1	1	0	0	0	0	0	0
15 O	0	0	0	0	0	0	0	0
16 P	1	1	0	0	1	0	1	0
17 Q	0	0	0	0	0	0	0	0
18 R	0	0	1	0	0	0	0	0
19 S	1	0	0	0	0	0	0	1
20 T	0	1	0	0	0	0	0	0
Sum	11	11	8	3	6	4	2	5
Percent	55%	55%	40%	15%	30%	20%	10%	25%

Table B.1: (continued)

Hotel	1b) Infastructure						
	1b) Road	1b) Electricity	1b) Water	1b) Airport	1b) Boat Landing	1c) Ownership	1d) Labor
1 A	0	0	0	0	0	0	0
2 B	1	1	0	0	0	1	1
3 C	0	0	0	0	0	0	1
4 D	0	0	0	0	0	0	0
5 E	1	1	1	1	1	0	0
6 F	1	1	1	1	0	0	1
7 G	0	1	1	1	1	1	0
8 H	0	0	0	0	0	0	0
9 I	0	1	0	1	0	0	0
10 J	0	1	1	0	1	0	0
11 K	0	0	0	0	0	0	0
12 L	0	0	0	0	0	0	0
13 M	1	1	1	1	0	0	0
14 N	0	0	0	0	0	0	0
15 O	0	0	0	0	0	0	0
16 P	0	1	1	1	0	0	0
17 Q	0	0	0	0	0	0	0
18 R	0	0	0	0	0	0	0
19 S	1	0	0	0	0	0	0
20 T	0	0	0	0	0	0	0
Sum	5	8	6	6	3	2	3
Percent	25%	40%	30%	30%	15%	10%	15%

Table B.2: Hotel Survey -- Did you perform a feasibility study before you built this property?

Hotel	1 A	2 B	3 C	4 D	5 E	6 F	7 G	8 H	9 I	10 J	11 K	12 L	13 M	14 N	15 O	16 P	17 Q	18 R	19 S	20 T	Total	Total as a %
Feasibility Study	1	0	0	1	0	1	0	1	1	0	0	1	1	0	0	1	0	1	1	1	11	55%
Copy of Study available	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%

Table B.3: Hotel Survey -- What are the most important economic reasons for locating in this region?

Hotel	3a) #Rooms	3b)Average Room Rate	3c)Average Occupancy	3d) Occupancy (1=seasonal)	3e) Seasonal (1=high season, 0.5=partial month during high season)												
					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Sum
1 A	402	$60.00	67%	1	1	1	1	0.5	0	0	0	0	0	0	0.5	1	5.0
2 B	12	n/a	n/a	1	1	1	0	0	0	0	0	0	0	0	0	0	2.0
3 C	10	n/a	n/a	1	1	1	1	0	0	0	0	0	0	0	0	0.5	3.5
4 D	18	n/a	n/a	1	1	1	1	1	0	0	0	0	0	0	0.5	1	5.5
5 E	12	$35.00	n/a	1	-	-	-	-	-	-	-	-	-	-	-	-	n/a
6 F	20	$60.00	n/a	1	1	1	1	1	0	0	0	0	0	0	0	1	5.0
7 G	25	$110.00	38%	1	1	1	1	0.5	0	0	0	0	0	0	0	0.5	4.0
8 H	12	n/a	n/a	1	1	1	1	0.5	0	0	0	0	0	0	0	1	4.5
9 I	10	n/a	n/a	0	1	1	1	1	1	1	1	1	1	1	1	1	12.0
10 J	41	n/a	n/a	1	1	1	1	0	0	0	0	0	0	1	1	1	6.0
11 K	50	n/a	n/a	1	1	1	1	1	1	0	0	0	0	0	0	1	6.0
12 L	10	n/a	n/a	1	1	1	1	0.5	0	0	0	0	0	0	0.5	1	5.0
13 M	6	n/a	n/a	1	1	1	1	1	0	0	0	0	0	0	0	0.5	4.5
14 N	24	n/a	n/a	1	1	1	1	1	0	0	0	0	0	0	0	1	5.0
15 O	70	n/a	n/a	1	1	1	1	1	0	0	0	0	0	0	0	1	5.0
16 P	22	n/a	n/a	1	1	1	1	1	0	0	0	0	0	0	1	1	6.0
17 Q	32	n/a	n/a	1	1	1	1	1	0	0	0	0	0	0	0	1	5.0
18 R	24	n/a	n/a	1	1	1	1	1	0	0	0	0	0	0	0	1	5.0
19 S	28	n/a	n/a	1	1	1	1	1	1	0	0	0	0	0	0.5	1	6.5
20 T	135	n/a	n/a	1	1	1	1	1	0	1	0	0	0	0	0	1	6.0
Total	963	$265.00	1.05	19	19	19	18	14	3	2	1	1	1	2	5	16.5	102
Average	48	$53.00	53%	95%	1.0	1.0	0.9	0.7	0.2	0.1	0.1	0.1	0.1	0.1	0.3	0.9	5
Total Sample	561																
Average Sample	30																

Table B.3: (continued)

Hotel	3f, Average daily rate high season	3g, Average occupancy high season	3h, Average daily rate low season	3i, Average occupancy low season
1 A	$ 90	97%	$ 50	51%
2 B	$ 30	100%	$ 19	1%
3 C	$ 28	75%	$ 15	23%
4 D	$ 51	100%	$ 32	50%
5 E	$ 35	100%	$ 30	35%
6 F	$ 60	n/a	$ 60	n/a
7 G	$ 110	80%	$ 110	13%
8 H	$ 60	70%	$ 50	30%
9 I	$ 75	75%	$ 55	75%
10 J	$ 115	95%	$ 80	8%
11 K	$ 183	78%	$ 145	40%
12 L	$ 65	75%	$ 45	13%
13 M	$ 45	78%	$ 32	10%
14 N	$ 73	70%	$ 55	n/a
15 O	$ 133	98%	$ 115	60%
16 P	$ 115	75%	$ 85	30%
17 Q	$ 55	89%	$ 34	53%
18 R	$ 75	60%	$ 60	0%
19 S	$ 95	83%	$ 76	38%
20 T	$ 155	95%	$ 114	28%
Total	$ 1,648	15.93	$ 1,262	5.58
Average	$ 82	84%	$ 63	31%

Table B.3: (continued)

Hotel	3j)Hotel labor provided by			
	Local	Costa Rican nationals	Foreign	Country
1 A	77%	20%	3%	Argentina, Columbia, France, Spain
2 B	100%	0%	0%	
3 C	100%	0%	0%	
4 D	90%	5%	5%	
5 E	90%	0%	10%	Canada, Denmark, Italy, USA
6 F	90%	10%	0%	Italy
7 G	90%	40%	60%	Belgium, Spain, France
8 H	100%	0%	0%	
9 I	40%	60%	0%	
10 J	80%	18%	2%	Panama, USA
11 K	90%	10%	0%	Canada
12 L	100%	0%	0%	Germany
13 M	100%	0%	0%	Switzerland
14 N	97%	1%	2%	Italy
15 O	90%	10%	0%	
16 P	95%	0%	5%	Italy
17 Q	80%	15%	5%	Holland
18 R	90%	0%	10%	
19 S	90%	9%	1%	
20 T	80%	18%	2%	
Total	17.69	2.16	1.05	
Average	88%	11%	5%	

Table B.3: (continued)

Hotel	3k) Cost Per Room	3l)Debt Important (1=yes)	3m) Costa Rican Lender	3n) Foreign Lender (1=yes)	Origination of Funds
1 A	$75,000	1	0	1	Spain
2 B	$3,000	1	1	0	
3 C	$1,000	0	0	0	
4 D	$16,000	0	0	0	
5 E	$21,000	0	0	0	
6 F	$35,000	0	0	0	
7 G	$53,000	0	0	0	
8 H	n/a	0	0	0	
9 I	$39,000	0	0	0	
10 J	$6,000	0	0	0	
11 K	n/a	n/a	n/a	n/a	
12 L	$7,000	1	0	1	Germany
13 M	$33,000	0	0	1	
14 N	n/a	n/a	n/a	n/a	
15 O	n/a	0	0	0	
16 P	$12,000	n/a	n/a	n/a	
17 Q	$15,000	1	1	0	Holland
18 R	n/a	n/a	n/a	n/a	
19 S	$36,000	1	1	0	
20 T	$22,000	0	0	0	
Total	$374,000	5	3	3	
Average	$24,933	29%	18%	18%	

Table B.4: Hotel Survey -- What did you perceive as the impact of this hotel on the community?

Hotels	4) Impact on community (1= owner/operators believe they have an impact on the community)	Comments
1 A	1	Big impact, cattle farming in past, problems with communications&tran,only pack animals to move goods to market, people were poor, land was owned by one person, inc. in com. opp., now men,women & children work, #people increase 5x, 20% wages, small bus.
2 B	0	1 employee during the high season, the rest is family labor, the hotel is quite, people like it because it is cheap & clean, people like the hotel because it is made of wood- attractive, not crowded
3 C	1	favorable impact, generates employment, 4 people not including owner and manager, new construction is negative
4 D	1	Tourism is becoming more up-scale, restaurants need better food, quality of service needs to be better
5 E	1	employs 6 fulltime, 6 people building, environmental damage from leaky septic tank leaking into the river, more trash
6 F	1	labor and jobs, as tourism expands, local shops will benefit
7 G	1	great impact, people are farmers, the hotel offers a different kind of job
8 H	1	more jobs
9 I	0	none
10 J	1	built 8 yrs ago only thing here, very important because the teak plantation, locally, which used to employ 700 people now only employs 6 employees
11 K	1	good lots of jobs
12 L	0	jobs
13 M	1	local people can find work, and come to the bar
14 N	1	jobs, owners are very friendly with local people
15 O	1	excellent, jobs
16 P	1	Before they opened the artichoke was unknown, brought Mediteranean style, private club, personal service, small and beautiful decoration; Training, employees learn new way to serve client
17 Q	1	create jobs
18 R	0	???
19 S	1	destroy community, change culture, tourist bought all the land & separate, cocaine, prostitution, values of people changing
20 T	1	jobs and no negative impact
Total	16	
Percent	80%	

Table B.5: Hotel Survey -- Did you choose this location because of the community?

Hotel	1 A	2 B	3 C	4 D	5 E	6 F	7 G	8 H	9 I	10 J	11 K	12 L	13 M	14 N	15 O	16 P	17 Q	18 R	19 S	20 T	Total	Percent
5a) Location choice because of the community	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
5b) Location choice because of local labor availability	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	5%
5c) Location choice because of the friendliness of local people	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3	15%
5d) Location choice because of the lack of people	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5%
5e) Location choice because of local culture	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%

Table B.6: Hotel Survey -- What are the most important environmental reasons for building in this location?

	6a) Env. reason		6b) Land use before hotel							
Hotel	nature	beach	farm	resid-ential	forest	scrub	com-mercial	hotel	cattle	other
1 A	1	1	0	0	0	0	0	1	1	0
2 B	1	0	0	1	0	0	1	0	0	a restaurant was on the site for the pasted 5 yrs, owners will take it over this year
3 C	1	1	0	1	0	0	0	0	0	0
4 D	1	0	0	0	0	0	0	1	0	lawn
5 E	0	0	0	1	0	0	0	0	0	0
6 F	1	0	0	0	0	0	0	0	1	0
7 G	1	0	1	1	0	0	0	0	1	0
8 H	1	1	0	0	1	0	0	0	0	0
9 I	0	0	0	1	0	0	0	0	0	before residental the land use was pasture and cattle
10 J	0	0	0	0	1	0	0	0	0	0
11 K	0	1	0	1	1	0	0	0	0	0
12 L	0	1	0	1	0	0	0	0	0	0
13 M	1	1	0	0	0	1	0	0	0	0
14 N	1	0	1	0	0	0	0	0	0	0
15 O	1	1	0	0	0	0	0	0	0	beach & swamp
16 P	1	1	0	0	0	1	0	0	0	0
17 Q	0	0	0	0	0	0	1	0	0	restaurant
18 R	0	1	0	0	1	0	0	0	0	0
19 S	0	0	0	0	1	0	0	0	0	0
20 T	0	0	0	0	0	0	0	0	0	mangrove
Sum	11	9	2	7	5	2	2	2	3	0
Percent	55%	45%	10%	35%	25%	10%	10%	10%	15%	0

Table B.7: Hotel Survey -- Who comes to your hotel?

	7a) Region of origin							7b) Age of guests	
Hotel	Costa Rica	USA	Canada	Europe	Australia	Other	Comment		
1 A	30%	15%	15%	30%	0%	10%	Latin Americas	n/a	60% families, 20% couples, 20% singles
2 B	10%	40%	25%	0%	0%	25%	Italy	35	
3 C	0%	25%	35%	30%	0%	10%	Urugay, Argentina, Germany, Sweden, Italy	35	
4 D	5%	20%	20%	50%	0%	5%			
5 E	0%	20%	20%	30%	0%	30%	30% guests are from Germany	30	70% couples the rest families and individuals
6 F	n/a	n/a	n/a	n/a	n/a	n/a		n/a	
7 G	5%	60%	20%	10%	0%	5%		35	couples
8 H	5%	35%	0%	60%	0%	0%		45	
9 I	1%	70%	0%	0%	0%	29%		n/a	
10 J	0%	45%	0%	55%	0%	0%	Germany, Switzerland	n/a	
11 K	20%	25%	15%	35%	0%	5%	Germany, Italy, France	n/a	
12 L	8%	8%	8%	78%	0%	0%	70% Germany, 30% divided between Italy, US, Canada, Costa Rica	40	
13 M	n/a	n/a	n/a	n/a	n/a	n/a	Switzerland, Germany, USA mix	40	20-50 or 60
14 N	10%	60%	20%	10%	0%	0%	Europeans come in the dry season	35	30-40 surfers
15 O	n/a	n/a	n/a	n/a	n/a	n/a	5 of the 70 rooms are alloted, sold to charters, 6 to Great Britain, 14 to Germany, 25 to Canada	50	40-60 couples
16 P	0%	30%	30%	30%	0%	10%	Switzerland, Germany, Italy,small amount from France and Spain; In the beginning 50% USA and Canada, changing	40	
17 Q	20%	35%	10%	35%	0%	0%	Germany and Italy	n/a	
18 R	n/a	n/a	n/a	n/a	n/a	n/a	USA, Italy, International, Costa Rica	n/a	
19 S	40%	60%	0%	0%	0%	0%		n/a	65-70% package
20 T	0%	25%	25%	50%	0%	0%		n/a	
Total	1.5	5.7	2.4	5.0	0.0	1.3		385	
Average/ Percent	9%	34%	14%	30%	0%	8%		39	

Table B.7: (continued)

	7c) Why do guest come (1=positive response)			7d) Guest Surveys (1=positive response)	
Hotel	Nature	CR Reputation	Other	Response	Comment
1 A	1	1	cheape price, good value, weather in europe, germans have business in CR, name recognition in the rest of latin america	1	exit survey every 10 days
2 B	1	0	water fall, stream & beach, National Park 8km away, natural forest on property, Monkies walk up to guests, horse back riding	1	informal exit survey at checkout
3 C	0	0	calm place, good service, included breakfast, free coffee	0	
4 D	0	0		1	informal
5 E	0	0	close to beach, quite, comfortable, garden and hamocks		
6 F	1	0	beach, horses, Mediteranean and Italian food		
7 G	0	0	people want to rest "that's it"	1	
8 H	1	0	impact of location, birds wake you up, biodiversity, cheaper than other places	1	informal
9 I	0	0	calm atmosphere, peace	0	
10 J	1	0	since good roads people with less money can come, the place use to be a pollitical hideout, people come with their girl friend	1	in the room
11 K	n/a	n/a		0	
12 L	0	0	good agency in Germany, connection in ger	1	post card survey
13 M	0	0	like the viev, word of mouth	0	
14 N	0	0	surfing, views, horses, us agency that books surfing, Playa Nerongo in a nearby famous surfing beach	0	have comment book
15 O	0	0	7 days to rest as part of a 15 day package, to relax	1	how was it
16 P	0	0	TYamerendo offers almost everything, real community, nite life; There hotel creats something exclusive, good food, good care	1	constantly
17 Q	0	0	price	1	students are doing the surveys
18 R	0	0	to rest	0	
19 S	0	0	package deals 65-70%	1	to determine satisifacition of guests with operations
20 T	0	0	relax and go to the beach	1	
Total	5	1		12	
Average/ Percent	26%	5%		48%	

Table B.7: (continued)

Hotel	Overall Comments
1 A	developers need confidence that tourist can get to the property, ie negoating more ferry service; more space for development is important; leach field for waste disposal; Water quality very important
2 B	tourism is the only thing that works
3 C	
4 D	
5 E	
6 F	
7 G	5-6000 ha farm, upscale
8 H	located away from beach because it is a hastle, worried it could become a concrete city, continental breaks, july aug medimum season, Italians & other europeans, airport 3km away
9 I	swimming pool, the owner would like a 15000 dollar deposit and 2000 dollars per month, current tenant only pays a symbolic amount
10 J	
11 K	vilas sold and managed by management company
12 L	
13 M	
14 N	
15 O	insects and crabs are a problem
16 P	
17 Q	
18 R	
19 S	Drilled wells water level goes down and down, now 5-6M, 5yrs ago 2-3M, 11 yr old property, sell time share to CR bankers,
20 T	owners also own the Auora Holday Inn in San Jose

APPENDIX C
DATA DICTIONARY

Table C.1: Data Layers

File Name	Feature	Class	Column	Item Name	Width	Type	N.DEC
c_roads	Road	Lines	1	FNODE_	11	N	0
			12	TNODE_	11	N	0
			23	LPOLY_	11	N	0
			34	RPOLY_	11	N	0
			45	LENGTH	13	N	0
			58	C_ROADS_	11	N	0
			69	C_ROADS_ID	11	N	0
park08	National Conservation Areas	Polygons	1	AREA	13	N	6
			14	PERIMETER	13	N	6
			27	PARK08_	11	N	0
			38	PARK08_ID	11	N	0
c1_crlu	Land Use	Polygons	1	AREA	13	N	6
			14	PERIMETER	13	N	6
			27	C1_CRLU_	11	N	0
			38	C1_CRLU_ID	11	N	0
			49	USO92	11	N	0
			60	COVER	30	C	0
			90	FREQ1	11	N	0
			101	NATURE	11	N	0
			112	FQ1	11	N	0
c1_soils	Soil Type	Polygons	1	AREA	13	N	6
			14	PERIMETER	13	N	6
			27	C1_SOILS_	11	N	0
			38	C1_SOILS-I	11	N	0
			49	TIPO	10	C	0
			59	GRANGRUPO	1	C	0
			60	PCODE	2	N	0
			62	FREQ1	11	N	0
			73	UNIDAD_CAR	30	C	0
			103	MODIFICADO	20	C	0
			123	FAMILIA	16	C	0
			139	PROFUNDIDA	4	N	0
			143	DRENAJE	2	N	0
			145	FERTILIDAD	2	N	0
			147	CLASE	10	C	0
			157	PERFIL	7	C	0
			164	A_HORZ	3	N	0
			167	OM	5	N	1
			172	TEXT	5	C	0
			177	SILT	3	N	0
			180	CLAY	3	N	0
			183	STRUCT	2	N	0
			185	K	5	N	3
			190	K4	5	N	3
			195	FREQ5	11	N	0

Table C.2: Key to Data Layers

Characteristic	Description	Parameters	Characteristics
Item name	Internal name of a particular field	Up to 10 alphanumeric characters	Polygons: Default: AREA, PERIMETER, "Filename"_, "Filename"_ID User defined: Unlimited
	Internal name of a particular field	Up to 10 alphanumeric characters	Lines: Default: FNODE_, TNODE_, LPOLY_, RPOLY_, LENGTH, "Filename"_, "Filename"_ID User defined: Unlimited
Width	Size in term of # of "bytes"	1 character = 1 byte	
		Up to 256 Characters	1-256
		Up to 16 digits including decimals	1-16
Type	Character Number		C N

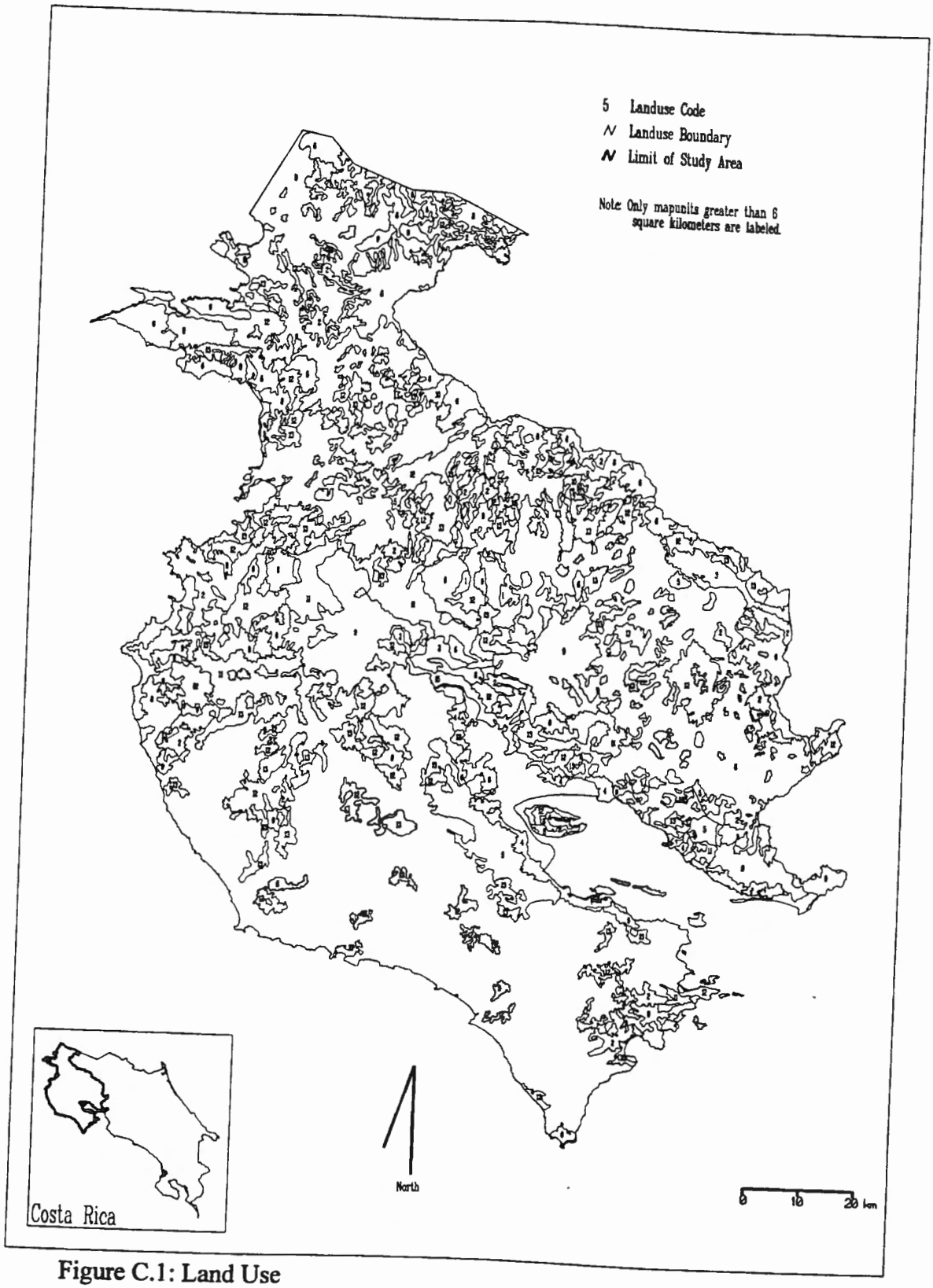

Figure C.1: Land Use

Table C.3: Land Use Key

Land Use Code	Land Use/Cover	Area Square Kilometers	Natural Land Use
1	burned areas	101	No
2	disturbed natural forest	674	Yes
3	lakes	69	Yes
4	mangroves	180	Yes
5	mixed pasture/crops	92	No
6	natural forest	970	Yes
7	ocean	0	No
8	pasture	3,287	No
9	permanent crops	939	No
10	rocky terrain	51	No
11	seasonal crops	530	No
12	secondary forest	1,588	Yes
13	tacotal	1,093	No
14	urban	29	No
15	wetlands	85	Yes

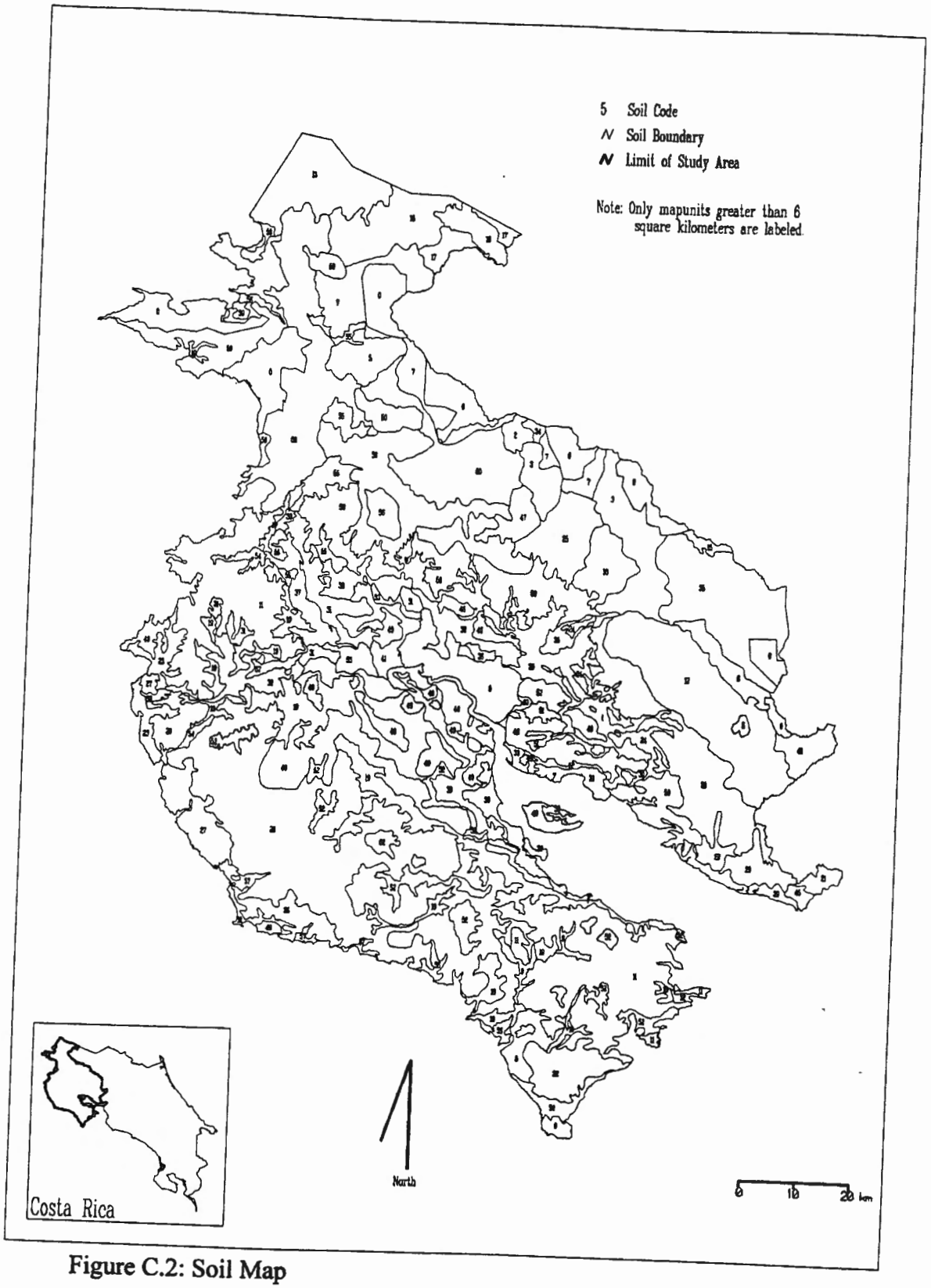

Figure C.2: Soil Map

Table C.4: Soil Key

Code	Great Group	Class	Suitable
1	Arguistoll	IIs_2c_3	yes
2	Dystrandept	II	yes
3	Dystrandept	IV	no
4	Dystrandept	IVe_1	no
5	Dystrandept	$IVs_{13}e_1$	no
6	Dystrandept	VI	no
7	Dystrandept	$VIs_{123}e_{12}$	no
8	Dystropept	$IIIs_{123}e_{12}$	yes
9	Dystropept	IIs_2h_2	yes
10	Dystropept	IVe_1	no
11	Dystropept	VII	no
12	Dystropept	$VIIe_{12}$	no
13	Dystropept	$VIs_{123}e_{12}$	no
14	Eutropept	II	yes
15	Haplohumult	$VIIs_2e_{12}$	no
16	Hapludult	$IIIs_{23}e_1$	yes
17	Hapludult	IVs_2e_1	no
18	Hapludult	$VIs_{23}e_1$	no
19	Haplustalf	II	yes
20	Haplustalf	$IIIs_{12}e_1$	yes
21	Haplustalf	$IIIs_{12}e_{12}$	yes
22	Haplustalf	$IIIs_{23}e_1c_3$	yes
23	Haplustalf	$IIIs_2e_1c_3$	yes
24	Haplustalf	$IIs_{23}e_1c_3$	yes
25	Haplustalf	$IVs_{123}e_1$	no
26	Haplustalf	$IVs_{23}e_1c_3$	no
27	Haplustalf	$IVs_2e_1c_3$	no
28	Haplustalf	$VIs_{123}e_{12}$	no
29	Haplustoll	II	yes
30	Haplustoll	IIs_2c_3	yes
31	Haplustoll	$IIs_2h_2c_3$	yes
32	Humitropept	II	yes
33	Humitropept	$IIIs_{123}e_1$	yes
34	Humitropept	$IIIs_2e_1$	yes
35	Hydrandept	VI	no
36	Pelludert	$IVs_{12}h_1c_3$	no
37	Pellustert	$IVs_{12}h_{12}c_3$	no
38	Pellustert	$IVs_{12}h_1c_3$	no
39	Sulfaquent	VIII	no
40	Tropaquent	$VIIIs_1h_{12}$	no
41	Tropaquept	$IIIs_{12}h_{12}$	yes
42	Tropaquept	$IVs_{12}h_{12}$	no
43	Tropaquept	$Vs_{12}h_{12}$	no
44	Tropopsamment	$VIIs_{12}$	no
45	Troporthent	VI	no
46	Troporthent	$VIIs_{123}e_{12}$	no
47	Troporthent	$VIIs_{13}e_{12}$	no
48	Ustorthent	VII	no
49	Ustorthent	$VIIIs_{13}e_{12}$	no
50	Ustorthent	$VIIs_{13}e_{12}$	no
51	Ustropept	II	yes
52	Ustropept	III	yes
53	Ustropept	$IIIs_{12}h_{12}$	yes
54	Ustropept	IIs_2	yes
55	Ustropept	IIs_2e_1	yes
56	Ustropept	IIs_2h_1	yes
57	Ustropept	IIs_2h_{12}	yes
58	Ustropept	$IVs_{13}e_1$	no
59	Ustropept	$VIIs_{13}e_{12}$	no

Table C.5: Key to Soil Classes

Class	Categories of Parameters													
	Erosion		Soils						Drainage		Climate			
	Slope (%)	Long -term Erosion	Effective Depth (cm)	Texture s_2 *** Soil 0-30cm	Texture s_2 *** Subsoil >30cm	Rockie-ness	Fertility	Toxicity s5 Salinity s_6	Drainage	Risk of Inundation	Life Zone	Dry Season	Mist	Wind
	e_1	e_2	s_1			s_3	s_4		d_1	d_2	c_1	c_2	c_3	c_4
I	<3	None	>120	Medium	Moderately coarse to moderately fine	No rocks	High	Slightly toxic Slightly saline	Good	None	bh-P bh-T bh-MB	Moderate	Absent	Absent
II	<8	None to slight	>90	Moderately fine to moderately coarse	Fine to moderately coarse	No rocks to slightly rocky	Medium to high	Slightly toxic Slightly saline	Moderately excessive to moderately slow	None to slight	All except rains and bmh	Any	Absent to moderate	Absent to moderate
III	<3	None to slight	>90	Fine to very fine	Fine to very fine	No rocks to slightly rocky	High	Slightly toxic Slightly saline	Moderately slow to slow	None to moderate	bs-P bh-T bh-P	Strong	Absent	Absent to moderate
	<15	None to moderate	>60	Fine to moderately coarse	Fine to moderately coarse	No rocks to moderately rocky	Medium to high	Moderately toxic Slightly saline	Moderately excessive to moderately slow	None to moderate	All except rains	Any	Absent to moderate	Absent to moderate
IV *	<30	None to moderate	>60	Very fine to moderately coarse	Very fine to moderately coarse	No rocks to rocky	Medium to high	Moderately toxic Slightly saline	Moderately slow to moderately excessive	None to moderate	All except Paramo, bmh M and bp-M	Any	Absent to moderate	Absent to moderate
V **	<15	None to moderate	>30	Any	Any	No rocks to strongly rocky	Any	Strongly toxic Moderately saline	Very slow to excessive	None to severe	All except Paramo	Any	Absent to strong	Absent to strong
	<30	None to moderate	>30	Moderately coarse to fine	Any	No rocks to strongly rocky	Any	Strongly toxic Moderately saline	Very slow to excessive	None to severe	All except rains and bmh-T	Any	Absent to strong	Absent to strong
VI	<50	None to severe	>60	Any	Any except coarse	No rocks to strongly rocky	Any	Strongly toxic Moderately saline	Moderately excessive to moderately slow	None to moderate	All except Paramo	Any	Absent to moderate	Absent to moderate
VII	<75	None to severe	>30	Any	Any	No rocks to strongly rocky	Any	Any	Any	Any	All except Paramo	Any	Any	Any
VIII	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any

* Rainy climate permits annual cultivation in this class.

** This class is suitable for permanent cultivation only when the effective depth is more than 60 cm and does not have wind or strong mist problems.

*** Sandy texture throughout the entire profile (ie: Psamments), is classified as Class VIII .

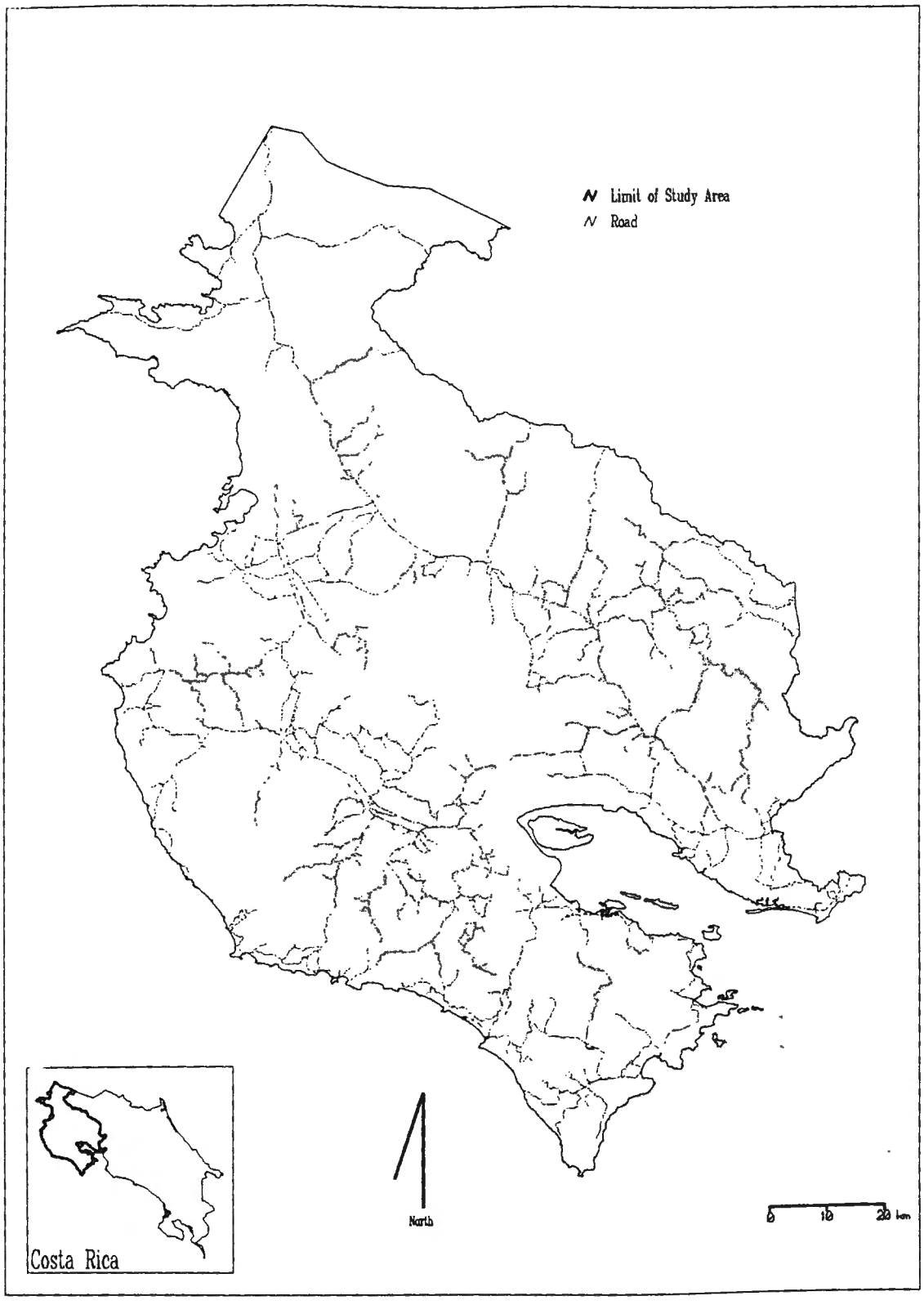

Figure C.3: Roads

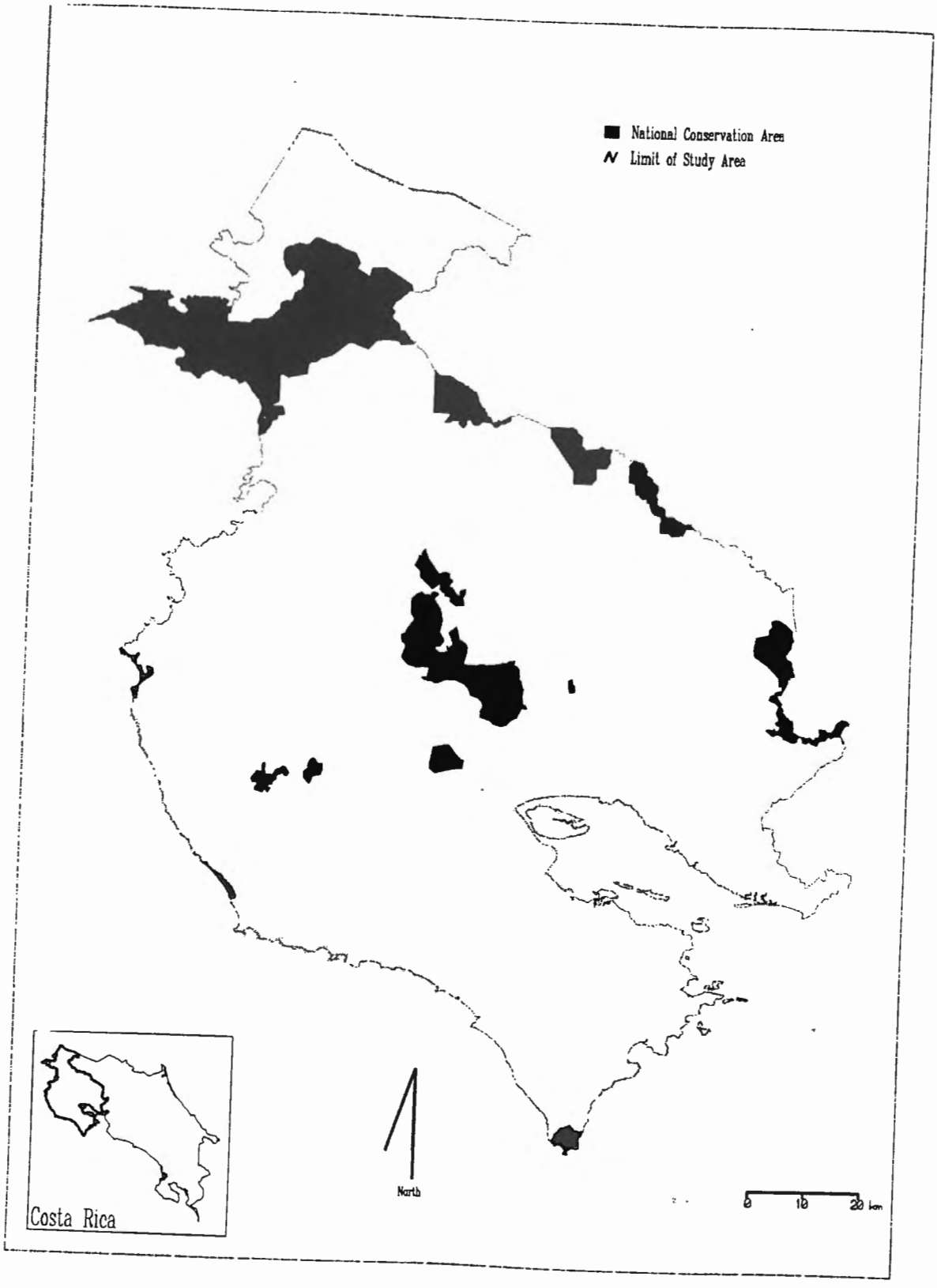

Figure C.4: National Conservation Areas

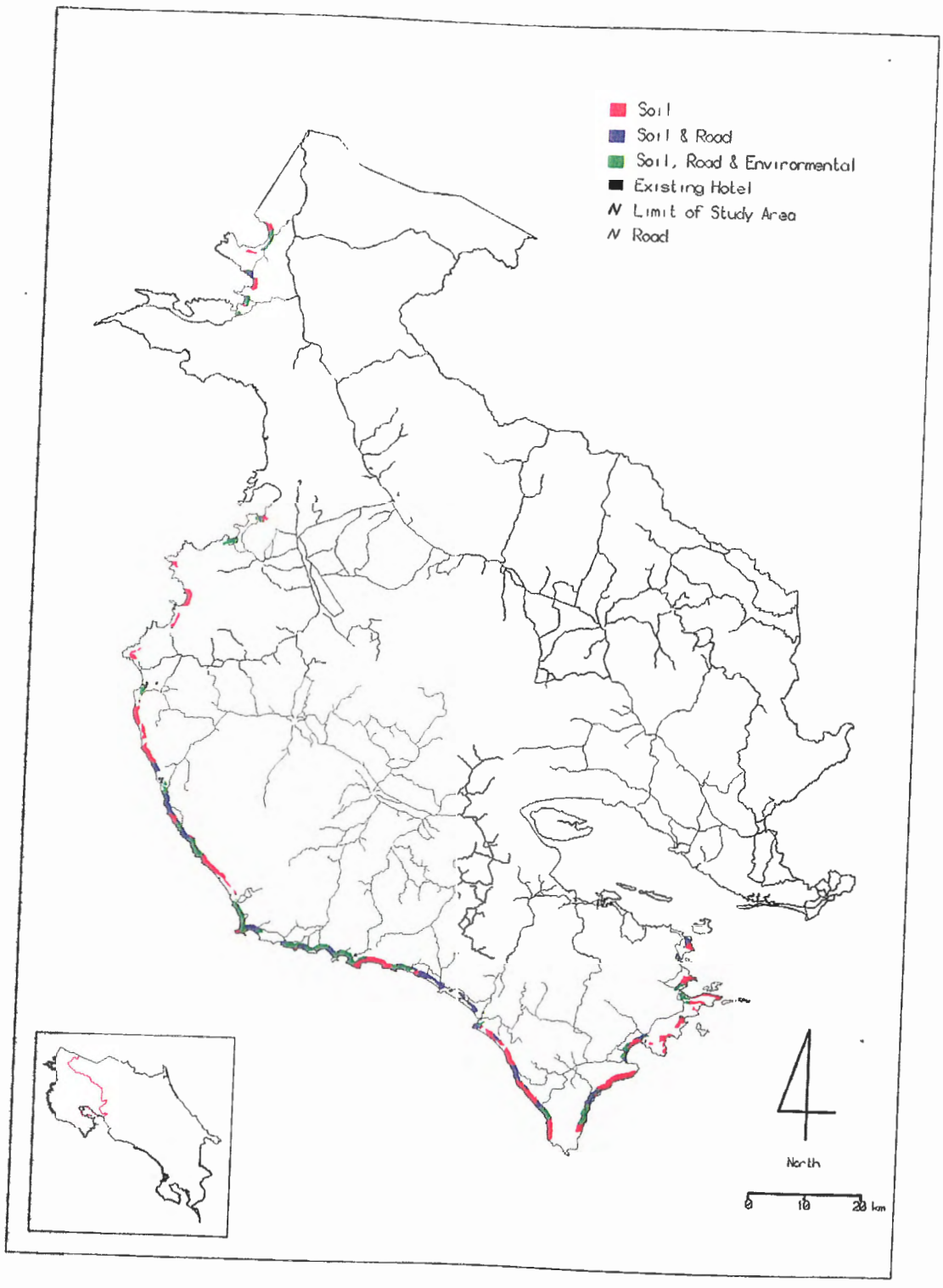

Figure C.5: Nicoya Peninsula

Table C.6: Costa Rica Lambert North Reference System

projection	Lambert Conformal Conic
datum	NAD 27
ellipsoid	Clarke 1866
major s-ax	6378206.4
origin long	-84.333333
origin lat	10.466667
origin x	500000
origin y	271820.522
scale fac	0.99995696
units	meters
stand in 1	9.933333
stand in 2	11

APPENDIX D
CASE STUDY CONTEXT

BACKGROUND

The area of the case study in North Western Cost Rica is filled with tourism attractions. The three main attractions are beaches, sport fishing and land availability. Figure D.1 shows the wide open areas, beautiful beaches and interesting land forms, which are part of the Costa Rican coastal area. Figure D.2 shows further coastal attractions including tourism development along a coastal road. Figure D.3 portrays a harbor with sport fishing boats moored at the end of a busy day.

Risks to tourism development accompany the many tourist attractions. Risks include flooding, impacts on the host community, degradation of water quality, and loss of habitat for Costa Rica's unique flora and fauna. Figure D.4 depicts coastal flooding of an access road to existing hotels. Some of the host community's living conditions are shown in Figure D.5. The loss of coastal lands by host communities can plant a seed of resentment between hotel developers and the host community who are selling out their coastal land resources.

Development of coastal hotels in the region has occurred, few of which have adopted a Costa Rican style. Figure D.6 depicts a coastal hotel with a swim-up bar. Hotels which are part of larger ranches in the region are illustrated in Figure D.7, which depicts a hillside coastal hotel. Figure D.8 displays a coastal hotel developed in a Mediterranean style. And Figure D.9 show a hotel developed in a South Pacific style. While international style resort are prevalent globally, adopting a local architecture and design allows for a distinctive Costa Rican product to emerge. This can offer a competitive advantage in a global tourism market, where visitors are likely to seek out a tourism product which exhibits features of local culture. This sense of place can be created using architecture, site design, furnishings, and cuisine.

These images are included to give the reader a visual sense of the region. It is the intent for these images to add a sense of place and an illustration of the resources, the risks, and small town resort land utilization type.

Figure D.1: Nicoya Peninsula - Beach

Figure D.2: Nicoya Peninsula - Coastal Development

Figure D.3: Nicoya Peninsula - Anchorage

Figure D.4: Nicoya Peninsula - Coastal Flooding

Figure D.5: Nicoya Peninsula - Existing Host Population

Figure D.6: Nicoya Peninsula - Coastal Hotel With Swim-up Bar

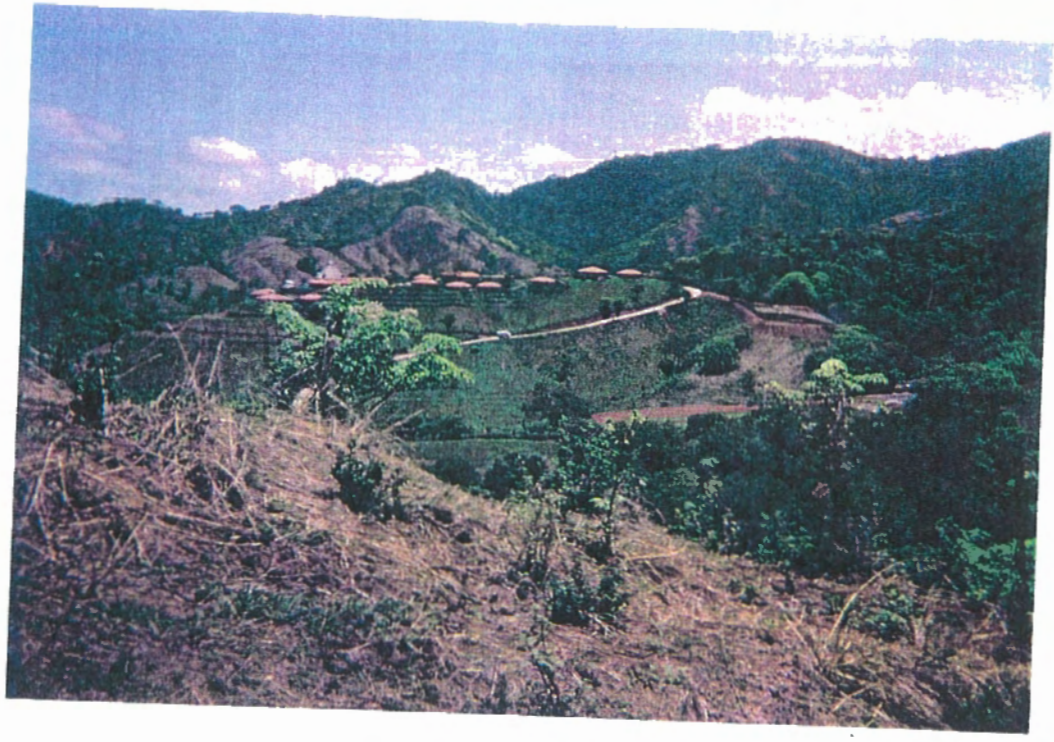

Figure D.7: Nicoya Peninsula - Hillside Coastal Hotel

Figure D.8: Nicoya Peninsula - Mediterranean Style Coastal Hotel

Figure D.9: Nicoya Peninsula - South Pacific Style Coastal Hotel